4-22-2016

The Scientific Conquest of New Mexico: Local Legacies of the Manhattan Project 1942-2015

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UNIVERSITÉ DE GRENOBLE

THÈSE

Pour obtenir le grade de

DOCTEUR DE L'UNIVERSITÉ DE GRENOBLE

Spécialité: **Langues, Littératures et Sciences Humaines/ Études Anglophones**

Arrêté ministériel: 7 août 2006

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préparée au sein du **Laboratoire ILCEA4** dans **l'École Doctorale Langues Littératures et Sciences Humaines— ED 0050**

La conquête scientifique du Nouveau-Mexique: héritage local du Projet Manhattan 1942-2015

Thèse soutenue publiquement le **18 septembre 2015** devant le jury composé de:

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THE SCIENTIFIC CONQUEST OF NEW MEXICO: LOCAL LEGACIES OF THE MANHATTAN PROJECT 1942-2015

by

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DISSERTATION

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

American Studies

Université Stendhal Grenoble 3

Grenoble, France

September, 2015

Direction de la Recherche

Commission de la Recherche
Compte rendu du 12 juin 2014
Séance restreinte aux enseignants-chercheurs élus – Extrait de déliberation

Étaient présents : Daniel lançon, Stéphane Macé, Bertrand Vibert, Malika Bastin-Hammou, Filippo Fonio.

Etaient excusés : Bertrand Cabedoche, Jean-Pierre Chevrot (représenté par Daniel Lançon) ; Catherine Delmas, François Genton (représenté par Bertrand Vibert) ; Francis Grossmann (représenté par Daniel Lançon), Isabelle Krzywkowski, Chantal Massol, Marinette Matthey, Isabelle Pailliart, Benoit Lafon, Solange Rossato.

Point N° 3 : **Demande de dérogation pour la rédaction de thèses en anglais**

- Demande de dérogation de Madame Lucie Genay, directrice de thèse : Madame Berthier. La Commission de la Recherche accorde, à l'unanimité, une dérogation pour la rédaction en anglais de sa thèse à Madame Lucie Genay.

Saint Martin d'Hères, le 12 juin 2014

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CONSEIL DE L'ECOLE DOCTORALE

Extrait de compte rendu de la séance du conseil du 27 mars 2014

Le Conseil de l'école doctorale LLSH s'est réuni le jeudi 27 mars 2014 sur convocation de la Directrice de l'école doctorale.

Point à l'ordre du jour : demande de rédaction de thèse en anglais

Ordre du jour :

1. **Demande de rédaction de thèse en anglais**

Lucie Genay : avis favorable car la doctorante envisage une carrière aux Etats Unis.

Saint-Martin-d'Hères, le 27 mars 2014

La Directrice de l'école doctorale

Catherine DELMAS

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ACKNOWLEDGEMENTS

I am grateful to many people who helped and supported me during my research in New Mexico; their cooperation, their assistance, their counsel, and their friendship brought this project to a successful conclusion. I would like to particularly thank M. García y Griego, who was my professor at the University of New Mexico (UNM) when I was an exchange student in 2008-2009, for agreeing to take part in my doctorate. His political history class was one of the most enthralling and challenging courses I have attended. His acknowledgement of my perseverance at the end of the semester was especially rewarding. In the fall of 2012, during my first research trip to New Mexico, I presented him my doctoral project; the advice he offered and the questions he asked allowed me to build solid foundations for my thesis.

I also wish to heartily thank M. Gerald Vizenor, who was also my professor at UNM in 2008, and to whom I am greatly indebted. His course on the Manhattan Project inspired me to work on the topic; his encouragements and advice were invaluable. Other UNM professors were involved in my research; they met with me to discuss the viability and relevance of my arguments, and they kindly shared their ideas on my project. Thus, I would like to express my gratitude to history professors Margaret Connell-Szasz, Louis Campo, and Charlie Steen, Dean of the History Department.

For their professionalism, kindness, and precious knowledge of archival collections, I would like to thank all the staff of the Center for Southwest Research; particularly Mike Kelly, Nancy Brown-Martinez, Christopher Geherin, Claire-Lise Benand, and Ann Massman. For the wonderful working conditions that they offer for visiting researchers, I would like to thank UNM, the Zimmerman Library, the Centennial Science and Engineering Library, the Parish Memorial Library, and the Fine Arts and Design Library. I deeply appreciate the helpfulness of all who assisted me at the Indian Pueblo Cultural Center and the National Museum of Nuclear Science and History in Albuquerque; at the J. Robert Oppenheimer Study Center and the Mesa Public Library in Los Alamos; and at the New Mexico State Records Center and Archives and the Fray Angélico Chávez History Library and Archives in Santa Fe. I must single out M. Peter Malmgren, director of the “Los Alamos Revisited” program, who generously took the time to explain his opinion and his own research projects to me.

Finally, I am most indebted to all the New Mexicans I met and presented my work to. Too many offered their help to name here, but I owe special thanks to Naomi Archuleta, Darryl Martinez, and the McCormick family in Los Alamos. For their friendship, their unfailing support, their precious advice and ideas, and, for some of them, their company on

research trips, I would like to thank my friends from the “Land of Entrapment”: Cheryl, Paul, Kevin, Justin, Romain, Andra, Saskia, Fernando, Juan, Julia, Tyler, and Nick. Special thanks go to my doctoral colleague and good friend Morgan LaBin Velaruz, to Kevin Brown for his valuable insights, and to my wonderful editors: my friend and former professor at UNM, Lynn Beene, my American-Briton friend, Austin Hancock, and my long-time friend, Kevin Shelden.

REMERCIEMENTS

Je souhaite tout d’abord exprimer ma gratitude à ma directrice, Mme Berthier-Foglar, qui me connait et me soutient indéfectiblement depuis ma troisième année de licence à l’Université de Savoie. Elle m’a guidée dans mes démarches pour partir au Nouveau-Mexique pour la première fois lors de mon Master et a dirigé mon mémoire de recherche sur les scientifiques qui ont participé au Projet Manhattan. Elle a joué un rôle essentiel dans mon choix de travailler sur cet État. Durant les quatre dernières années, elle a dirigé ma thèse et mon parcours doctoral d’une manière qui m’a toujours permis d’aller plus loin dans ma réflexion, de retrouver le bon chemin lorsque je me perdais et de construire solidement chaque étape de mon doctorat. Son expérience a été mon premier soutien et un repère qui m’ont permis d’aller au bout de mon projet et de mes idées.

J’adresse mes remerciements aux membres de mon jury de thèse, M. Genton et M. Frayssé, pour l’intérêt qu’ils portent à mon travail et pour leur avis éclairé sur ma recherche; et je suis particulièrement reconnaissante à M. Kempf qui était mon professeur à l’Université Lumière Lyon 2 lors de mon année de préparation au concours de l’agrégation et qui m’a apporté son écoute et son conseil au moment de faire le choix de me lancer dans un doctorat.

Mes remerciements vont également à l’Université Stendhal de Grenoble, à l’École Doctorale Langues Littératures et Sciences Humaines et au laboratoire ILCEA4 dont fait partie le groupe CEMRA, pour leur générosité, les formations et l’encadrement qu’ils fournissent aux doctorants. Cette structure m’a permis de présenter mes travaux dans des colloques et autres manifestations scientifiques en France et à l’étranger, et m’a aidé à financer mes recherches aux États-Unis. Je remercie également l’Université de Savoie et le laboratoire Langages, Littératures et Sociétés où j’ai commencé mon doctorat. Que soient également remerciées l’Université de Savoie, la Galerie Eurêka à Chambéry et l’Université de Caen Basse Normandie pour m’avoir offert la possibilité de financer ces quatre années de recherche. Merci beaucoup à l’Association Française des Études Américaines pour la bourse

de thèse qu'elle m'a octroyée en 2012 et pour leur travail de communication si précieux pour la communauté scientifique.

Il me reste à exprimer toute ma gratitude à mon entourage, sans qui cette thèse n'aurait pu voir le jour. Merci du fond du cœur à toute ma famille pour l'affection et les encouragements qu'ils m'ont tous apportés; je remercie tout particulièrement ma grand-mère, Mamema, mes parents, Elisabeth et Claude, ma sœur, Christel, et mon compagnon, Guillaume, qui ont été mes « piliers », une source intarissable de réconfort et d'énergie au cours de cette aventure. Merci à mes amis d'Alsace, à mes amis de longue date, à ceux de mes voyages, à ceux du monde universitaire et à ceux du badminton qui m'ont aidée à décompresser dans les moments opportuns. Qu'ils sachent combien leur soutien et leur amitié m'ont été précieux.

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LIST OF ACRONYMS

AEC	Atomic Energy Commission
AFB	Air Force Base
ALAS	Association of Los Alamos Scientists
ALO	Albuquerque Operations Office
AT & SF	Atchison, Topeka and Santa Fe Railroad
AT & T	American Telephone and Telegraph
BTL	Bell Telephone Laboratories
CCC	Civilian Conservation Corps
CLER	Citizens for LANL Employee Rights
CCNS	Concerned Citizens for Nuclear Safety
CIC	Counter-Intelligence Corps
DOD	Department of Defense
DOE	Department of Energy
EIS	Environmental Impact Statement
ENDAUM	Eastern Navajo Diné Against Uranium Mining
EPA	Environmental Protection Agency
ERDA	Energy Research and Development Administration
FAS	Federation of Atomic Scientists
FBI	Federal Bureau of Investigation
GNEP	Global Nuclear Energy Partnership
GTCC	Greater-Than-Class C
HOME	Healing Ourselves and Mother Earth
ICBM	Intercontinental Ballistic Missile
ICRP	International Commission on Radiological Protection
IFNEC	International Framework for Nuclear Energy Cooperation
ISL	In Situ Leach
LAHDRA	Los Alamos Historical Document Retrieval and Assessment
LANL	Los Alamos National Laboratory
LARS	Los Alamos Ranch School
LASL	Los Alamos Scientific Laboratory
MASE	Multi-Cultural Alliance for a Safe Environment
MED	Manhattan Engineering District
MIT	Massachusetts Institute of Technology
NASA	National Aeronautics and Space Administration
NCRP	National Council on Radiation Protection and Measurements
NPL	National Priorities List
NMED	New Mexico Environment Department
NMSM	New Mexico School of Mines
NMSU	New Mexico State University
NNSA	National Nuclear Safety Administration
NRC	Nuclear Regulatory Commission
NRC	National Research Council
NTS	Nevada Test Site
OFCCP	Office of Federal Contract Compliance Programs

ORNL	Oak Ridge National Laboratories
R & D	Research and Development
RECA	Radiation Exposure Compensation Act
REM	Roentgen Equivalent Man
SM	Staff Member
SNL	Sandia National Laboratory
TEC	Technician
TERA	Terminal Effects Research and Analysis group
UNM	University of New Mexico
URI	Uranium Resources Inc.
WIPP	Waste Isolation Pilot Plan
WPA	Works Progress Administration
WSMR	White Sands Missile Range
WSPG	White Sands Proving Grounds

À Pabeba.

GENERAL INTRODUCTION

The land, flora, fauna, and peoples of New Mexico were the witnesses of the birth of the atomic age at 5:30 am on July 16, 1945, when the world's first atomic bomb exploded in the *Jornada del Muerto*[1] desert. This explosion climaxed the Manhattan Project: a two-billion-dollar atomic research and weapons production complex undertaken by the United States Army Corps of Engineers—in cooperation with the United Kingdom and Canada—during the Second World War. Less than a month after this first blast, the descendants of the Trinity test "Gadget"[2] practically annihilated the Japanese cities of Hiroshima and Nagasaki, revealing to the rest of the world the existence of atomic bombs. In the United States, the Manhattan Project is foremost recollected with patriotic pride as the enterprise that saved the free world from fascism. The scientists who participated in the Project[3] were celebrated as the heroes who put an end to the War after President Truman announced the Hiroshima bombing on the radio. They had fought "the battle of the laboratories" in the shadow of secrecy, on the frontier of science, and they had conquered the mysteries of atomic energy in the name of national security.[4] The Manhattan Project was immediately recognized as the greatest scientific undertaking—or "gamble," in Truman's words—of history that mobilized close to 129,000 men and women across the U.S.[5]

Although the date of July 16, 1945, does not bear the same significance in collective memory as the Japanese bombings, it is immensely significant in global history for ushering in a new era; an era in which men acquired the capacity to destroy themselves manifold; an era which introduced a new seemingly inexhaustible source of energy that fostered many dreams; and an era which transformed regions of the world into dominions of the nuclear industry. New Mexico, the "Land of Enchantment," acquired a new identity during World

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[1] The name of the desert means "journey of the dead man" in reference to the Spanish explorers and travelers who died of thirst or Apache Indian attack on that particular track of *El Camino Real* (the King's Highway), which connected Spanish missions in the Southwest.

[2] The plutonium bomb tested at Trinity in July 1945 was dubbed the "Gadget." It was an implosion plutonium bomb like the one later used at Nagasaki. Its detonation system was more complex than the gun-type uranium bomb used in Hiroshima and, therefore, required testing.

[3] When referring to the Manhattan Project—both the national undertaking and its local component at Los Alamos—the word "project" will be capitalized. "Laboratory" will also be capitalized when referring to the Los Alamos Laboratories, which also often appears in its singular form, or to the Sandia Laboratories.

[4] Harry S. Truman, "Statement by the President of the United States, The White House, Washington, DC, August 6, 1945." Harry S. Truman Library, Papers of Eben A. Ayers, Box 4, Army press notes, *American Experience*, Arlington, VA: Public Broadcasting Service (PBS), 1995-2015, http://www.pbs.org/wgbh/americanexperience/features/primary-resources/truman-hiroshima/, accessed November 8, 2012.

[5] Vincent C. Jones, *Manhattan, the Army and the Atomic Bomb*, Washington, DC: Center of Military History, U.S. Army: For sale by the Supt of Docs, U.S. G.P.O., 1985, 34.

War II as the cradle of the nuclear age, and underwent a phenomenal transformation as a result of the arrival of science in its remotest lands. The Manhattan Project initiated what I define as New Mexico's third conquest—after the Spanish and American conquests; a scientific conquest that led this young American state on the path to becoming a nuclear Eldorado, dragging along local populations who both gained and lost from their bond with nuclear science.

In 1942, Manhattan Project sites mushroomed in the four corners of the country. In the American West, these sites increased the militarization of the region and served as a vector for the Federal Government to weave a tight web of control over some of these long-discarded areas. The sites also formed the skeleton of what was to become a huge military-industrial complex and the spearhead of America's nuclear strategy during the Cold War against the Soviet Union. In October 1942, the Project leaders were looking for a locale to centralize the research being conducted in university labs all around the country and in the U.K. and where scientists could work on solutions for specific problems in the building of the bomb. The development, final processing, assembly, and testing of the bomb would be conducted at project Y on an isolated *mesa*[6] in northern New Mexico. The future of the state was sealed on November 16, 1942; this future as a recipient of a nuclear panacea was to break the state's isolation and its cycle of reliance on agricultural and pastoral activities. On this unassuming day, J. Robert Oppenheimer, scientific director of project Y, suggested to his military counterpart, General Leslie Groves, that the secluded Los Alamos Ranch School (LARS) on the Pajarito Plateau would be an adequate location for the establishment of a secret atomic laboratory. On February 7, 1943, the Manhattan Engineering District took official possession of the Ranch School in "the interests of the United States in the prosecution of the War," and waves of scientists and soldiers started flooding in.[7]

Physicist John Manley describes the scientists' arrival in one of the remotest places in the country as "a new civilization colonizing this Pajarito Plateau of northern New Mexico, some 800 years after the first-known permanent inhabitants of this particular region, the Keres

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[6] A *mesa* is a mountain that has a flat top and steep sides.

[7] Henry L. Stimson, Secretary of War, "Los Alamos Ranch School Seizure Letter," correspondence to Albert J. Connell, Director of Los Alamos Ranch School, December 1, 1942. The full letter is available on wikisource, creative commons. http://commons.wikimedia.org/wiki/File:Los_Alamos_Ranch_School_Seizure_Letter.jpg accessed April 12, 2014.

people, came to this plateau about 1150."[8] Their arrival was indeed the nascence of a new form of scientific conquest that was justified by the momentousness of the scientists' mission. It was originally estimated that three hundred people would be enough to do the job, but the population soon doubled, tripled, and quadrupled, making the need for more housing and more space a top priority. By the summer of 1945, the community had reached six thousand people.[9]

In the months following the completion of the scientific mission, a massive exodus affected Los Alamos. Scientists were eager to go back to their academic careers and to put the barbed wire of the scientific army post behind them. The pressing question the heads of the Manhattan Engineering District (MED) had to answer in the aftermath of the War was what would become of the laboratory on "the Hill?" The present face of New Mexico would inevitably be radically different if the Pajarito Plateau had been deserted by this new civilization of scientists and restored to its state of utter isolation. Instead, the scientific conquest marched on and spread to other parts of New Mexico, bringing phenomenal changes in its wake. The local impact of the Manhattan Project goes far beyond the limits of the town of Los Alamos; it is a multifaceted legacy and an ongoing process. Today, the wartime Project's offspring can be mapped out throughout New Mexico: two national laboratories (Los Alamos and Sandia in Albuquerque), three test sites (Trinity, Gasbuggy, and Gnome), three Air Force bases (Holloman, Kirtland, and Clovis), waste disposal sites (at the National Laboratories and at the Waste Isolation Pilot Plant in Carlsbad), nuclear reactors, nuclear weapon storage sites (such as the one in the Manzano Mountains), the remains of uranium mining and milling in the Grants region, the country's largest military installation of White Sands Missile Range (WSMR), and additional military reservations. Thus, over the decades following the creation of site Y, the budding scientific community in the Jemez Mountains not only grew to become the Los Alamos National Laboratories (LANL) and a ten-thousand-inhabitant town; it also had a momentous impact on the surrounding region. The Laboratories acted as catalysts for an influx of scientific colonization, as they produced extensions and partner institutions along the Rio Grande River. This development flooded the region with

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[8] John Manley, "A New Laboratory is Born," in Lawrence Badash, Joseph O. Hirschfelder, and Herbert P. Broida, eds., *Reminiscences of Los Alamos, 1943-1945*, Dordrecht, Holland: D. Reidel Publishing Company, 1980, 32.

[9] Jon Hunner, *Inventing Los Alamos: The Growth of an Atomic Community*, Norman, OK: University of Oklahoma Press, 2004, 38.

employment opportunities that were new and different from the types of occupations previously known to the residents of New Mexico.

This dissertation retraces the story of this scientific colonization from the point of view of those who have often been cast aside to the margins of official histories: the local people. In the 1940s, local Pueblo Indians, Hispanic farmers, Mexican immigrants, and Anglo[10] ranchers extensively relied on agro-pastoral activities for sustenance and lived on the fringe of industrialized America. Many of these locals' lives were drastically altered by the development of the nuclear economy. The current socio-economic, demographic, and environmental situation of New Mexico is considerably correlated to the history of the Manhattan Project. In fact, the arrival of atomic science during the course of the Second World War revolutionized this remote, generally ignored land in the American West, and resulted in the development of a federally-sponsored nuclear and high-technology complex.

1. Assessment of the transformation of New Mexico

In the initial scoping phase of this research project, the main question I used for guidance was "to what extent and how did the Manhattan Project impact New Mexico and New Mexicans?" My first objective was to assess the magnitude of the state's transformation before addressing the other questions that soon ensued from this original reflection. A brief historical review of the state's transformation will introduce these questions, and comparing pre-World War II and post-Cold War New Mexico will justify the term "revolutionized" I used above.

When New Mexico acquired American statehood in 1912, the effects of its extended status as a territory for 64 years were apparent. The pivotal factor leading to the reshaping of the region into a member of the United States was the growing influx of Anglo-American settlers, which was facilitated by the railroad after the arrival of the first passenger train into the territory on the line of the Atchison, Topeka, and Santa Fe Railroad in 1879. Nonetheless, the "Americanization" of New Mexico was a rather sluggish process; hindered and slowed down by the hardships of life in the desert, the pace of this "Americanization" was in accord with the region's history of successive conquests and settlements. In the 1940s, most of the local population lived in a secluded world organized in self-sustaining villages, a few mining towns, and the larger cities of Albuquerque and Santa Fe. The new measures of wealth introduced by the Industrial Revolution—such as capital and means of production

[10] *Anglo* or *Anglos* refer to white Americans who are not of Spanish descent.

ownership—had not yet reached parts of this pre-industrial world. Land, the former equivalent of these measures, was still sought by many New Mexico inhabitants.[11] In the three main cultures represented in the state—Hispanics, Anglos, and Indians—land ownership was pre-eminently significant because many families saw working the land as their main, and sometimes only, livelihood to provide revenues and daily necessities. Therefore, most occupations centered on the exploitation of the desert's limited resources. In northern New Mexico for example, where the contrast with the new postwar economy was most visible, Hispanic villagers and Pueblo Indians used the land for most aspects of daily life. The family land would go from father to son, and the transmission included the knowledge of how to work the land, how to water from the *acequias*,[12] and live to the rhythm of the seasons. The use of varying farming techniques, including dry, floodwater, and irrigation farming to counter climatic difficulties, were demanding both in manpower and time, and gave the villages' life a tempo in tune with the seasons. Even after the turn of the century, very few kitchen staples were not locally produced because villagers either grew or bartered for their food, and, therefore, the self-sustaining communities of New Mexico seldom used money in transactions.[13]

In 1930, 59% of the total New Mexican employed population was employed in agriculture.[14] Yet, land ownership was often insufficient to escape the poverty striking the region, especially in time of severe drought. Family members often had to travel far away to obtain ways of bolstering their meager farming incomes. They would leave their land to find work as miners, sheep herders, or seasonal laborers in other parts of the state or in Arizona, Montana, Wyoming, and California. The extraction industries were the second most important economic sector with coal in the lead. Precious metals and copper were also mined at the beginning of the century. In the 1920s, oil was discovered in the northwestern and southeastern portions of the state and the mining exploitation of potash started near Carlsbad in the south. For these economic reasons, New Mexico was certainly part of what historian of the American West Gerald Nash, calls "America's third world." Nash describes the following:

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[11] Hal Rothman, *On Rims and Ridges: The Los Alamos Area since 1880*, Lincoln, NE: University of Nebraska Press, 1997, 20.
[12] *Acequia* is the Spanish word for ditches.
[13] William DeBuys, *Enchantment and Exploitation: The Life and Hard Times of a New Mexico Mountain Range*, Albuquerque, NM: University of New Mexico Press, 1985.
Elizabeth Kay, *Chimayó Valley Traditions*, Santa Fe, NM: Ancient City Press, 1987.
[14] Brian McDonald, David Boldt, and University of New Mexico, "The New Mexico Economy: History and Outlook," Albuquerque, NM: University of New Mexico, Institute for Applied Research, Bureau of Business and Economic Research, 1988, 10.

"In 1940, the West was still characterized by a colonial economy. […] Agriculture, livestock, and mining were the major industries of this underdeveloped area that constituted America's 'Third World.'"[15] Nash's use of the terms "colonial economy" and "America's 'Third World'" is particularly interesting for it sets forth the idea that New Mexico was an internal colony dependent on the industrialized East. This idea prompts new questions: if the state's economic situation prior to World War II can be defined in colonial terms, how did this status evolve after the War? Did New Mexico's economy retain its place in this colonial system of domination from the East upon the West, or did it emancipate from outside economic forces?

In addition to economic dependence, New Mexico, like other Western states, suffered from isolation. Nonetheless, the region attracted an increasing number of tourists looking, precisely, for a form of seclusion. At the beginning of the twentieth century, the development of the railroad, coupled with the accessibility to tourist sites and an exceptional climate, allured numerous tourists to the "Land of Enchantment," as the state is nicknamed. An interest in the prehistory of the continent was spurred by archeologists who had explored the ruins of pre-colonial villages in the 1880s, and had debated on the establishment of National Parks and Monuments,[16] which would control access to these sites. By 1933, there were eight parks and monuments in New Mexico, including ruins at the Aztec Ruins, Bandelier or Gila Cliff Dwellings Monuments, vestiges of the Spanish colonial era at the Salinas Pueblo Missions and El Morro Monuments, and fabulous landscapes at the Capulin Volcano, White Sands Monuments, and Carlsbad Caverns Park. Tourism became increasingly valuable for the local economy, and New Mexico multiplied its efforts to attract American tourists after it was integrated in the Union. In the 1940s, those who travelled to New Mexico were usually drawn by sightseeing, archeology, and the hope to be cured from certain life-threatening diseases thanks to the state's renowned climate. Health tourism prospered; sanatoria and hospitals sprouted all over the region offering "health-seekers" climatological cures for tuberculosis and hot spring treatments. Oppenheimer himself first came to the state in 1921 to recover from dysentery.

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[15] Gerald D. Nash, *World War II and the West: Reshaping the Economy*, Lincoln, NE: University of Nebraska Press, 1990, 2.

[16] The difference between national parks and national monuments is that a national monument is intended to preserve at least one nationally significant resource, whereas a national park is usually larger and preserves a variety of nationally significant resources. (Definition from "Frequently Asked Questions," *National Park Service*, Washington, DC: United States Department of the Interior, http://www.nps.gov/cong/faqs.htm, accessed January 11, 2015).

Despite the asset of a growing tourism industry, most of the state was characterized by rampant poverty in the decades preceding World War II. Several factors, such as loss of land to immigrants, corporations, or the Federal Government, the exhaustion of pastures, the dwindling of natural resources, and the impacts of the Great Depression and the Dust Bowl, had gradually contributed to the further impoverishment of the New Mexican population. In the 1930s, the Roosevelt administration took steps to bolster the New Mexican economy through its New Deal policies. One of the most noticeable manifestations of the New Deal was the Civilian Conservation Corps (CCC), whose camps sprung up across the state between 1933 and 1942. These camps brought money and jobs to the state, and, thus, "big government" figured as a new viable source of economic stability and employment for New Mexicans. As I will demonstrate, this federal presence helped smooth the path for the expansion of the nuclear industry after the War. The nuclear industry was also later seen as the means for achieving work in the form of federal jobs. In sum, as the U.S. was on the brink of war, New Mexico was one of the poorest and most secluded states in the Union, where small communities strongly clung to their ancient ways to survive, and where economic strains were at their worst.

When project Y was established at Los Alamos, the exceptional circumstances of the War deprived Hispanic and Anglo homesteading families of the livelihood provided by the land they owned on the Pajarito Plateau, and which they had to give up to the government. However, with the loss of land came the gain of employment opportunities right next door; an actual blessing for the surrounding villages. Families no longer had to separate for months while some left to find work in the neighboring states. The Project, through the Zia Company, the principal subcontractor to the Lab, hired profusely from the valley to do maintenance work at the secret laboratory. Secrecy required that labor be found in the vicinity so as to avoid bringing outsiders in and risking security leaks; consequently, local New Mexicans were the beneficiaries of a privileged and exclusive source of employment. This situation never repeated itself in time of peace. The arrival of the scientist pioneers on the Hill originated novel contacts between two antipodal cultures: Spanish-speaking and Indian rural workers on the one hand, and highly-educated American and European top scientists from the world's greatest universities on the other. The encounter between scientists and locals aroused curiosity on both sides, that was favorable to exchanges, but difference in status also fueled stereotyping. Scientists were invited to Pueblo dances and Hispanic fiestas; they purchased

pottery, rugs, jewelry, and handicrafts, and, thus, participated in the amplification of the tourist trade.

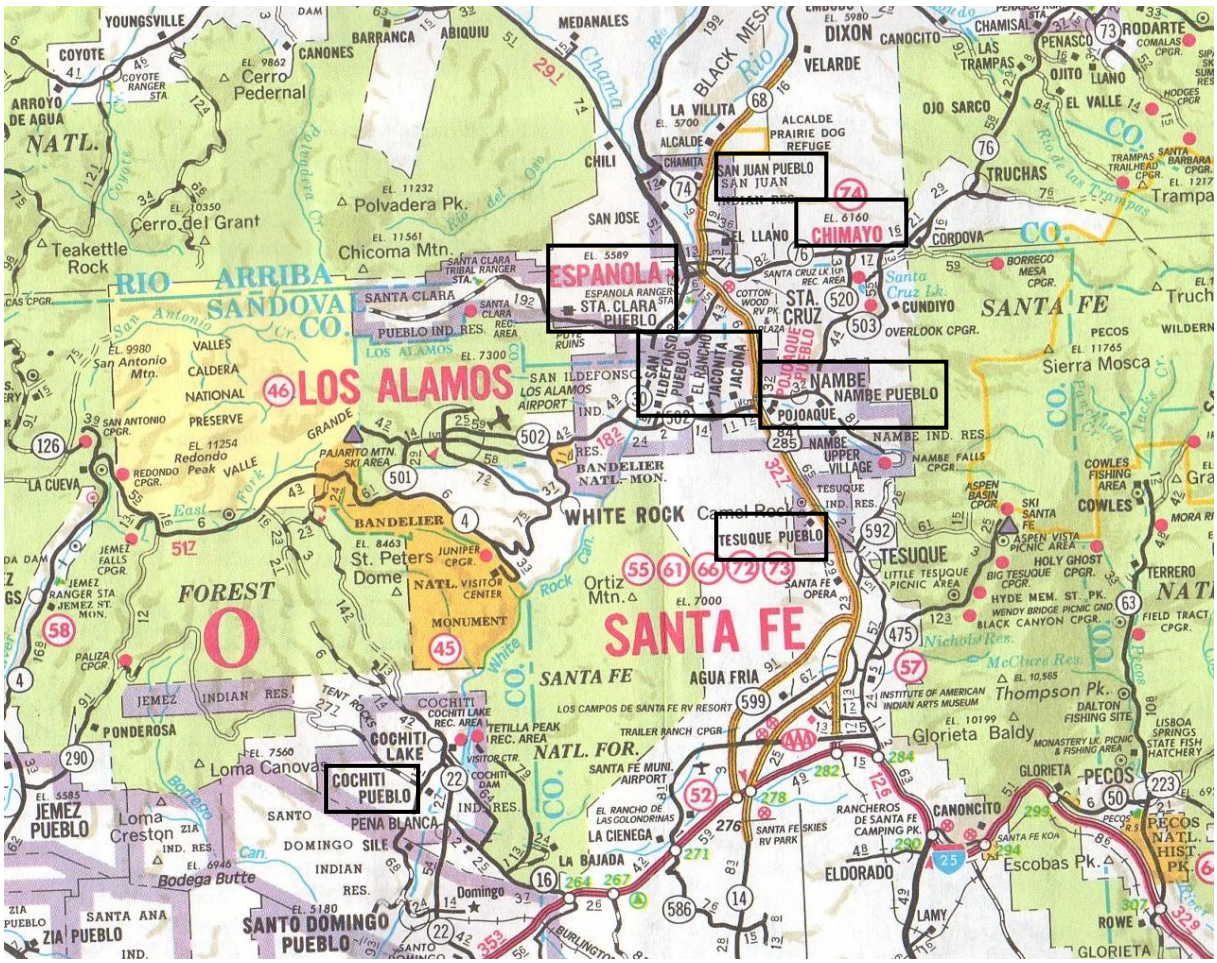

Fig. 1: Northern New Mexico. Source: "Indian Country Guide Map; Arizona, Colorado, New Mexico, Utah," Explore! Series, Heathrow, FL: American Automobile Association, 2012.

As early as 1944, Manhattan Project officials targeted other places in New Mexico to carry on their atomic enterprise. The scientific conquest marched on when it became clear that more remote, extensive, and "inhabited" portions of land were needed to test "the Gadget." The Alamogordo Bombing and Gunnery Range proved most useful for that purpose. The area and its military installations, now known as WSMR,[17] work in close collaboration with the Labs. In March 1945, Project Alberta was initiated to assure that the bomb would be a practical airborne military weapon. Alberta highlighted the need for yet new locations to pursue the Lab's atomic experiments. In late July 1945, the Z division was created and moved to the military-owned Oxnard Field in Albuquerque, near Kirtland Air Force Base. Today, this locale is the site of the Sandia National Laboratories (SNL), which is the second largest

[17] White Sands is now the largest overland military test range in the U.S. totaling 3,200 square miles (5,150 square kilometers).

employer in the state after schools.[18] This propagation of science-related installations translated into a huge economic boom resulting in higher employment numbers, increased income, and massive demographical growth. For example, Albuquerque's population of about 70,000 in 1940 reached over 200,000 in 1960.[19] In turn, the multiplication of jobs and the influx of money and people fueled the creation and prosperity of other businesses, as well as institutions of higher education, that also serviced the nuclear economy. The uranium industry in the Grants region can be added to the list. In 1950, a Navajo Indian named Paddy Martinez found yellow coating on Todilto limestone on the lands of the Santa Fe Railroad at Haystack Mesa containing the mineral so precious to America's military-industrial complex.[20] As a result of this discovery, Grants became the uranium capital of the world and a magnet for prospectors and mining companies who employed locals—mostly Navajo Indians—to mine the radioactive ore and turn it into yellowcake.[21] With the addition of uranium extraction, New Mexico's nuclear industry became a so-called cradle-to-grave industry, extanding from raw material to storage of old weapons. The most recent installation in New Mexico is the Waste Isolation Pilot Plant (WIPP) near Carlsbad, which received its first nuclear waste shipment in 1999, after a twenty-year political battle that divided anti-nuclear activists, concerned citizens, and Carlsbad's enthusiastic promoters who were anxious to welcome a project worth 800 jobs close to their town. I created the following map to serve as a visual synthesis of New Mexico's nuclear industry:

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[18] Frederic C. Alexander Jr., *History of Sandia Corporation through Fiscal Year 1963*, Albuquerque, NM: Sandia Corporation, 1963, 3.
[19] Layne Rochelle Karafantis, "Weapons Labs and City Growth: Livermore and Albuquerque, 1945-1975," Master's Thesis, University of Nevada, Department of History, 2012, 99; 118.
[20] Donald C. Ross and California Department of Conservation, Division of Mines and Geology, "Descriptive Petrography of Three Large Granitic Bodies in the Inyo Mountains, California," Geological Survey Professional Paper 601, Washington, DC: United States Government Printing Office, 1969, 5.
[21] Yellowcake is a processed oxide of uranium extracted and concentrated from uranium ore through milling that is used as an intermediate step in the production of nuclear weapons and as the raw material for commercial nuclear materials, especially fuel for nuclear reactors.

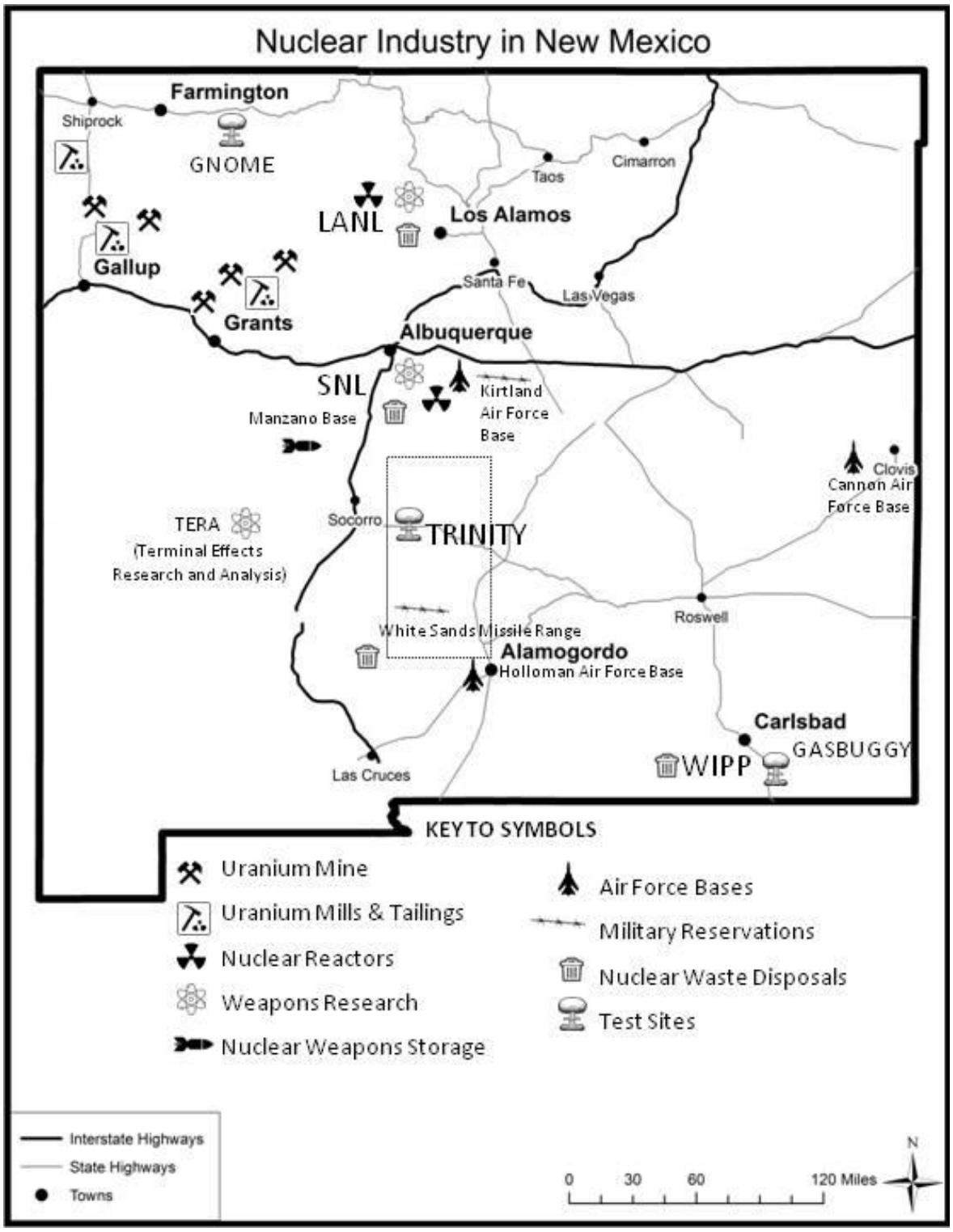

Fig. 2: The Nuclear Industry in New Mexico. Source: Personal map by Lucie Genay, 2012.

The conclusion to this accelerated historical summary is indisputable: World War II and the Cold War utterly revolutionized New Mexico's economic, demographic, and environmental landscape. There is also no denying that the nuclear industry shaped a new social order and had repercussions on cultural patterns, but the question, on which this

dissertation lays, concerns the repercussions of these changes on the New Mexican population, and how New Mexicans perceived these changes.

2. Questions and hypotheses

A plethora of questions stemmed from these first observations. First, through which mechanisms was New Mexico's transformation operated and who were the main actors in the scientific conquest? Second, how were local populations, i.e., the inhabitants of the state before World War II, affected by the changes in their environment? What was their experience of the socio-economic upheaval in the postwar decades? How did they respond to their state's new role as the cradle of the atomic age? And third, how can one evaluate the durability and fair distribution of the benefits entailed by the new booming industry—jobs, federal funding, attractiveness for the state, inflow of tourists, etc.—and most importantly, to what extent did these populations gain from this high-technology revolution? What price did they have to pay? Even though statistics indicate a formidable rise in wealth and living standards, New Mexico still ranked fifth in the nation for the number of persons below the poverty level in 2008.[22] Who were the true beneficiaries of the scientific revolution, then? Who was granted access to the high-paying jobs? A few initial remarks permitted me to form hypotheses on the deeper and unknown impacts of the Manhattan Project that directly concern the local witnesses of the development of New Mexico's military, industrial, and scientific complex.

A first hypothesis to account for the enduring poverty issue in the state was that the income from the nuclear complex concentrated around the new bastions of the nuclear industry where immigrant-scientists resided. The pride in being the land where the atomic bomb was born translated into campaigns advertizing the nascent high-technology centers that needed to recruit the nation's top scientists and engineers. The nebula of research and development facilities along the Rio Grande was praised as a Mecca for ambitious young scientists. The renown of the fathers of the atomic bomb, who had led the undertaking to success during the War, greatly contributed to attracting the cream of the crop of atomic science from other states. Consequently, out-of-state Ph.D.-holders drawn by the lucrative and prestigious positions offered by the research centers and military installations colonized neighborhoods, like in Albuquerque, or a whole town, like in Los Alamos. With each new

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[22] United States Census Bureau, U.S. Department of Commerce, "Persons below the poverty level 2008," *The 2012 Statistical Abstract, The National Data Book: state rankings,* http://www.census.gov/compendia/statab/2012/ranks/rank34.html, accessed November 20, 2012.

step in the scientific conquest, newcomers migrated en masse to Los Alamos, Albuquerque, Alamogordo, Grants, or Carlsbad. This flow of immigrants, which was a direct and logical outcome of the new economic situation, would then underscore existing inequalities and create new ones in New Mexican society depending on people's access to the nuclear bonanza. The second hypothesis, therefore, concerned the increase in inequalities. Forty years after the Los Alamos Laboratory was declared to be a permanent installation, almost 70% of Los Alamos County's population of was from out of state, a jarring number next to other northern New Mexican counties' statistics such as San Miguel's 0.66% out-of-state population. Likewise, 3.5% of Los Alamos's population was under the poverty level, with a median family income of $30,307, compared to nearly 27% in San Miguel, with a median family income three times lower ($10,841). At the same time, New Mexico ranked second in doctoral scientists and engineers per 10,000 in the nation, but 29th in number of high school graduates, and 38th in average annual income in the 1988 State Policy Data Book.[23]

The paradoxes and discrepancies behind those figures suggest that the benefits of the nuclear industry were distributed unequally among local and immigrating populations and that, as a result, Los Alamos became an island of privileges disconnected from the anxieties of surrounding communities. To understand the reasons behind this situation, the history of the Manhattan Project and the way neighboring communities were integrated in the Project at its earliest stage is fundamental. Early generations of valley workers generally perceived Los Alamos as an immense advantage. The salary that locals earned enabled them to participate more actively in the growing consumer society. Improvements in material gains and modernization of households were evident as people's purchasing power increased and workers for the Lab were able to buy their first cars or televisions. Yet, many never caught up with the national standards of income. Somewhere on the course upward, something prevented them from going further. Because of the state's history as an internal colony of the United States and its demographical composition, I postulated that questions of education, discrimination, and political agency were involved.

Priorities for New Mexicans shifted from survival to employment and education. The increased reliance on wage-work built up a harsh competition among job seekers and, in most cases, New Mexican workers and graduates of local higher-learning institutions were unable to compete with outsiders. As we will see, the University of New Mexico's "Impact Los

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[23] Chris Dietz, "The Impact of Los Alamos National Laboratory on Northern New Mexico," Master's Thesis, New Mexico Highlands University, Department of Behavioral Science, 1989, 50; 41.

Alamos" Oral History Project documents several examples where young Anglos just out of school were made staff members on the spot when valley workers had to wait for several years to reach that goal.[24] Rather, as these interviews suggest, a glass ceiling came to exist, which prevented local non-Anglo residents from easily obtaining high-level positions. Such instances of preferential treatment reveal indeed forms of ethnic, geographical, and educational discrimination, and these forms have been witnessed by multiple generations of nuclear industry workers. Being granted access to the Labs or to other facilities of the high-technology corridor along the Rio Grande generated jealousies and tensions in the poorer parts of the state. An additional factor for this tendency was the envy aroused by the adjacency to a culture of material abundance rendered more conspicuous with the arrival of wealthy newcomers.

In this context of rapid industrialization and modernization of their environment, many agricultural workers were able to desert the rough and demanding labor on the farm for easier and more reliable work in the cities. Thus, agricultural activities that had been the pillars of the economy before the World War II declined, and this precipitated a demographic shift from a rural, agrarian culture to an urban, industrial culture. The state's role in the Cold War opened a channel for invasion of people and ideas. Culturally, the nuclear economy helped convey dominant ways and ideas which replaced some of the ancestral lifestyles and modified the role played by traditions based on the sacrosanct value of land. As in other instances of new industries entering traditional societies, these cultural changes would fracture the New Mexican identity, splitting it between pro and anti nuclear groups. For those who succeeded in getting a job at one of the nuclear facilities, it meant entering a new culture; a new philosophy of "nuclearism," defined as the belief in nuclear weapons as the means for maintaining national security. Not all employees adapted the same way to the ideology. While some fully embraced it, others rejected it.

In the process of changing its economic base, New Mexico's dependence on land and on eastern markets shifted to a dependence on government investments. The exceptional circumstances of World War II and of the Cold War developed a federally-sponsored economy in the state as federal funds fueled the nuclear engine. This dependence transfer to the Federal Government was a third hypothesis; that is, that New Mexico's colonial status did

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[24] "Impact Los Alamos Project." Oral History Projects and Video Recordings Collection. Albuquerque, NM: Center for Southwest Research. University Libraries. University of New Mexico. Collection MSS821BC, 1984-2006.

not end with World War II but was merely modified to suit the nation's new atomic objectives. Secrecy was paramount in keeping these objectives and supporting the development of the military-industrial complex. Then, in the 1970s and 1980s, when the nuclear-warfare anxiety of the Cold War transformed into environmental and health concerns, controversies broke out in New Mexico. No longer protected by automatic government classification of their work, government-owned and private contractors' weapons labs began to come under attack from local activists accusing them of having dealt irresponsibly with the dangerous by-products of their nuclear activities. Public knowledge grew after the Three Mile Island accident in March 1979, and even more so after the end of the Cold War. In 1980, environmental reporter Phil Niklaus and writer Dede Feldman published a series of articles on the environmental impact of Los Alamos Scientific Laboratory (LASL)[25] with the Southwest Research and Information Center, a leading actor in the rise of anti-nuclear activism in Santa Fe. They noted "Solid waste materials, ranging in size from test tubes and rubber gloves to massive 'glove-boxes' and other laboratory equipment rendered useless by radioactive contamination, continue to be placed in huge trenches and shafts cut in the volcanic tuff at Los Alamos."[26] The dangerous dumping practices and unreasonable risk-taking in use since the War, which were the result of informed decisions based on the unsuitable safety standards of the time, had been maintained under the opaque cover of secrecy. Over the 1980s, some of the most harmful environmental consequences of the nuclear industry were disclosed in the whole state. These revelations greatly influenced local perceptions of the nuclear industry and further divided opinions. For this reason, this parameter had to be taken into account to write this dissertation.

The environmental legacy could neither be ignored; not only because it is a symbol of the Manhattan Project's costliest local legacy, but also because the way these environmental consequences affected and still affect New Mexicans today is the source of relevant questions on the notions of environmental equality and ecological justice. Journalist Vincent B. Price published an alarming study of New Mexico's environment in 2011, in which he demonstrates the environmental damage caused by the scientific conquest that he

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[25] Site Y, the Los Alamos Laboratory, became the Los Alamos Scientific Laboratory in 1947 after it was taken over by the Atomic Energy Agency, and was renamed the Los Alamos National Laboratories in 1981.
[26] "Radiation: How Much Is Too Much?," in Philip W. Niklaus and Dede Feldman, "How Safe is New Mexico's Atomic City? Radiation Control at Los Alamos Scientific Laboratory," Albuquerque, NM: Southwest Research and Information Center, 1980, 11.

emphatically calls a "nuclear colonization."[27] The environmental legacy would then be yet another argument to content that New Mexico was colonized by nuclear science and its beneficiaries. Price points to the injustice of dangerous industrial practices and sheds light on environmental catastrophes that went, incredibly, almost unnoticed such as the Chuck Rock accident on July 16, 1979, at a uranium mine when a dam on a huge evaporative tailings pond burst, sending millions of gallons of radioactive liquid and tons of radioactive waste into the Puerco River.[28] His environmental study documents one of the most concerning legacies of the scientific conquest but also emphasizes, once again, the unequal distribution of risk among populations. Furthermore, the term "nuclear colonialism," another version of Price's "nuclear colonization," is now broadly used by indigenous peoples who denounce the use of their lands as nuclear dumping grounds. Longtime activist and Executive Director of Healing Ourselves and Mother Earth (HOME), Jennifer Viereck defined the expression in 1992 as "the taking (or destruction) of other people's natural resources, lands, and wellbeing for one's own, in the furtherance of nuclear development."[29] Political authors and activists Ward Churchill and Winona LaDuke called the nuclear economy "radioactive colonialism."[30] The constant reference to colonialism in these environmentalists' and activists' discourses corroborates the idea that the development of nuclear industries has come to be perceived and examined as a form of invasion.

The way in which the nuclear industry developed and integrated New Mexico's employment-eager populations seems to have favored the acceleration of economic disparities, new forms of racial and gender discrimination, and environmental degradation. This multifaceted legacy qualifies the immediately visible positive outcome of New Mexico's metamorphosis, rather suggesting the idea of a Faustian or Devil's bargain between the state and nuclear science. Along with the notion of colonialism, the Faustian bargain metaphor imposed itself as a central concept in this research.

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[27] Vincent B. Price, *The Orphaned Land: New Mexico's Environment since the Manhattan Project*, Albuquerque, NM: University of New Mexico Press, 2011, 33.
[28] *Ibid.*, 139.
[29] "Nuclear Colonialism," *HOME: Healing Ourselves & Mother Earth*, Reno, NM; North Bennington, VT: Healing Ourselves & Mother Earth, 2012, http://www.h-o-m-e.org/nuclear-colonialism.html, accessed November 10, 2012.
[30] See Churchill Ward and Winona LaDuke, "Native America: the Political Economy of Radioactive Colonialism," *Critical Sociology*, Thousand Oaks, CA: Sage Publications, Vol. 13, No. 3, April 1986, 51-78.

3. Thesis and concepts analysis

Following these introductory remarks, which form the embryonic core of this dissertation, my argumentation is supported by a meticulous conceptualization of my research object; that is, the legacy the Manhattan Project in New Mexico. The repeated use of the terms "colonialism," "colonialization," and "conquest" in the beginning of this introduction calls attention to the basic point of the thesis I will develop in this work. As mentioned above, I consider the postwar revolution of New Mexico as its third conquest after the Spanish and American conquests. I do not contend that New Mexico is a colony of the nuclear industry in a traditional imperialist[31] sense. However, numerous elements in the state's relation with science can be spontaneously described by using the colonial lexical field. More precisely, the concept of an internal form of colonialism, specific to the United States, applies to New Mexico's association with science if one considers it as a story of encounter and exploitation between radically diverging populations who had had no previous contact and competed for the same resources. In this case, colonialism refers to the submission of one people to another in a relation of political and economic domination. The concerned populations are the inhabitants of New Mexico who had been in the state for several generations before World War II on the one hand, and all who migrated to the state to take part in the nuclear boom on the other—from atomic pioneers to the new generation of engineers who were recruited at the new nuclear sites in the south-eastern part of the state. The three ethnicities—Anglo, Hispanic, and Native American—will be included in the first group, taking into account their cultural, social, and historical specificities. As members of different ethnic groups have been affected in similar ways by the spread of the scientific conquest, it seemed illogical to focus solely on the two ancestral peoples of the region, i.e., the Spanish and Native Americans. Yet, because of the history of the state and of its demographics, an emphasis on these two groups is to be expected.

When addressing the example of uranium mining in the northwestern part of the state, I will also mention economic colonialism, which differs from territorial colonialism in that the main actors are not nation states, but economic entities such as big corporations. The situation of economic dependence that these corporations create between themselves and the local

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[31] The difference between colonialism and imperialism being vastly debated, I will specify here that I use the term "imperialist" in reference to the great colonial empires of the nineteenth century to clearly state that the relations between New Mexico and the United States were dissimilar from those between Great Britain or France and their colonies, especially regarding the administration and subjugation of colonized peoples which would not be applicable, while maintaining that aspects of the relation correspond to a colonial relation.

population can be described in colonial terms. In that regard, economic colonialism is closer to neocolonialism, which is defined as "the economic and political policies by which a great power indirectly maintains or extends its influence over other areas or people."[32] In the case of the uranium industry in New Mexico, this type of colonialism is particular for it mixes corporate and government interests and so, it combines economic and government colonialism.

The American Federal Government acquired land, peopled it with settlers, and exploited it economically for the benefit of its defense policies. The development of the nuclear industry in New Mexico has been the result as much of practical criteria as of its land being conveniently inhabited by populations in a situation of desperate poverty and isolation. These people immensely gained but also suffered losses when atomic science was brought into their world. In New Mexico, as in other regions affected by the Cold War, a price has been and is still being paid. That is the reason why I will argue that New Mexicans entered a Devil's or Faustian bargain in the course of this scientific conquest. The longed-for proximity between people's homes and work sources, the multiplication of employment opportunities, the rise in income, and the hope for prosperity, although seemingly godsends, shrouded pernicious, harmful repercussions. I use the expression "a Faustian bargain" because of the high level of risk-taking involved in New Mexico's relation with science. Not only in environmental terms but also in social and economic terms since the advent of the nuclear industry has made the state, and significant parts of its population, dependent on Federal Government support and industry demands. When the benefits of their entrance in a lucrative cash economy started to dwindle, local populations gradually became aware of how much the new economy cost them and would cost in the future.

One could object that these local populations did not have any knowledge of what was happening at Los Alamos during the War; that they did not *knowingly* enter any "bargain" and, therefore, that the concept is not applicable. Yet, in the decades that followed the establishment of the Los Alamos Laboratory, much enthusiasm was shown throughout the state in support of the further development of its scientific and military installations. Once the truth was known about the atomic scientists' presence in northern New Mexico, the state and most of its populations did not express rejection, but rather became patriotic advocates for nuclear science and its derived industries. The secretive dimension and the lack of knowledge

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[32] This definition is from the Merriam-Webster online dictionary. *Merriam-Webster*, Merriam-Webster, Inc., An Encyclopedia Britannica Company, 2015, http://www.merriam-webster.com/.

concerning the possible consequences of the pact are, in fact, fully part of the concept. Furthermore, "Faustian" refers to the abandonment of moral or spiritual principles to obtain wealth or knowledge. In their embrace of nuclearism, many workers experienced moral struggles and a spiritual questioning because of the morality issues posed by the faith in weapons of mass destruction. Physicist and director of the Oak Ridge National Laboratory (ORNL), Alvin Weinberg, was the first to use the expression "a Faustian bargain" to describe nuclear energy in an article entitled "Social Implications of Nuclear Energy."[33] He also coined the expressions "big science" and "technological fix." He later wrote: "my characterization of nuclear energy as a Faustian bargain made me unpopular within the nuclear industry—but I became known among critics of nuclear energy as a sort of in-house conscience—a member of the nuclear community who was willing to voice doubts."[34] His use of the expression "a Faustian bargain" referred to the promises of nuclear energy as an inexhaustible virtually nonpolluting and cheaper source of energy, which are counterbalanced by the health and environmental consequences of radioactivity. The way I intend to use that same expression slightly differs from Weinberg's, as I mainly will address the economic, social, and cultural impacts of nuclear weapons and energy production, rather than the scientific issues at stake in nuclear research. Nevertheless, I will demonstrate in this dissertation how and why Weinberg's expression is appropriate to define the relation of New Mexicans with the nuclear industry and with the Federal Government.

I also chose to define the third conquest of New Mexico as a "scientific" conquest rather than an "atomic" or "nuclear" conquest to emphasize the role played by scientific progress as a driving force. Although the atomic bomb can be seen as a climax in the history of physics, chemistry, and engineering, other branches of science were impacted by the follow-ups of the atomic experiments including medicine, technology, biology, and agriculture. New Mexico's research and development centers have diversified their activities to expand to other scientific fields than atomic and nuclear weapons. In addition, the generic term "science" is a reminder

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[33] Alvin Weinberg, Interview by Steven H. Stow and Marilyn Z. Mclaughlin, Oak Ridge, TN, 31 March 2003, "Oak Ridge National Laboratories," United States Department of Energy, Center for Oak Ridge Oral History, http://cdm16107.contentdm.oclc.org/cdm/ref/collection/p15388coll1/id/165, accessed January 10, 2015.

[34] Alvin M. Weinberg, *The First Nuclear Era: The Life and Times of a Technological Fixer*, New York, NY: American Institute of Physics Press, 1994, 176-177. Weinberg's unpopularity among nuclear power supporters came from his interest in improving the safety of nuclear reactors and, according to *Washington Post* journalist Patricia Sullivan, this interest contributed to his being fired as the head of the ORNL in 1972. Patricia Sullivan, "Alvin M, Weinberg, 91; Pioneer in Nuclear Science," *The Washington Post*, Washington, DC, 22 October 2006, http://www.washingtonpost.com/wp-dyn/content/article/2006/10/21/AR2006102100860.html, accessed November 20, 2012.

of the almost systematic partnership between movements of colonization and scientific progress and discoveries but in this case, the conquest was operated *in the name of* science and progress. The reference to progress is thus in keeping with the American pioneering spirit of Manisfest Destiny, which is another founding concept I will use to show how the scientific conquest followed the path traced by new Mexico's mid-nineteenth century military conquest.

Finally, secrecy is the last aspect that needs commenting because it will be a key notion to understand the relation between New Mexicans and nuclear science. Due to the Cold War, the Federal Government's actions and decisions related to nuclear weapons were all under the veil of secrecy. The general public had no access to knowledge that was remotely linked to the atomic complex since it was automatically issued as classified information. The purpose of secrecy was to protect the American nuclear complex from outside enemies but also from the American public by concealing its negative effects. The multiplication of lawsuits, which began in the 1980s, proved that secrecy had indeed postponed legal issues and public scrutiny which could have impaired the complex's efficiency in fighting the Cold War.

The idea of something being revealed also refers to the unexpectedness of some of the Manhattan Project's legacies in New Mexico and to the choc that some New Mexicans had after years of taking part in the nuclear industry. For instance, Theresa Connoughton was a Hispanic native of Santa Fe who spent 21 years as a LANL employee before being laid off in November 1996. When she attended a conference to present the results of the oral history project conducted by the University of New Mexico on the impact of Los Alamos, she talked about her experience realizing that she must have had been "in total denial." She states:

> You know, once this veil of denial is lifted, you have no choice but to fight it. […] I tell you it is really an incredible picture to get when one finally realizes that one has been asleep for most of one's life. I think the science at the Laboratory is commendable, but, unfortunately, it has come at the sacrifice of people. And I think that, if people are sacrificed, then the product is useless.[35]

This woman's testimony both refers to the concept of secrecy and to that of a Faustian bargain as she mentions the "sacrifice of people" in the name of scientific knowledge. The combination of the two notions appears in many testimonies, be it in a similar dramatic way, through anger, or with hindsight. Throughout my research, the emotional dimension has been

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[35] "'Impact Los Alamos' Symposia: Audience Responses," *New Mexico Historical Review,* Albuquerque, NM: University of New Mexico, Vol. 72, No. 1, 78.

almost omnipresent, but my intent is to go beyond the emotional aspect of the locals' discourse, and analyze the socio-economic mechanisms behind the nuclear complex, which have led to such emotions.

4. State of the art and methodology

The Manhattan Project has been an enticing, engaging, and fascinating subject for diverse writing since 1945, as shown by the abundance of literary and scholarly works based on its history. On August 12, 1945, the first official account of the scientific and technical development of the atomic bomb was released. It was the so-called "Smyth Report" by physicist Henry De Wolf Smyth.[36] Since then, many authors have published on the subject from different points of view: from memoirs of participants by scientists and their wives, military personnel, and politicians; to works by historians and anthropologists, as well as narratives of early witnesses of the dramatic changes on the Pajarito Plateau. The most celebrated work on the history of the Manhattan Project is undoubtedly Richard Rhode's *The Making of the Atomic Bomb* first published in 1986. The 1980s were, in fact, one of the most prolific decades for works on nuclear matters.[37] Numerous publications of that time have also centered on the Japanese bombings, focusing either on the effects of the bomb, or on the debate on whether the atomic bomb was necessary to force the Japanese to surrender.[38]

The bomb, the arms race, and the Japanese bombings monopolized for long the attention of nuclear historians. This emphasis on global characteristics of the bomb long kept in the dark other aspects of its legacy, such as the local impacts on populations and the environment at the Oak Ridge, Hanford, Los Alamos, and, later, at the Nevada Test site. Only toward the end of the Cold War, and following the revisionist trend of social history, did studies begin to center on the way the bomb affected local histories and memories such as in

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[36] The full title was *Atomic energy for military purposes: the official report on the development of the atomic bomb under the auspices of the United States Government, 1940-1945*.

[37] See Bertrand Goldschmidt, *The Atomic Complex: A Worldwide Political History of Nuclear Energy;* Gerard H. Clarfield and William M. Wiecek, *Nuclear America: Military and Civilian Nuclear Power in the United States, 1940-1980;* Vincent C. Jones, *Manhattan, the Army and the Atomic Bomb*; Ronald E. Powaski, *March to Armageddon: The United States and the Nuclear Arms Race, 1939 to the Present*; and Gregg Herken, *The Winning Weapon: The Atomic Bomb in the Cold War, 1945-1950*.

[38] See Michael J. Hogan, ed., *Hiroshima in History and Memory;* Kyo Maclear, *Beclouded Visions: Hiroshima-Nagasaki and the Art of Witness;* Richard H. Minear, ed., *Hiroshima: Three Witnesses*; Toyofumi Ogura, ed., *Letters from the End of the World: A First Hand Account of the Bombing of Hiroshima*. J. Samuel Walker, *Prompt and Utter Destruction: Truman and the Use of Atomic Bombs Against Japan*; Gar Alperovitz, *The Decision to Use the Atomic Bomb;* and Paul Ham, *Hiroshima Nagasaki: The Real Story of the Atomic Bombings and their Aftermath*; Tsuyoshi Hasegawa, *Racing the Enemy: Stalin, Truman, and the Surrender of Japan*.

Tad Bartimus and Scott McCartney's work *Trinity's Children: Living along America's Nuclear Highway* in 1992. In their introduction, the authors present their book as

> the result of hundreds of interviews conducted up and down the highway [Highway 25 from Las Cruces, NM, to Buffalo, WY] over four years, as well as extensive research in archives and records warehouses of documents dating back to the Manhattan Project. It is not a regional book, or a travelogue, but it is a journey. It is part love story, part oral history. It feeds off the emotion and excitement of its people and is paced by the whirl of technological change.[39]

This dissertation follows this path to shed light on the perspective of common people, who also played a part in the American atomic adventure, and whose voices were stifled by national defense policies and by the weight of worldwide historical debates. Since the 1990s, studies of the impact of the nuclear buildup, complex, and secrets on the United States have flourished, but there remain gaps in the people's history of the nuclear age. My purpose here is to use a different prism to relate a part of the New Mexican history that has been dealt with, on many occasions, from an outside perspective, but rarely from the angle of those whose lives were revolutionized or sometimes shattered by their encounter with science. Locals have contributed to the success of the Labs, to the profits made by the uranium industry, to the construction and maintenance of storage sites, to America's military supremacy, and to the advancement of science. Therein lays the historical value of their stories.

The first steps towards a social history of the nuclear age, and specifically of the Manhattan Project, were taken by participants who wrote their personal memoirs. The first to publish his own version of the story of the Manhattan Project in 1962 was its military director, General Leslie M. Groves. In *Now It Can Be Told: the Story of the Manhattan Project*, the general described the political and logistical challenges he encountered as the head of the Project. He also sparingly addressed a few of the scientific aspects of the undertaking; however, in 1980, Lawrence Badash, Joseph O. Hirschfelder, and Herbert P. Broida began the preface of *Reminiscences of Los Alamos, 1943-1945*, with the observation that Groves' book was the only published firsthand account of the Project, and that scientists seemed reluctant to share their reminiscences. Starting in 1975, they had organized a series of lectures at the University of California in which prominent Los Alamos scientists talked about their

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[39] Tad Bartimus and Scott McCartney, *Trinity's Children: Living Along America's Nuclear Highway*, New York, NY: Harcourt Brace Jovanovich, 1992, 4.

contribution to the Project. Their 1980 book was a compilation of all these lectures. In 1989, Joseph J. Ermenc continued the work with *Atomic Bomb Scientists: Memoirs, 1939-1945: Interviews with Werner Karl Heisenberg, Paul Harteck, Lew Kowarski, Leslie R. Groves, Aristid Von Grosse, C. E. Larson.*[40] Other scientific testimonies followed in the 1980s and 1990s such as Hans Bethe's *The Road from Los Alamos*[41] or Robert Serber's *Peace and War: Reminiscences of a Life on the Frontiers of Science*.[42] The first publications on the history of Los Alamos were thus, for the most part, practical narratives and scientific accounts of atomic developments.

Beginning around the same time, as the scientists felt the urge to share their memories, their wives also began to write about the non-scientific aspects of life in the wartime scientific post. This moment represented a departure from military and scientific accounts to a social history of the community. In 1988, Charlotte Serber and Jane Wilson edited an equivalent of their husbands' compiled lectures in *Standing by and Making do: Women of Wartime Los Alamos*. Phyllis Fisher also put in writing her recollections from her time on "the Hill" in *Los Alamos Experience* in 1985, and Berenice Brode wrote *Tales of Los Alamos: life on the Mesa, 1943-1945* in 1997. These works were highly helpful to draw an accurate picture of the atmosphere during the War and included the first stories of encounters between the Hill-dwellers and local New Mexico residents. Historian Cynthia Kelly and the Atomic Heritage Foundation later greatly contributed to the preservation of the memory of the Manhattan Project by combining all these accounts in two major works: *Remembering the Manhattan Project: Perspectives on the Making of the Atomic Bomb and its Legacy* and *The Manhattan Project: The Birth of the Atomic Bomb in the Words of its Creators, Eyewitnesses, and Historians*.[43]

These publications do not include any testimonies of New Mexican participants in the birth of New Mexico's nuclear complex. After perusing the literature on the Manhattan

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[40] Joseph J. Ermenc, ed., *Atomic Bomb Scientists: Memoirs, 1939-1945: Interviews with Werner Karl Heisenberg, Paul Harteck, Lew Kowarski, Leslie R. Groves, Aristid Von Grosse, C. E. Larson,* Westport, CT: Meckler, 1989.

[41] Hans A. Bethe, *The Road from Los Alamos: Collected Essays of Hans A. Bethe*, Masters of Modern Physics, American Institute of Physics, 1991.

[42] Robert Serber, *Peace and War: Reminiscences of a Life on the Frontiers of Science*, New York, NY: Columbia University Press, 1998.

[43] Cynthia C. Kelly, and the Atomic Age Foundation, eds., *Remembering the Manhattan Project: Perspectives on the Making of the Atomic Bomb and Its Legacy*, Hackensack, NJ: World Scientific, 2004. And Cynthia C, Kelly ed., *The Manhattan Project: The Birth of the Atomic Bomb in the Words of its Creators, Eyewitnesses, and Historians*, New York, NY: Black Dog & Leventhal Publishers, Inc., 2007. The Los Alamos Historical Society also published *Behind Tall Fences: Stories and Experiences about Los Alamos at its Beginning*, Los Alamos, NM: Los Alamos Historical Society, 1996.

Project and on Los Alamos, this absence strikes as conspicuous. Two authors concentrated their research on New Mexico and studied the state's relation with science from a local angle: Ferenc M. Szsasz and Jon Hunner. The former is celebrated for his historical work on Trinity and contemporary New Mexico.[44] The latter was the first historian to publish a work, entitled *Inventing Los Alamos: the Growth of an Atomic Community,* on the evolution of the Los Alamos military post into an actual town in the postwar years. Yet, even though using "New Mexico" and "atomic" in the same sentence immediately summons the name of Los Alamos, the bond between the state and atomic science did not stop at Los Alamos. The connection spread to other counties and affected other New Mexican lives. Almost all the places that appear on the map of nuclear New Mexico (see Figure 2) have individually been the subject of writings—reports, articles, or books[45]—that centered on the environmental, political, and economic impacts of their nuclear facilities. None of these projects, however, have delimited their scope to the whole state; nor have any of them put forward the various viewpoints of New Mexico's local populations. I sought to connect these nuclear dots so as to explain how the nuclear map of the state came into existence, and what this map means to those who have been affected, both in positive or negative ways, by the local nuclear complex.

Beginning in 1991, the University of New Mexico oral history project "Impact Los Alamos: Traditional New Mexico in a High Tech World," headed by Carlos Vásquez, conducted interviews in the Española valley among residents who had worked or still worked at LANL. The project covered the period from 1943 to 1993—the time between the creation of the Los Alamos Laboratory and its fiftieth anniversary. At the core of the project was the fundamental question of whether science had benefited the area or damaged ancestral cultures and eroded local traditions.[46] "Crucial as Los Alamos' global impact has been, its influence on local people and communities has often been neglected," writes Scott D. Hughes, managing editor of the *New Mexico Historical Review,* in the introduction to the special issue of the journal on "Impact Los Alamos."[47] Carlos Vásquez, director of the project, explained the difficulties the project encountered because of working on this neglected issue. He notes that "many locals saw the study as controversial and potentially compromising. Since LANL

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[44] See Ferenc Morton Szasz, *The Day the Sun Rose Twice: The Story of the Trinity Site Nuclear Explosion, July 16, 1945* and *Larger Than Life: New Mexico in the Twentieth Century*.
[45] These publications are referenced in the bibliography and will be cited progressively in this dissertation.
[46] Carlos Vásquez, "Impact Los Alamos: Traditional New Mexico in a High Tech World, Overview of Project and Symposia," *New Mexico Historical Review,* Albuquerque, NM: University of New Mexico, Vol. 72, No. 1, January 1997, 4.
[47] Scott D. Hughes, "Impact Los Alamos: Managing Editor's Introduction," *New Mexico Historical Review,* Albuquerque, NM: University of New Mexico, Vol. 72, No. 1, January 1997, 1.

is the largest employer in the area and pays salaries often three to five times what other local employers pay, there is a premium in getting and keeping a job at the Lab."[48] Asking people about nuclear science in New Mexico was indeed a delicate matter. The "Impact Los Alamos" collection of interviews, which has not been used in any published work yet, became a basis for my research as I listened to the interviews and transcribed them.

Another project, "Los Alamos Revisited," directed by Peter Malmgren, also gathered interviews of blue collar LANL workers. These were available at the Santa Fe New Mexico State Records Center and Archives, but did not focus on local New Mexican employees.[49] This collection was nonetheless informative and useful because testimonies formed patterns with others under study. Likewise, a few interviews of local residents' children appeared in Katrina Mason's oral history, *Children of Los Alamos: An Oral History of the Town Where the Atomic Age Began*, amongst those of physicists' sons and daughters. Annie G. Ross's doctoral dissertation, "One Mother Earth, One Doctor Water: A Story about Environmental Justice in the Age of Nuclearism. A Native American View," provided helpful insights on the point of view of Native American communities, which was missing from the other collections of interviews. In addition to these oral histories, the Atomic Heritage Foundation and Los Alamos Society's "Voices of the Manhattan Project" and the New Mexico Farm and Heritage Museum's "Farm and Ranch Folks Project" also included relevant material on Los Alamos and on the Tularosa Basin. Lastly, stories about local people published in newspapers helped fill in the gaps in the interview collections, which focused primarily on Los Alamos.[50]

Discovering such sources gave my doctoral project its impetus. Although the issues and questions at stake in this dissertation have been mentioned or examined in brief paragraphs in works cited above, there remains an historical void. These oral history collections provided the means to fill some of this void. To rewrite the social history of the Manhattan Project in New Mexico and address its multiple legacies from a New Mexican perspective, I first returned to these previous works in order to extract every mention of New Mexicans and of the role they played, or were given, in the nation's nuclear history. After selecting and transcribing interviews from existing collections, I conducted a few interviews myself and

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[48] Vásquez, "Impact Los Alamos," 6.
[49] Peter Malmgren, "Los Alamos Revisited, an Oral History," Santa Fe, NM: New Mexico State Records Center and Archives, 2000.
[50] "Farm and Ranch Folks Project," Oral History Program, Las Cruces, NM: New Mexico Farm and Ranch Heritage Museum, New Mexico Department of Cultural Affairs, Research and collections, http://www.nmfarmandranchmuseum.org/oralhistory/browse_by_project.php?project=1, accessed April 25, 2014.

was confronted to the same reluctance and difficulties that Carlos Vásquez noted. I supplemented my work with intensive research on archival material including paper collections, economic reports, local newspapers and magazines, and unpublished theses in various archive centers and libraries in Albuquerque, Los Alamos, and Santa Fe.[51] During this archival phase, I targeted material on Los Alamos but also on the rest of New Mexico's nuclear installations where other New Mexicans have taken part in the development of the military-industrial complex. The great bulk of the material available on New Mexico's nuclear history is, in fact, about Los Alamos for chronological reasons; yet, my purpose was to include the rest of the state in this nuclear history since all the affected places are connected in the nuclear economy. I therefore visited these locations, presented my project to residents, and learned from their reactions and opinions.[52]

5. Outline

My analysis of the local legacy of the Manhattan Project is divided into four parts. A first part consists in a presentation of the state of New Mexico before World War II, which underscores the reasons why the Land of Enchantment was ideally prepared to be the recipient of an economic revolution. This part introduces the three-people social order in force in the state and underlines the importance of land and agricultural activities in New Mexico's history, economy, and culture. From this first descriptive point, my argumentation will move on to explore New Mexico's pre-industrial economic situation on the eve of the Wolrd War and how "seeds" for a new industry had been "planted" since the end of the nineteenth century. This will also lead me to explain how economic strains intensified during the Great Depression and took their toll on the population who was desperate for employment opportunities close to people's homes. This part's last chapter will focus on the steps leading to the arrival of science on the isolated Pajarito Plateau. I will thus use the region's history to highlight the irony behind the selection of that particular location for the building of a secret atomic research laboratory.

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[51] These centers were the University of New Mexico Zimmerman Library, the Centennial Science and Engineering Library, the Parish Memorial Library, the Fine Arts and Design Library, the University of New Mexico Center for Southwest Research, the Indian Pueblo Cultural Center, and the National Museum of Nuclear Science and History in Albuquerque; the J. Robert Oppenheimer Study Center and the Mesa Public Library in Los Alamos; and the New Mexico State Records Center and Archives and the Fray Angélico Chávez History Library and Archives in Santa Fe.

[52] These places include the Bradbury Science Museum, the Los Alamos Historical Society Museum, Grants' Uranium Mining Museum, the Trinity Site, the White Sands Missile Range Museum, and the town of Carlsbad.

Part two revolves around New Mexico's third conquest, i.e., the scientific conquest for the sake of progress and in the name of national security. A first chapter will center on the theory of internal colonialism and on the definition of the American West as the U.S.'s domestic empire. This theoretical frame will be the means to address questions of continuity and/or rupture in New Mexico's history. To illustrate that point, I will dwell on the militarization of the state during World War II and on the land condemnation proceedings at Los Alamos, as well as in the Tularosa Basin. I will then center on the arrival of the first atomic scientists at site Y and show how images of the mythical West, the Frontier, and Manifest Destiny influenced these new pioneers' experiences and relations to locals. The New Mexican communities around Los Alamos are thus comprised in the stereotypical images that the scientists used to describe their western adventure. I will oppose these images to the memories of local workers, who saw the Laboratory first and foremost as an unprecendented economic opportunity. This part will end with an account of the Trinity test, putting forward local witnesses's accounts and reactions, and with the pivotal decision to maintain the Laboratory at the end of the War despite New Mexico's prior assets during the selection phase of the Project having become, once again, shortcomings.

Part three, the core of this dissertation, will be an examination of New Mexico's Faustian bargain with science. To understand the workings of this "bargain," I will break it down and dissect each of its mechanisms. First, the economic outcome of "big science" in New Mexico was exceptionally profitable, and the immense benefits of the nuclear industry generated hope that New Mexico might access its longed-for prosperity. Efforts were made to attract the nation's best scientists to Los Alamos and Albuquerque in order to sustain the economic growth. The economic boom also produced unwavering local support for the nuclear complex. Second, "big science" worked hand-in-hand with "big government." New Mexico's economy became increasingly dependent on federal funds to keep fueling its nuclear industry. As a result of this dependence, the local economy became a tributary of events happening on a global scale, which impacted the national budget for nuclear weaponry production during the Cold War. Third, secrecy was the last but not least important key ingredient that linked the other mechanisms together and affected New Mexicans the most because they were not aware of the risks they were exposed to. For the same reason, secrecy contributed to a strong, patriotic local enthusiasm for the nuclear complex.

The fourth and last part will deal with the multiplication of fallout from New Mexico's scientific conquest from the end of World War II to the present. The environmental, moral,

cultural, and socio-economic legacies of the Manhattan Project will be appraised and interpreted in this final section to show what price New Mexicans have had and will have to pay for becoming a dominion of the nuclear industry and for furthering its development. I will first address the environmental impact with an emphasis on notions of environmental injustice. I will then dwell on socio-economic implications, particularly on the issue of inequalities. The last point I will develop is the junction between New Mexico's atomic past and a complex future, which involves new parameters and new controversial questions. As a result of people's growing awareness in the 1980s and 1990s, new controversies, concerns, and scandals broke out on gender and race discrimination, on land compensation for those who had lost their properties during the War, on how to reorient research away from nuclear weapons, on cleanup of contaminated sites, and on the opening of the Waste Isolation Pilot Plant. These topical issues are part of the inheritance of New Mexico's scientific conquest and prove that economic dependence, on the Federal Government and on its military-industrial and scientific installations, continues to be problematic in the state today.

PART 1: BEFORE THE ATOMIC SCIENTISTS CAME

CHAPTER 1: THE THREE CULTURES OF NEW MEXICO

1. Cultures

"Official stories of the Manhattan Project tend to begin with scientific discovery and military necessity. The land and its people, their histories together, rarely appear, except perhaps as necessary sacrifices."[1] Because the purpose of this dissertation is to reverse the tendency mentioned here by historian of the Manhattan Project Peter B. Hales and to begin the story of the Project with the land and its people, one should start with a brief history of New Mexico, particularly of its first two conquests and its people. Moreover, to fully grasp the magnitude of the changes that occurred in the post-World War II decades, one has to become familiar with the three-people social order in the state and where this triad originated.[2] Although violence and colonization had been a constant dynamic in the building process of modern New Mexican society, by the beginning of the twentieth century a relatively stable social order had resulted. New Mexico's numerous cultural entities formed a complex socio-cultural stratum comprising 22 Indian tribes, descendants of Spanish conquerors, American settlers, Mexican immigrants, and other newcomers. Each group was demarcated by its strong set of values, traditions, and beliefs. The ecologies of an arduous life in the semi-desert had much to do with the impression that stasis rather than integration of cultural spheres existed; in fact, the disparate groups hardly merged but existed in parallel, with some influence on each other nonetheless. The history of New Mexico presents a succession of cultural layers being superimposed on one another, opposing, and affecting one another. Therefore the relative equilibrium between the main social groups was the result of countless power struggles over the region's meager resources.

Historians have generally identified five main stages in New Mexico's history: the prehistoric days of the Anasazi and Mogollon cultures, in the north and south respectively around 1000 C.E.; the arrival of the Spaniards with the Coronado expedition of 1540; the independence of Mexico in 1821; the Treaty of Guadalupe Hidalgo in 1848; and, finally, American statehood in 1912. Each of these stages melds together a history of violent encounters with intricate cultural layering that produced a social order based on the three main groups: Native Americans, Hispanics, and Anglos. Tensions among these three cultures

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[1] Peter B. Hales, *Atomic Spaces: Living on the Manhattan Project*, Urbana, IL: University of Illinois Press, 1997, 10.

[2] See Erna Fergusson, *New Mexico, A Pageant of Three Peoples*, Albuquerque, NM: University of New Mexico Press, 1973.

are still very much alive, but the three cultures are the pillars of a multicultural New Mexican society and, have learned how to coexist.

All conquerors came to the Southwest, or the Northwest depending on the point of view, attracted by the prospects of hidden resources or driven by missionary purposes. The lure of the fabled "Seven Cities of Cibola" brought Spanish explorers northward. Missionaries sought to spread the catholic faith among the populations they found there. American President James Polk's expansion policy turned American ambitions westward on a mission to complete the young nation's Manifest Destiny. The land of New Mexico stood on America's way to the Pacific. The details of New Mexico's transitions from one sovereign to another are far less relevant to this discussion than is the way each transition and cultural influence contributed to the construction of a unique kaleidoscope of specific cultures.

a. The Native American cultures in New Mexico

The presence of Native Americans and the influence of their cultures in the state of New Mexico are fundamental to examine the development of the nuclear industry in the state after World War II. Some Native Americans became notable characters in Manhattan Project stories, but, most importantly, tribal members have been active participants, exploited workers, and severe critics of the industry. Therefore, to understand these various positions, a brief cultural explanation is necessary.

Among the 22 Indian tribes represented within the borders of present-day New Mexico, nineteen are known as Pueblo Indians. "*Pueblo*" is the Spanish word for "*village*" and refers to these tribes' sedentary lifestyles along the Rio Grande and Rio San Jose. The ancestors of these communities, groups of 400 to 2,000 individuals at the time they were discovered by Spanish explorers, were arranged around the central plaza where ceremonies, dances, and other rituals of social life occurred. At the plaza's center was typically the *kiva*—an underground circular ceremonial room that was accessible with a ladder from the roof.[3] From the sixteenth century on, the Pueblo people have been the object of numerous anthropological and ethnological studies over the years, sometimes leading to abuses. Nevertheless, most tribes proudly affirm that their secrets are intact and that books cannot teach anyone the ancestral ways they have been able to retain over the centuries, especially their religious beliefs passed orally from one generation to the next. The central belief in Pueblo culture that

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[3] See Susanne Berthier-Foglar, *Les Indiens Pueblo du Nouveau-Mexique: De l'arrivée des conquistadors à la souveraineté des nations pueblo*, Pessac, France: Presses Universitaires de Bordeaux, 2010.

the people emerged from the insides of the Earth at their origin sheds light on the bonds they believe connect them to nature and natural forces. Some of their shrines are places to access the underworld from where the people came out.[4] This conviction, at polar opposite from the Christian myth of the "fallen man," makes the Pueblo a blessed, rather than fallen, people who still live in Paradise; that is, "nowhere in Pueblo myths do humans experience a fall from 'God's' grace. The people and their worlds are sacred and indivisible."[5] The Pueblo people's sense of place and sense of belonging are strong features that still identify them today.

Although currently identified by distinct reservations, the three other New Mexico tribes were historically semi-nomadic (See Figure 3). The Jicarilla Apache are in the northern part of the state, the Mescalero Apache are in the southeast, and the largest tribe, the Navajo, maintain a reservation in the northwest corner of the state. The Jicarilla, a name meaning "little basket makers" and given by the Spaniards, are part of the greater Athapascan group that migrated to the American southwest from Canada sometime between the fourteenth and sixteenth centuries. As a people of hunters-gatherers, they established campsites to last a season and then moved on to maintain the natural balance of the flora and fauna in the mountains or plains. The Mescalero Apache also were hunters-gatherers and were reputed for their adaptability and fierceness in combat. Both tribes' ability to adapt to changes in their environment rather than reshaping their natural habitat to fit their needs partially elucidates how their cultures traversed ages of invasions and attempts at eradication. Their activities of hunting and gathering limited their fate to their immediate environment; therefore, their mobility has been crucial to mitigate environmental changes.

The cradle of Navajo civilization, the place of the Changing Woman's birth—the *Dinétah*—is located east of Farmington, NM (Lat: 36.74°N Lon: 108.23°W Elev: 5502ft), and is still a pilgrimage destination for Navajos seeking their cultural origins.[6] Similarly, the *Diné* people have managed to protect their cultural heritage despite growing pressure from the surrounding world. For instance today, still, the Navajo matriarchal system provides that property of land and livestock goes from the mother to the youngest daughter and that after a girl marries, her husband comes to live with his wife's family. The permanence of these

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[4] Rina Swentzell, "Pueblo Space: An Understated Sacredness," in Marta Weigle, Frances Levine, and Louise Stiver, eds., *Telling New Mexico: A New History*, Santa Fe, NM: Museum of New Mexico Press, 2009, 45.
[5] *Ibid*., 47.
[6] Peter Iverson, "Diné (Navajo) History: 'Black Clouds Will Rise,'" in Marta Weigle, Frances Levine, and Louise Stiver, eds., *Telling New Mexico: A New History*, Santa Fe, NM: Museum of New Mexico Press, 2009, 79. *Dinétah* can also refer to the homeland of the Navajo Nation between the four sacred mountains.

traditions despite being surrounded by a patriarchal Spanish-Mexican and then Anglo-American society is proof of the capacity of Navajos to use confinement and oral transmission as ways to preserve their cultural inheritance.

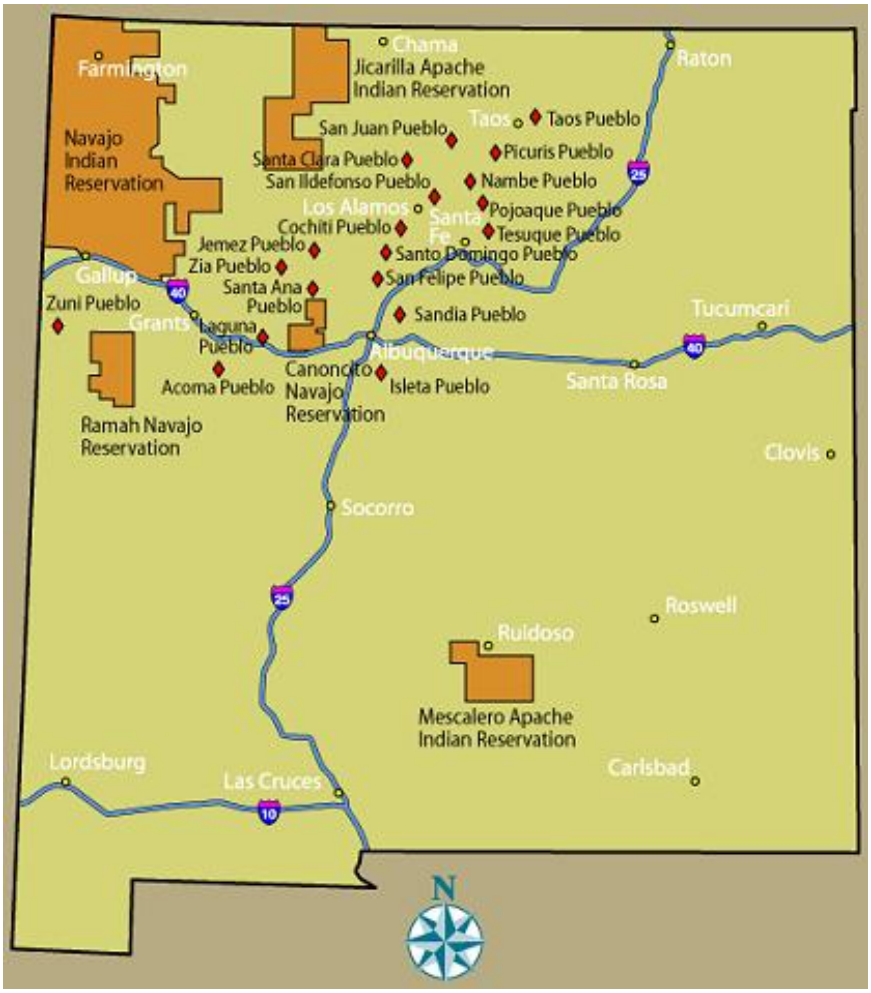

Fig. 3: Native American Tribes in New Mexico. Source: United States Department of Health and Human Service, "Welcome to the New Sunrise Regional Treatment Center," Rockville, MD: Indian Health Service, http://www.ihs.gov/albuquerque/newsunrise/, accessed January 25, 2015.

These native groups share not only a past of warfare and alliances but also share their reliance on the land to sustain life whether through agriculture, livestock rising, hunting, and gathering. When the Spaniards came looking for the seven cities of gold, they established their first relationships with the Pueblo Indians from the Rio Grande valley whom they considered "more civilized" than the semi-nomadic tribes known for their raiding. The area, now known as *Cibola*, comes from the name chosen by the Spaniards from a Zuni word meaning *buffalo*. Indians first encountered whites at Hawikuh, Zuni Pueblo, in July 1540. American anthropologist and specialist of southwestern Indian tribes Edward H. Spicer depicted the Pueblos as "cultural islands" in his work on the colonization of New Mexico, *Cycles of Conquest*. He explained that, wherever the land and resources lacked appeal to the

invaders or whenever the Indian population was able to resist the invaders, tribes avoided extermination and acculturation because their enclaves remained somewhat culturally protected.[7] It is indeed the cultural resilience and isolation of New Mexico Indians that has enabled them to retain their languages and their spiritual, artistic, and lifestyle traditions to endure historic upheavals over the centuries of invasion. At the beginning of the twentieth century, this population lived virtually the same way as their ancestors had for centuries. It would be impossible and disrespectful to sum up or generalize a millennia-old civilization in a few paragraphs. Thus, the intention here is solely to underscore how preserved and powerful Native American traditions have reached present-day New Mexico. Long-ingrained traditions and cultural characteristics will also serve to better comprehend the role they later played in the Manhattan Project and the development of the nuclear industry.

b. The Spanish-American culture in New Mexico

New Mexico is a minority-majority state; that is, unlike the majority of the United States, the Anglo-American population is a minority. The statistical majority is the Hispanic or Latino population whose culture has mixed with mainstream American traits to create a unique blend. While some members of this group are descendants of immigrants from Latin America, others can trace their lineage to the Spanish and Mexican settlers of the region. With Native Americans, these Spanish-Americans are considered as the ancestral peoples of New Mexico. Likewise, they became decisive participants, advocates, or critics of the scientific conquest; and their complex position between modern and traditional worlds is a key component of the New Mexico-Manhattan Project story.

As a Spanish colony, New Mexico struggled. Its inhospitable desert and mountainous landscapes fiercely defended by its original inhabitants largely hindered the settlement process. Spanish colonists looking for new civilizations, souls, and wealth were interested in what they heard of the Rio Grande valley people because as settled, agricultural communities, they were bound to have accumulated riches and would be easier to convert to the Catholic Church. In 1598, Don Juan de Oñate (ca. 1550-1626) became the first successful conqueror and governor of New Mexico at San Juan de Caballeros. After almost a century of gradual colonization, subjection, and conversion, the Pueblo people still sought to recover their

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[7] Edward H. Spicer, *Cycles of Conquest: The Impact of Spain, Mexico, and the United States on the Indians of the Southwest, 1533-1960*, Tuscon, AZ: University of Arizona Press, 1992, 1. Spicer's purpose in this work centers on the impact of western civilization on Indian populations and culture as a result of contact. He studied the way in which Indians have responded to contacts with people who viewed themselves as "bringers of civilization" (6).

homeland, but their successes were short lived. In 1680, the Pueblo revolt wiped the Spaniards off the land for thirteen years, forcing them to relaunch their conquering efforts. After the re-conquest, the colonists and Pueblos entered alliances to fight against their common enemies: the Navajo, Apache, Comanche, and Ute Indians (from Colorado) who raided their farms. Toward the end of the eighteenth century, the semi-nomadic tribes were eventually defeated, and an era of stabilization began during which the colonization took deeper roots.

The Spanish settlers brought along their religion, language, techniques, weapons, art, and ceremonials. Their cultural identity from New Spain and traces of Neo-Aztecism can be noticed in every aspect of contemporary New Mexican Hispanic culture and worldview. In that respect, the Spanish who came to live in New Mexico were already more American than European; and, as contacts with the Pueblos multiplied, other new cultural elements permeated their households such as indigenous pottery and woven carpets.[8] For two hundred and fifty years, the cultural influence between the people of New Spain and Native Americans was reciprocal despite their mutual antipathy that led them to war. Some places of worship eventually were superimposed as in the Chimayó valley between the Rio Grande and the Sangre de Cristo Mountains—the southernmost subrange of the Rocky Mountain. In the range's southern portion, the Catholic churches *Capilla del Santo Niño de Atocha* in El Potrero and *El Santuario de Chimayó* still attract pilgrims to venerate the Holy Child; these have been sacred places since pre-Hispanic times when the Tewa Indians of the Ohkay Owingeh Pueblo—also known as San Juan—regarded Chimayó as a shrine. The word "*Chimayó*" derives from the Tewa Indian name for the sacred hot springs, Tsimajopokwi; moreover, "since prehistoric time the inhabitants of this arid land have treasured these green valleys for their rich, alluvial soil and precious water for irrigation."[9]

Life was difficult for the settlers who had to adapt to the high plains and desert with little outside help and had to fight aggression from hostile Indians. Many came because they had a chance of becoming *hidalgos*, noblemen, if they stayed in New Mexico. Once tensions eased, a new autonomous society based on farming and pastoral activities developed. These enclaves of population "became bastions of cultural preservation, for they were at once so self-sufficient that they had little need for the outside world and yet so poor that the outside

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[8] Thomas E. Chávez, *An Illustrated History of New Mexico*, Albuquerque, NM: University of New Mexico Press, 2002, 10.
[9] Elizabeth Kay, *Chimayó Valley Traditions*, Santa Fe, New Mexico: Ancient City Press, 1987, 7.

world had little need of them."[10] Similarly to the Indian Pueblos, the Spanish settlements thus became cultural enclaves or Spicer's "cultural islands" as well. The small population units relied on hard work, self-defense, and sparse natural resources for survival. They even turned to native remedies and Indian medicine when needed like in times of epidemic. The situation of these villages as isolated, poor, and ignored by the rest of the world endured and was, in many respects, still the same in the 1940s.

Isolation operated a form of merging between Indian and Hispanic cultures on the vital aspects of the settlers' adaptation to the desert. Union and marriages commonly happened between Native Americans, especially Pueblo Indians, and Hispanics. The resources of New Mexico were not appealing enough and its surroundings were too dangerous for a more massive and energetic colonization; thus, it became insulated, far from the centers of New Spain or from the emerging United States. Then, the Mexican period marked the grand opening of this frontier outpost, increasing its role as a passageway for traders from foreign nations. Under the Spanish imperial rule, trade with foreigners had been forbidden, but New Mexico's ideal geographical situation revealed itself after Mexican independence with the opening of the Santa Fe Trail in 1822 and the growth of the older route to Chihuahua.[11] Yet another culture seeped into New Mexico with the arrival of Anglo traders and trappers.

c. The Anglo-American culture in New Mexico

On November 13, 1821, Don Pedro Ignacio Gallego accidentally met William Becknell's group of traders at the foothills of the Sangre de Cristo Mountains, a mile south of present-day Las Vegas, NM. Becknell (1787-1856) was a businessman who had failed at various enterprises on the Missouri frontier. He used French to communicate with the group of New Mexicans because it was the universal language of the North American fur trade. Gallego sent Becknell and his men to Santa Fe where they would sell their goods. This first contact laid down the terms of the Anglo-New Mexican relations as a commercial exchange and led to the development of the wagon route known as the Santa Fe Trail.[12] New Mexico

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[10] William DeBuys, "The Sangre de Cristo Mountains," in Marta Weigle, Frances Levine, and Louise Stiver, eds., *Telling New Mexico: A New History*, Santa Fe, NM: Museum of New Mexico Press, 2009, 27.

[11] See Josiah Gregg, *Commerce of the Prairies, or, the Journal of a Santa Fè Trader: During Eight Expeditions across the Great Western Prairies, and a Residence of Nearly Nine Years in Northern Mexico*, New York, NY: J. & H. G. Langley, 1845, https://archive.org/details/greggscommerceof00gregrich, accessed April 16, 2015.

[12] For accounts by travelers on the Santa Fe Trail, see Marc Simmons, ed., *On the Santa Fe Trail*, Lawrence, KS: University Press of Kansas, 1986, and Susan S. Magoffin, *Dow the Santa Fe Trail and into Mexico: The Diary of Susan Shelby Magoffin, 1846-1847*, Ed. Stella M. Drumm, American Tribal Religions (Book 3), Lincoln, NE: University of Nebraska Press, Bison Books, 1982.

could then be traversed by all kinds of people. Fur traders, Army men, families, slave-owners and their slaves, free African Americans, herders, farmers, and artists—all went through or came and left but rarely stayed. American manufactured goods rather than cultural traits first affected local cultures.

Even after New Mexico was ceded to the United States and became a territory, American settlers and contacts remained limited. Indeed, the "Americanization" of New Mexico was a rather slow process. The pace of Americanization was hindered by the hardships of life in the wild, dry land and proportionate to an American reluctance to be immersed in a radically different ethnic majority. One reason why New Mexico remained a territory for so long was that, "although New Mexico had sufficient population to qualify for statehood, the fact that the population was neither Protestant nor English-speaking caused opposition for the next sixty-two years."[13] General Stephen Watts Kearny (1794-1848) invaded New Mexico in 1846; it was declared a territory of the United States in 1850 but reached statehood only in 1912. The most aggressive critics of the territory did not hesitate to describe the territory as a burden for the United States and General William T. Sherman (1820-1891) was even quoted saying that "the United States ought to declare war on Mexico and make it take back New Mexico."[14] His sentiment is a straightforward indicator of New Mexico's lack of attractiveness to the American population even twenty years after its annexation. The most conspicuous Anglo presence in the territory was the Army, first during the Mexican-American War and later during the Civil War; but the Army also surveyed and carried out an inventory of the land and its resources. Consequently, land speculators, grabbers, prospectors, and opportunists poured into the territory from the east. A growing number of Anglo people of different economic, social, and ethnic backgrounds came and disturbed some of the established social patterns between Pueblo and Hispanic societies, especially regarding to the sacredness of land.

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[13] Chavez, *An Illustrated History of New Mexico*, 11. Admission in the Union was determined by the Northwest Ordinance of 1787 which stated that the population of a territory must be at least 60,000 people to qualify for statehood.

[14] "History: Statehood; Treaty of Guadalupe-Hidalgo—The 1850 Compromise," New Mexico Art Tells New Mexico History, *New Mexico Museum of Art*, Santa Fe, NM: New Mexico Museum of Art, 2010, http://online.nmartmuseum.org/nmhistory/people-places-and-politics/statehood/history-statehood.html, accessed January 9, 2014.

The Anglo conquest imported values centered on individualism, mercantilism, cash economy, and private property.[15] These values often collided with the local self-sufficient Native and Hispanic cultures that generally relied on collective efforts to survive. Toward the end of the nineteenth century, the arrival of the railroad accelerated the Anglo colonization, linking the oldest (non-Anglo) civilization in the country to the vibrant, cosmopolitan cultures of the East. The completion of the Atchison Topeka and Santa Fe (A.T. & S.F.) railroad in 1879 is usually termed a revolution in New Mexico history for it connected the territory with the eastern markets and sources of capital and permitted the inflow of thousands of Anglo settlers who acted as a pivotal factor in shaping the region into a potential American state. Myths associated with the West and its unoccupied land of opportunities lured immigrants to start a new life on "the frontier of civilization." Along with the increase of the Anglo population, the competition for the desert's limited resources became harsher.

The advent of new industries, of tourism, and of a cash economy became vectors for cultural changes among the Native American and Hispanic societies who entered the still-debated dilemma between acculturation to Anglo ways and preservation of their traditions. Tensions among the three groups never completely died out. Some of these tensions were even revived by the post-World War II advent of science, as will be shown throughout this work. Nonetheless, New Mexico has sometimes been "held up as a shining example of successful cultural *pluralism*, that is, a society in which distinctive cultural groups, while maintaining their identities, exist in a relatively peaceful atmosphere of tolerance, even mutual respect and cooperation."[16] This statement will be called into question by the study of the unheard voices of the Manhattan Project because of the new parameters introduced by new stakes in the twentieth century. However, I argue that this "successful cultural pluralism" founded on a relative equilibrium between the three ethnicities can be connected to a common characteristic that many New Mexicans—be they Indian, Hispanic, or Anglo—shared at the end of the nineteenth century: the various forms of attachment to their land. Even today, long-time residents in the region agree that something in the New Mexican soil, landscape, and

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[15] See Howard R. Lamar, *The Far Southwest, 1846-1912: A Territorial History*, Albuquerque, NM: University of New Mexico Press, 2000. And then for a larger perspective on Anglo influence and on the development of the American West after 1890, and Earl S. Pomeroy, *The American Far West in the Twentieth Century*, Ed. Richard W. Etulain, The Lamar Series in Western History, New Haven, CT: Yale University Press, 2008.

[16] F. Chris Garcia, "To Get Along or to Go Along? Pluralistic Accommodation versus Progress in New Mexico politics and government," in Richard W. Etulain, ed., *Contemporary New Mexico, 1940-1990*, Albuquerque, NM: University of New Mexico Press, 1994, 30.

climate creates a highly satisfying sense of belonging and rooting.[17] Therefore, access to the land and its resources has been the determining factor in the construction, maintenance, and disturbances of the New Mexican social order.

2. Land and lifestyles

a. Three cultures of the land

Despite the successive waves of colonization and settlements, the diverse cultural groups of New Mexico consistently faced the same struggles as their ancestors: competing for limited resources of water, game, wood, and grazing. In 1985, conservationist and environmental historian William DeBuys wrote "this competition is virtually as intense today as it was two thousand years ago, particularly if one adds 'employment' to the list of resources at stake."[18] Employment as a resource came rather late in New Mexico compared to the industrialized East. The Manhattan Project dramatically increased the value of the resource and, in thus doing, reconfigured the state's economy. However, changes leading to this turning point were already underway. In order to understand the extent that the native cultures of New Mexico were affected by the phenomenal changes after World War II one needs to be familiar with the pre-eminent significance of land and land ownership in the region. As already mentioned, for many New Mexican families, land meant everything because it meant *life*. Work, for instance, was defined as working off the land in order to survive—as opposed to exploiting the land to its maximum capacity for profit. Consequently, most occupations had to do with the exploitation of the desert's limited resources: farmable plots, water, wood, wild animals and plants, and minerals.

Each culture had, and still has, a different representation of the land. For Pueblo Indians, the people who came out of the earth, the land has a spiritual quality: the mountains conceal sources of spiritual energy and lakes or fissures in the ground are perceived as doors to the underworld. Their diverse shrines are usually perceptible by a natural landmark: a boulder, a stream, a hill, or a cave that also appears in their songs and stories. These sacred places on the land are conferred a protective or powerful property. Some tribes, such as the Zuni, Hopi, and Navajo, were reported to practice "geophagy" or "earth-eating" because the earth of the valley was believed to have healing properties. At Laguna Pueblo, clay balls found on the riverbank

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[17] Today's young generation has even modified the state's nickname, "the Land of Enchantment," to "the Land of Entrapment" to express this connection to the land and the need to always return to New Mexico.
[18] William DeBuys, *Enchantment and Exploitation: The Life and Hard Times of a New Mexico Mountain Range*, Albuquerque: University of New Mexico Press, 1985, 8.

were considered to have properties as well, and "the Hopi rubbed damp clay on their bodies in a war ritual."[19] *El Santuario de Chimayó* encloses *El Pocito*, a little well containing the sacred earth or holy dirt of the valley.

Fig. 4 a: El Santuario de Chimayó **Fig. 4 b: *El Pocito***
Source: *Welcome to El Santuario de Chimayó*, Holy Family of Chimayó, 2010-2013, http://www.elsantuariodechimayo.us/Santuario/windex.html and http://www.elsantuariodechimayo.us/Santuario/Pocito.html, accessed February 2, 2015.

Semi-nomadic tribes also display their attachment to the earth in their rituals. Navajo parents, for instance, traditionally bury their newborn's placenta and umbilical cord in the earth as a symbol of their cyclic connection to the soil since bodies are returned to the earth when one passes away.

While Hispanics did not consider their land as sacred, they did consider land the source of all life or as the "mother and protector of their traditional subsistence pastoralism."[20] Because they had little exterior help and were so isolated from the Spanish and later from the Mexican mainland, the Hispanic families who settled in New Mexico developed strong feelings of gratefulness and humility toward the land on which they depended. The colonists who settled in northern New Mexico "were true *paisanos* who lived off the land and close to it" according to Elizabeth Kay, specialist of the traditions in the Chimayó valley. A hymn to the region reflects these *paisanos*' attachment to the land: "*De la tierras fui formado, La tierra me da de comer; La tierra me a sustantado, Y al fin yo tierra ha de ser*."[21] Centuries later, many New Mexico Hispanics still pay tribute to this special bond between their traditions and the land. New Mexican journalist and writer Juan Estevan Arellano even considers *nuevomexicanos* as wholly part of the land; he writes about a "communion with the landscape" and explains that "Though once we, *la raza cósmica* (The Cosmic Race), might

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[19] Kay, *Chimayó Valley Traditions*, 17.
[20] DeBuys, *Enchantment and Exploitation*, 9.
[21] Kay, *Chimayó Valley Traditions*, 20. "From the earth I was made, and the earth shall eat me, the earth has sustained me, and at last earth I shall be also."

have been an alien presence in this land—because of our Spanish fathers—we have now become as natural in this landscape as the piñon tree."[22] Comparatively, the two ancestral peoples' relation to the earth and the land differs in that the Native American connection has a more spiritual dimension, yet the Hispanics and Indians share a sense of belonging *in* the land and a grateful relation *to* the land that historically provided for their vital needs.

These features are differently present in the Anglo relation with the land because Anglo ranchers and farmers who also lived off it and its resources aimed instead to participate in the market economy and expand their activities when possible. For the Anglo-American settlers, land was primarily valued for its productive potential. It was as commodity that could be exploited in capitalist ways through ranching, mining and cash-crop farming. This entrepreneurial view partially explains why it took a while for a substantial permanent Anglo community to establish residence in New Mexico. Simply put, as, workable resources were too scarce and unprofitable. However, more recent Anglo immigrants, especially artists, have expressed a devotion to the region's soul-stirring natural landscapes and sky, showing evidence of a deeper attachment to the land that came to exist in the Anglo New Mexican culture. Ultimately, one characteristic of the land that transcends these cultural schisms is the sense of autonomy that land ownership conveys in a region cut-off from the bigger centers of civilization and, thus, keeps for long the attributes of a frontier. As DeBuys and Harris note:

> Something happened in the soil of New Mexico. Isolated by broad deserts from their countrymen to the south, the *norteños* of New Mexico drew nourishment from the land in which they lived. […] While Virginia, Kentucky, or Missouri may have represented civilization's advancing edge for two or three generations, New Mexico remained a lonely and embattled frontier for three hundred years. It became *una patria*, a fatherland, in its own right.[23]

All New Mexicans associated property of the land with autonomy and stability, but this stability was challenged by changes in the legal definition of property that accompanied each conquest of the territory. Similar to the cultural evolution of its peoples, access to land ownership in New Mexico resulted from succeeding layers of Indian, Spanish, Mexican, and

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[22] Juan Estevan Arellano, "La Querencia: La Raza Bioregionalism," *New Mexico Historical Review*, Albuquerque, NM: University of New Mexico, Vol. 72, No. 1, January 1997, 32. On the Cosmic Race, which was inherited from the mix between Aztec and Spanish cultures, see Colin M. MacLachlan and Jaime E. Rodríguez O., *The Forging of the Cosmic Race: A Reinterpretation of Colonial Mexico*, Berkeley, CA: University of California Press, 1980.

[23] William DeBuys and Alex Harris, *River of Traps: A Village Life*, Albuquerque, NM: University of New Mexico Press in association with the Center for Documentary Studies, Duke University, 1990, 65.

American ruling. Later New Mexico land maps, such as the one in Figure 5 below, resemble a patchwork of many colors identifying the types of ownership, private and public, for every single acre. These maps can be read as the legacy of the three peoples who successively settled the region: Indian, Spanish, and American.

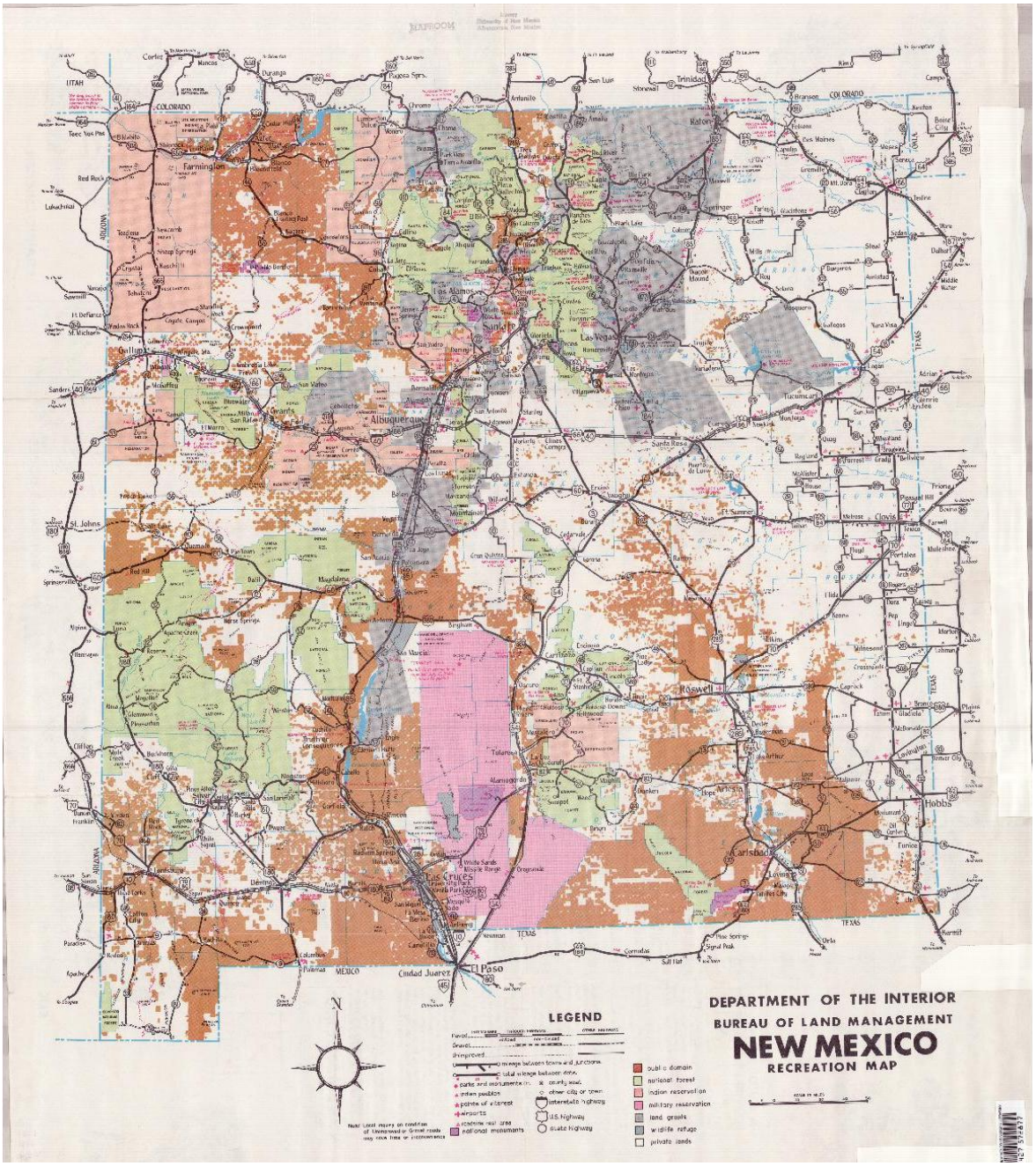

Fig. 5: New Mexico Recreation Map, 1968. Source: Department of the Interior, Bureau of Land Management, 1968, Albuquerque, NM, Map & Geographic Information Center (MAGIC), University Libraries, University of New Mexico, Centennial Science and Engineering Library.

b. The Land Grant system

The Land Grant system is one of the greatest vestiges of the Spanish colonial empire in the American Southwest. It is still perceivable today and has been the source of much regional

advancement. Unresolved Land Grant issues reappeared in northern New Mexico years after the Federal Government took possession of what used to be land grants in Los Alamos, and, thus, these issues are wholly part of the Manhattan Project's legacy.

Land grants originally were the crown's favored way of colonizing territories: small parcels of land were granted to reward loyal Spanish citizens, mostly soldiers. The Treaty of Guadalupe Hidalgo ratified on February 2, 1848, to put an end to the Mexican-American War and to transfer New Mexico to the United States stated that "property of every kind now belonging to Mexicans [...] shall be inviolably respected."[24] Yet, the numerous violations brought about by the transition to the Anglo-American legal system stripped many original New Mexico citizens of their land and thus of their livelihood.

The ancestors of the land grants were the *encomiendas*. These were lands awarded to Juan de Oñate and his followers who became *encomenderos*, owners and exploiters of these lands—which often infringed on Pueblo land. The abuses of these absentee landlords who excessively asked tributes from the Indians living on their land eventually led to the Pueblo Revolt of 1680. The *encomiendas* system was abandoned after the re-conquest by Governor Diego de Vargas in 1692 and was replaced by land grants. De Vargas awarded the first private grants to his faithful followers who resettled the land. Among the first to receive land grants were also the Indian Pueblos in an effort to recognize their right to property and avoid yet another massive revolt. The current Pueblo reservations delimited by the United States are based on the borders of the land the Indians were granted by the Spanish.

Thereafter, anyone could request ownership from the governor of a parcel on which they had set their sights by following these steps: address a written petition to the governor explaining why the petitioner(s) were in need of the land, describing it, and promising to settle and cultivate it; get a favorable report by the local *alcalde* (the government official) who would investigate the case; receive the governor's approval; and, finally, be granted the act of possession. The boundaries were usually determined by natural markers on the landscape such as a river, a ridge, a hill, etc. Robert J. Torrez, former New Mexico State Historian (1987-2000), studied *The Land Records of New Mexico* at the New Mexico Records Center and Archives in Santa Fe. He comments on the act of taking possession of the land on the day the grantee met with the *alcalde* to determine these boundaries: "This marvelous procedure

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[24] "Transcript of Treaty of Guadalupe Hidalgo (1848)," The Avalon Project at Yale Law School, *Our Documents.gov*, National History Day, National Archives and Records Administration, and USA Freedom Corps, http://www.ourdocuments.gov/doc.php?doc=26&page=transcript, accessed January 12, 2012.

demonstrates that in order to own property under the Spanish and Mexican land grant system, you had to physically step on the land, run your fingers through the soil, and make a public commitment to live on it, cultivate it, and, if necessary, defend it with your life."[25] Therefore, the land grants ceremonial was an expression of duty; it integrated an obligation to commit to one's land by all means and at all costs into the New Mexican Hispanic culture.

But the most important type of grants which became a legal puzzle once the U.S. began imposing yet new ownership laws, were the communal grants. Each grantee would be allotted an irrigable plot and a parcel to build a house. The rest of the grant would be commonly used by the group of settlers for grazing pastures, hunting, gathering wood and plants, fishing, watering, etc. While private grants could be sold as private property after four years, common grants could not. As a consequence of this system, the Spanish villages' social organization was centered on a collective exploitation of land and water combining private and common land grants in an arrangement where fences, even to separate individual plots of land, were useless. Between planting seasons, animals were left to graze on the stubble in private fields. Older boys and young men were employed to keep the livestock where they were supposed to be and to fetch them when they wandered too far. This system enabled a relatively equal distribution of resources among families, thus compensating for the irregularity and unevenness of the New Mexican landscape, and preserving its indispensable natural balance, key to a sustainable exploitation of its limited cultivable areas. At the core of this organization based on individual and communal land use for subsistence purposes, was what William DeBuys called a culture of *verguenza*: an honesty that refrained people from designing ways "to advance themselves at the expense of others."[26] Excesses were thus generally proscribed, and the villagers' agro-pastoral existence rested on a perpetual seasonal cycle.

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[25] Robert J. Torrez, Former State Historian, "New Mexico's Spanish and Mexican Land Grants," *New Mexico Genealogical Society*, Albuquerque, NM: New Mexico Genealogical Society, 1997, http://www.nmgs.org/artlandgrnts.htm, accessed January 2012.
[26] DeBuys, *Enchantment and Exploitation*, 195.

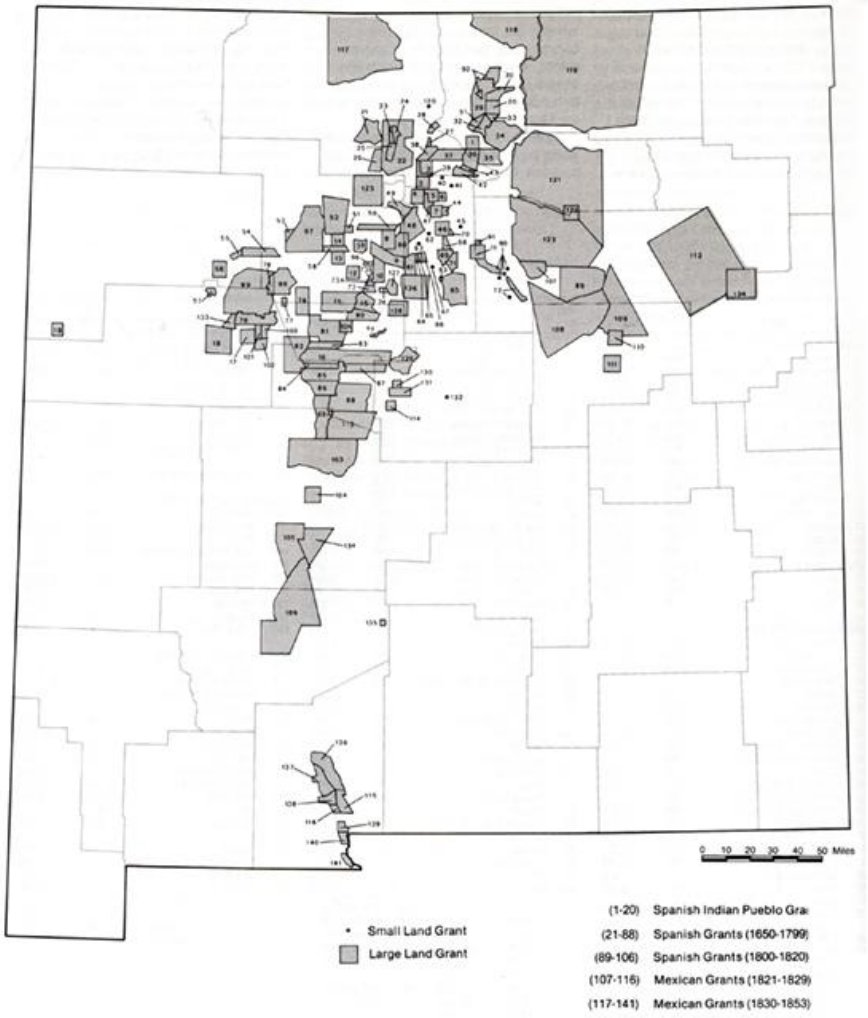

Fig. 6: Land Grants in New Mexico. Source: Jerry L. Williams, ed., *New Mexico in Maps*, Albuquerque, NM: University of New Mexico Press, 1986, 104.

c. Land transfers to Anglo immigrants

Under Spanish rule, foreigners were forbidden to acquire land without becoming Spanish first; but, similar to commercial relations, Mexico's independence in 1821 from Spain was a turning point for land ownership in New Mexico since, after 1828, it became possible for foreigners to request and be awarded a land grant. This shift allowed the coming of the first Anglo permanent settlers who, some of whom, married Mexican women and became naturalized Mexican citizens.[27] As the small Anglo population grew, competition among the would-be landowners became harsher, and an increasing number of parcels were gradually transferred into the hands of eager, sometimes unscrupulous newcomers. Whereas the original Anglo grantees abided by the Mexican legal system, the American view of

[27] Malcolm Ebright, "New Mexican Land Grants: the legal background," in Charles L. Briggs and John R. Van Ness, eds., *Land, Water, and Culture: New Perspectives on Hispanic Land Grants,* Albuquerque, NM: University of New Mexico Press, 1987, 25-26.

property violently clashed with the natives' land-and-water-sharing system once New Mexico entered its long territorial period. Historical analyses demonstrate that the outcome of this clash was an overwhelming expropriation of Hispanic land to the benefit of Anglo immigrants and the disturbance of the fragile balance local communities had built with their environment. Both points will prove to be of paramount importance when addressing later land issues after the building of the Los Alamos Laboratory that sits on one of the largest land grants in northern New Mexico.

The legal and historical mechanisms at work during the transitional period that initiated the readjustment of the territory to American values were both slow and violent due to the width of the cultural and ideological divides between the former and new sovereign nations. As a result of these characteristics, integration was never fully attained and the adaptation or combination of Spanish-Mexican to or with Anglo-American values has been a delicate, continuing process since the 1850s. Regarding the land issue, the American colonization forced its institutions on top of those established by predecessors, regardless of topographic unsuitability, rather than merging the two opposing systems in an approach of adaptation to the specificities of the region. Although the Guadalupe de Hidalgo Treaty (1848) should have protected Mexican proprietors,[28] the notorious deletion by the U.S. Senate and then President Polk of Article X, which would have put a guarantee on Spanish and Mexican land grants, minimized this protection from the start. As for Pueblo Indians, their property rights were not mentioned in the Treaty since they were included in the Land Grant system. The ensuing adjudication process required the non-English-speaking residents of the conquered territories to follow a procedure to claim their rights to the land they lived on and to obtain confirmation of these rights from U.S. authorities. Again, New Mexico suffered from its lack of attractiveness, its poverty, and its colonial status. In contrast, California, which became an American state after only two years as a territory in 1850, had the ability to ensure by vote in Congress that the adjudication be conducted as impartially as possible. Lawyer and historian

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[28] Article VIII of the Treaty reads "In the said territories, property of every kind, now belonging to Mexicans not established there, shall be inviolably respected. The present owners, the heirs of these, and all Mexicans who may hereafter acquire said property by contract, shall enjoy with respect to it guarantees equally ample as if the same belonged to citizens of the United States." "Transcript of Treaty of Guadalupe Hidalgo (1848)," The Avalon Project at Yale Law School, *Our Documents.gov*. For a discussion of the property rights derived from the Treaty of Guadalupe Hidalgo and the differences in treatment between Indian and Hispanic rights, see Christine A. Klein, "Treaties of Conquest: Property Rights, Indian Treaties, and the Treaty of Guadalupe Hidalgo," *New Mexico Law Review*, Albuquerque, NM: University of New Mexico School of Law, Vol. 26, 1996, 201-255. Klein demonstrates that Treaty promises are not equal in a comparison of the status of Indian tribes as dependent sovereigns under the guardianship of the United States to the individual status of Hispanics, who were perceived as members of a community, but not as a collective unit.

Malcolm Ebright, who compared the pace of the processes in the two regions, explained that, when 73% of claims made by Californians had been confirmed, only 24% of New Mexicans' had. The main explanation for the difference lay in contrasting economic potentials: "Being a poorer state than California, New Mexico found that Congress tended to minimize the importance of settling their land grant titles, so much so that the procedure first set up to New Mexico was wholly inadequate to deal with this vast and complicated issue."[29]

In 1854, Congress instituted the office of Surveyor General of New Mexico and tasked the office with extending the federal public land survey that divided the redefined American space into rectangles called townships that would later be ready for settlement through various legislations such as the Homestead Act. This mathematical systematic method hardly suited the arid New Mexican varied landscape. Moreover, land grants would be surveyed only once confirmed. Therefore, it took over a century for areas in some of these grants to be surveyed. The task of recommending whether claims should be confirmed or not by Congress was under the responsibility of the Surveyor General. Corruption, dishonesty, and speculation were widely spread among claimants who approached him. Moreover, this system did not have a provision for overlapping land claims, so it applied the rule "first there, first served." According to Ebright, "It was not unusual for enterprising Anglos to wrest from the *Hispanos* their land grant property through fraud or manipulation of the land laws."[30] Original Hispanic grantees were confronted with dishonest individuals who sought any way to enrich themselves at the expense of others. To defend their rights and guide them through a legal maze they barely understood, villagers would hire lawyers. And, because the villagers often did not have the money to pay for their legal counsels, so they would give a lawyer a portion of the land that the lawyer had helped them confirm in exchange for his services. The latter was sometimes among those driven by unprincipled designs and would then use the 1876 Partition Act to coerce his fellow owners into selling at a low price to an accomplice. Members of the famous Santa Fe Ring—lawyers but also businessmen, public and legal officials—were specialists in land grant speculation. In 1889 a new institution was created to deal with the matter: the Court of Private Land Claims that overly favored the government in most cases because villagers had no access to Spanish and Mexican records that could prove their title to the land. The court could reject a claim on grounds of insufficient proofs and documents or of failure to settle the land among other reasons.

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[29] Ebright, "New Mexican Land Grants," in *Land, Water, and Culture*, 33-34.
[30] *Ibid*., 34.

Meanwhile, communal land grants were acquired by the U.S. government when the Supreme Court stated that the common lands that had belonged to the governments of Spain and Mexico at the time their titles were made had passed to the U.S. government under the Guadalupe de Hidalgo Treaty (1848). This ploy was how the Federal Government acquired the Carson and Santa Fe National Forests in the north. The U.S. government was to blame for failing to ease the transition from Spanish to American law according to William DeBuys. Some land grants were very large but were used by hundreds of villagers as collective grazing lands for example—as was the case for the Las Trampas Grant. For that reason, American commissioners found it too hard to partition the Grant with the owners and preferred selling the land at public auction to the highest bidder for cash. The Hispanic owners were not represented in court.[31]

New Mexicans, whose survival often depended on their land, did fight back using physical violence against specific actors of these expropriations, but their resistance was generally forgotten because, in the end, it failed against the all-crushing American bureaucratic machinery. Sociologist Carl S. Knowlton argues that "They were left defenseless before the invading, dynamic, legalistic, lawless, and competitive Anglo-American civilization that did nothing to prepare them for adequate citizenship; stripped them of most of their land; reduced them to the situation of a conquered people without enforceable rights, and left them in extreme poverty."[32] The land grabbing by enterprising, sometimes immoral Anglo newcomers posed a problem because their ways put an increasing strain on the established cultural ecology[33] of New Mexico, which was unfit for a market-oriented capitalist economy. These practices also ushered a pattern for land appropriation repeatedly used thereafter by American companies, governments, and individuals in time of need such as during World War II and the Cold War. Nonetheless one should not forget that these practices were generally observable everywhere in the American West and that richer regions attracted even greater numbers of opportunists. Elsewhere, changes were more spectacular and faster while, in New Mexico, the harshness of an arid high-altitude climate acted as a practical deterrent. Despite the flow of immigrating entrepreneurs and the influence of the Anglo lifestyles that

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[31] DeBuys, *Enchantment and Exploitation*, 175.

[32] Clark S. Knowlton, "Causes of Land Loss Among the Spanish Americans in Northern New Mexico," published in *Rocky Mountain Social Science Journal*, Odessa, TX: Rocky Mountain Social Science Association, Vol. 1, May 1963, (202-211), 2.

[33] Cultural ecology is a term coined by anthropologists to refer to the reciprocal influence between people and their environment. For more information on the subject, see Julian Haynes Steward, "The concept and method of cultural ecology," in Nora Haenn and Richard Wilk, eds., *The Environment in Anthropology: A Reader in Ecology, Culture, and Sustainable Living*, New York, NY: New York University Press, 2005, 5-9.

were brought in, many New Mexican families in rural areas—which were most of the region in the late nineteenth century—clung to their ancestral seasonal lifestyles. Until the second half of the twentieth century, the geographic, climatic, and ecological specificities of New Mexico dictated the life conditions of these residents in a way that simultaneously slowed down modernization and safeguarded traditions but also maintained these inhabitants in a situation of dire poverty.

d. Ancestral New Mexican lifestyles

One of the effects of the Second World War on the region pertains to these ancestral New Mexican lifestyles as, over time, this traditional world gradually faded. For this reason, it is essential to portray these traditions rigorously and depict the world in which the New Mexican populations were pursuing their long-standing quest for sustainable adaptation to the dry broken landscape before they experienced a novel, unusual invasion. The geography of New Mexico—within its modern boundaries—varies from the high Great Plains in the east, the Colorado Plateau to the northwest, the Rocky Mountains range in the north central section, and the Basin and Range region to the south, thus called because of the alternation between rugged mountain ranges and desert basins. Residents' occupations depend on the nature of their region's soil and on whether the climate is arid or semiarid. In the eastern third, for instance, the plains have long been used for sheep and cattle ranching. To the north and along the main rivers, agriculture developed with the first Pueblo dwellers. In more elevated regions, Hispanic herders followed a seasonal cycle of vertical transhumance to make the most of the irrigated slopes; by doing so, they could retreat to the valley and avoid the severity of winters in the mountains. Populations accordingly congregate in the portions of land, disseminated in between wide deadly deserts, where they could find enough water, wood, cultivable and/or grazing soil to survive.

A notable fact about the New Mexicans' relationship to their land, as mentioned before, is a constant and utter reliance on the soil and what it can produce with little transformation. The cultural ecology of northern New Mexico reveals that Hispanic villagers and Pueblo Indians used the land for virtually every aspect of daily life. For their houses, they used mud and river cobles for the foundations, sun-dried adobe[34] bricks, held together by mud mortar and plaster for the walls, and beams and lintels from the surrounding forests for roofs. The

[34] Adobe is a building material traditionally used in the Southwest. The name refers to the sun-dried bricks made of mud (sand and clay), water, and organic materials (straw or dung).

fields were planted with fruit, corn, alfalfa, wheat, barley, oats, chickpeas, pinto beans, potatoes, and green *chile* among other crops. For meat they relied on hunting (for big game but also rabbit or wild turkey), fishing (mostly river trout), and the livestock (goat, sheep, cattle, pigs, etc.) they had grazing on the plaza's communal lands and on mountain pastures. They also gathered plants and fruits from the surrounding areas for medicinal and cooking purposes. Furthermore, in the arts and crafts, tools or material provided by nature were omnipresent such as in the celebrated Pueblo Indian pottery. Indian potters still use raw clay, make natural dies from plants and minerals, and draw with a yucca leaf as a stylus. The renowned turquoise, bead, copper, silver, and other jewelry is also linked to their rituals.

The use of varying farming techniques including dry, floodwater, and irrigation farming demanded labor and time; farming, thus, gave the villages' life its tempo accordingly to the seasons. A great majority of New Mexicans lived seasonally and agriculturally, but few farmers sold the products of their labor because what they grew or raised was meant to be consumed by the family. Meat was the true indicator of wealth in Jacobo Romero's reminiscences of his small Hispanic village in the Sangre de Cristo Mountains, El Valle: "The net value of things was calculated not in dollars, possessions, or leisure, but in terms of food. All the irrigating, fence repair, haying, and tending of cattle led toward one goal: the production of meat. [...] Meat was security, sustenance, the foundation of the household."[35] "Sustenance" is the key word in comprehending village life during the 1900s in rural New Mexico as these communities were self-sustaining and almost autarchic. Some families brought in an outside income from weavings made in the winter months of November through February. Surplus crops and homespun blankets were taken to other villages to be bartered for other goods such as beans, potatoes, and wool. At the end of the summer harvest, neighbors helped one another to cut the wheat or tie *chiles* in *ristras*—long strings of hot pepper that were left to dry in the sun under porches. Yucca root, *amole*, was also gathered on the hills once a year by the men to make soap; and the women would wash curtains, bedspreads, furniture coverings and linens at the *acequia* behind the *plaza*, the main village square. Elizabeth Kay, who described traditions in the Chimayó valley notes that "Property was kept up and replastering done yearly. Land remained unfenced and doors unlocked as there was little crime."[36]

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[35] DeBuys, et al., *River of Traps*, 34.
[36] Kay, *Chimayó Valley Traditions*, 55.

Water always was the inescapable issue of life in a desert climate. As a matter of fact, water shortages became a major, recurring issue with the arrival of water-greedy easterners during the Manhattan Project because of their lack of education regarding living in such an environment. New Mexicans perpetually dedicated most of their energy to providing water both for domestic and agricultural purposes. These duties were usually shared by communities who used communal labor to maintain and regulate their irrigation system of *acequias*—ditches. In the Cañones upland region, for instance, associations of users would agree on informal rules and elect a *mayordomo*—with sometimes a board of commissioners if the group were larger—who would settle disputes between users and organize the cleaning of the ditches each spring by a joint labor force.[37] As shown by the many instances of cooperation whether in the Hispanic villages or the Pueblos, the community needs often superseded individual needs. Solidarity was a pillar of society and left little space for personal distinctions.

Charles Lange's study of Cochiti Pueblo in the 1950s provides information on the interactions between the Pueblo residents and the Hispanics. Cochiti is one of the rare tribes to have Spanish-Americans reside on its territory. There were friendships and even marriages between Cochiti and Hispanics but their relations varied from ignorance to a desire to oust them from the community. Hispanics were forbidden for instance to watch some of the Indian dances. The trading post was the place where people bartered, and, in Cochiti, the first store was managed by a Mexican family in 1895. Their descendants still operated stores in Cochiti in the 1940s. The Cochiti people were dependent on these stores because motor transportation only became available after the War, providing opportunities to go to town and trade outside the pueblo. Pueblo members also sometimes asked Spanish-Americans who could speak English to help them with official letters or government documents. Yet, one of the tightest bonds between the two cultures was the Roman Catholic Church. The influence of religion on pueblo life could be seen in the combination of certain Native celebrations with the calendar of the Catholic Church.[38]

In this region, even after 1900, few kitchen staples were not locally produced—coffee and sugar were examples—because villagers either grew or bartered for all their food, seldom

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[37] John R. Van Ness, "Hispanic Land Grants: Ecology and Subsistence in the Uplands of Northern NM and Southern Colorado," in Charles L. Briggs and John R. Van Ness, eds., *Land, Water, and Culture: New Perspectives on Hispanic Land Grants,* Albuquerque, NM: University of New Mexico Press, 1987, 186-187.
[38] Charles H. Lange, *Cochiti: A New Mexico Pueblo, Past and Present*, Albuquerque, NM: University of New Mexico Press, 1959, 17-20.

needing any money in their transactions. As a result of this widespread autonomy, employment was originally not a very sought-after resource in New Mexico outside of the two main urban centers in Albuquerque and Santa Fe. DeBuys, whose work is a great treasure for understanding the reciprocal relationship between men and their environment in the area, studied the ecologies of northern New Mexico and the lives of communities in the arid southwest. He writes: "The most important thing I learned was that a society's relationship to land is reciprocal [...]. In adapting to the environment, a society alters the land both purposefully (clearing fields for agriculture, building dams on rivers) and by accident (overgrazing, climate change)."[39] The history of New Mexico can indeed be retraced by the alterations its successive populations made to the land, which is, in that sense, the memory of generations of colonizers. Their labor, their hopes and excesses are all instilled in a memory of the land and show in its responses to them. In *River of Traps*, Jacobo Romero's testimony of the hardships of life in his isolated community—plowing, irrigating, harvesting, herding, hauling firewood, and repairing the irrigation ditches—emphasizes the exceptional durability of this relationship:

> To be sure, the people who wrung a living from Diamante's chilly meadows lived in many ways like the *indios* who gave the *banco del Apache* its name. Even more, they lived like generations of New Mexicans before them. They depended for all they had or hoped for on the strength in their arms, they capacity to work, and la *voluntad de Dios*. They knew their prayers might go unanswered, their work unrewarded. They were subject at every turn to the mountain storms that washed precious seed from the furrows or flattened crops, to the winter snow which at 9,000 feet [2,743 meters] accumulated several feet deep and lingered for months.[40]

The religious fervor of Hispanic farmers, referred to here with the expression "*la voluntad de Dios*," permeated most aspects of village life. Dependence on the whims of a difficult climate turned most farmers toward God to pray for better conditions. Spanish colonists were devout Catholics, and their descendants perpetuated many of their religious traditions. Private chapels were common in northern villages; they were centers for Mass and feast day celebrations. On New Year's Eve, the Medina family of El Potrero, for example, would give a dinner at the *Capilla del Santo Niño de Atocha* to all parishioners after High Mass. Generations of New Mexico's Hispanic families have grown up hearing tales of the

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[39] DeBuys, "Sangre de Cristo Mountains," in *Telling New Mexico*, 23.
[40] DeBuys, et al., *River of Traps*, 65.

Holy Child, *Santo Niño,* wearing out his shoes on nightlong errands of mercy about the countryside. Hence there still exists the custom of placing an offering of baby shoes at the foot of his statue in the chapel.[41] The importance of religion also showed in the spatial organization of these communities centered on the plaza and the main church. Residential areas were built around these two cornerstones of the village's life. When a settlement on the Spanish or Mexican frontier was established, the plaza, church, and residential lots were first built. Only afterwards would each member family receive a title to a lot, irrigated land, and the rights to graze livestock and cut timber on the village commons. A propriety grant could also be "awarded to a prominent individual who promised to secure settlers, distribute residential sites and irrigated land, build canals and dams, a church, secure a priest."[42] He was proprietor or patron of the village, and the settlers would assist him militarily. This type of grants was usually found in areas subjected to Indian raids. The *sitios*—a large personal grant awarded in return for military, economic, or political services—also became more and more like community grants as descendants multiplied through the laws of partition that provided for the division of property among heirs.

At the turn of the twentieth century, New Mexico was still very scarcely populated, but a few towns had attracted bigger numbers. Anglo merchants, lawyers, bankers, politicians, and ranchers followed the Spanish missionaries and established their headquarters in Santa Fe, the former royal town of the Holy Faith and capital of the Spanish "Kingdom of New Mexico" built over a few Pueblo villages that the Spanish dominated in the 1880s. In the nineteenth century, lawlessness, corruption, and poverty struck the American travelers who reached the end of the Santa Fe Trail. Originally, Santa Fe's organization did not much differ from any other Spanish village with a plaza and a church at its core, but, being the seat of power, Santa Fe attracted the most settlers and gradually metamorphosed under their influences. Despite the town's history as a dangerous outpost on the frontier, it had become the state's center of culture and civilization at the time of statehood.

Meanwhile, the town of Albuquerque was also growing and split into two parts: Old and New Town after the arrival of the railroad. The Spanish had settled in Old Town in 1706: twelve families acting on orders from the Spanish governor formed the settlement named after Don Francisco Fernandez de la Cueva Enríquez, Duke of Alburquerque, 34th Viceroy of Spain

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[41] Kay, *Chimayó Valley Traditions,* 1.
[42] Knowlton, et al., "Causes of Land Loss," 2-3.

(1653-1660).[43] Prior to the beginning of Spanish exploration in 1540 with Francisco Vasquez de Coronado's expedition, Indian groups had been living in this area for approximately twelve thousand years. There were dozens of Pueblo villages in the Rio Grande Valley before the Spanish settlers created small agricultural communities adjacent to them. The settlement centered on a plaza and a church with a bell tower; adobe buildings were clustered around these main structures, and irrigated farmland outlined the community. Albuquerque prospered but grew slowly.[44] Little remains of this past, except a few archeological sites and present-day pueblos to the north and south of Albuquerque. The heritage of this period resides in certain roads, the agricultural irrigation ditch system, and agricultural lot orientations in some areas of the valley.[45]

The small community became a town with the arrival of the railroad in the 1880s; by the end of the nineteenth century, a new urban space emerged. New Town Albuquerque undertook the Americanization of their community "particularly through the replication of commercial and public architecture from styles commonly found in the eastern half of the United States and the newer big cities of the West."[46] The town had become a bastion of the Anglo invasion so much so that it had changed its name because the Anglo-Americans entering the town after the 1840s had a hard time pronouncing the Duke City's long, strange name and the additional "r" was dropped to facilitate pronunciation.[47] Town life in nineteenth-century Albuquerque was also characterized by rampant lawlessness, which did nothing to make New Mexico more attractive as explained by Miguel Antonio Otero, author and New Mexico Governor (1892-1906), in his celebrated *My Life on the Frontier: 1864-1882*: "New Mexico was located so as to receive the backwash from two streams. From one side Texas, Kansas, Colorado, and the Indian Territory deposited their flotsam and jetsam of humanity, while from the other side Utah, Arizona, and California spewed their human refuse. New Mexico became a sort of catch basin for this type, and Las Vegas in particular the

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[43] On the toponymy of places in New Mexico, see Robert Julyan, *The Place Names of New Mexico*, Albuquerque, NM: University of New Mexico Press, 1998.
[44] Robert Turner Wood, "The Transformation of Albuquerque 1945-1972," Doctoral Thesis, University of New Mexico, 1980, 6-7.
[45] Stephen M. Wheeler and Wade Patterson, "The Rise of the Regional City: Spatial development of the Albuquerque metropolitan area," *New Mexico Historical Review*, Albuquerque, NM: University of New Mexico, Vol. 82, No. 1, Winter 2007, 2.
[46] Carleen Lazzell and Melissa Payne, *Historic Albuquerque: An Illustrated History*, San Antonio, TX: Historical Publishing Network, 2007, 49.
[47] Marc Simmons, *Albuquerque, A Narrative History*, Albuquerque, NM: University of New Mexico Press, 1982, xv.

rendez-vous for them."[48] The violence also appeared through "aggressive business enterprise"; and anyone, despite their state of wretchedness, could rise to fortune and political power. While Spanish-Americans owned small businesses and were discreet in politics, "hard-driving Anglos" made fortunes and invaded the political landscape: "many of the people who did the best came from far-off places."[49] So both cities, Albuquerque and Santa Fe, were the converging centers of Anglo immigration to New Mexico but suffered from a bad reputation in spite of their American communities' efforts to redraw the urban landscape to their cultural sensibilities.

A major upheaval at the end of the nineteenth century accelerated the Americanization of city life: the railroad. This historical rupture inaugurated a period of massive demographic and political changes in the territory, which contributed to a situation of economic strain and instability. After having presented the New Mexican peoples, their history, lifestyles and environment, it is now necessary to have a clear view of the economic struggles the populations were confronted with in the period after the territory's incorporation in the national railway system until 1942 which played an important role in the region's readiness for new economic opportunities.

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[48] Miguel Antonio Otero, *My Life on the Frontier: 1864-1882*, Rev. ed., Santa Fe, NM: Sunstone Press, 2007, 181.
[49] Wood, "The Transformation of Albuquerque," 7; 51.

CHAPTER 2: NEW MEXICO'S ECONOMY ON THE EVE OF WORLD WAR II

1. Economic diagnosis

a. Railroad and industrialization

According to historian Hal Rothman, the American West lagged thoroughly behind the rest of the country in terms of industrialization before World War II. No state lagged more than New Mexico. Rothman demonstrated how the Western states still relied on their most precious resource, land, to be the pillar of their economies and to provide the industrialized East with raw materials to be transformed and consumed: "Industrialization made the acquisition of capital and the means of production the new measure of wealth. In the West, people still sought the preindustrial equivalent, land. [...] No longer did mere ownership connote wealth and freedom. The value of land was predicated on the kind of products it could deliver to the markets of the East."[1] Western economies developed through this relation of dependence and consequently relinquished much of their autonomy.

In the case of New Mexico's evolution at the beginning of the twentieth century, its tardiness in adopting the values of the industrial age was in accord with its history of reclusiveness and its cultural differences to the rest of the country. Again, as proof, one can mention its sixty-four-year-long status as a territory. According to historian and activist Roxanne Dunbar-Ortiz, "New Mexico's longtime status as a territory allowed a continuance of colonial-like conditions and uncontrolled economic exploitation of resources and labor."[2] That is why a dual, or even contradictory, picture can be painted of early twentieth century New Mexico: massive changes accompanied the growing Anglo presence and the introduction of a cash economy but, at the same time, most of the state remained isolated from these changes, extremely poor by modern and contemporary standards, a place where residents perpetuated traditions and lived in virtually the same way as two hundred years earlier.

By 1880 the railroad, symbol of industrialization, had reached Albuquerque and begun to challenge the old economic system by turning into a huge industry offering thousands of jobs. The A.T & S.F. Railway did not allow Albuquerqueans to make fortunes since it was owned in Kansas, but it made jobs available. It became the largest employer in town boasting

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[1] Rothman, *On Rims and Ridges*, 20.

[2] Roxanne Dunbar-Ortiz, *Roots of Resistance: A History of Land Tenure in New Mexico,* Norman, OK: University of Oklahoma Press, 2007, 119. Roxanne Dunbar –Ortiz is also known for her work on indigenous history; her last work challenges the founding myths of the country, using the concept of colonialism to examine American policies toward indigenous peoples in *An Indigenous Peoples' History of the United States*, Boston, MA: Beacon Press, 2014.

2500 workers.[3] By 1908, "an average of 53,000 freight cars annually were passing through Albuquerque, and eight passenger trains traveled in and out of the city every day."[4] As everywhere along the rail, buildings mushroomed, manufacturing and merchandising firms underwent a remarkable growth, and all finance-related activities were boosted. Twenty years after the first locomotive entered the city, "many of the industrial firms that had been established in the early railroad era were solidly entrenched and flourishing. They included everything from brickyards, tanneries, flouring mills, packing houses, and foundries to wagon factories, steam laundries, woolen mills, bottling works, and a cement plant."[5] To show the importance of the railroading industry for Albuquerque, one should note that the famous Central Avenue was originally called Railroad Avenue and renamed in 1912. The railroad is also the reason why Albuquerque overtook Santa Fe as the territory's economic center since the A.T & S.F. line bypassed the old capital because of terrain difficulties to arrive directly in old town Albuquerque. Enthusiasm was such that the city businessmen undertook to organize a Territorial Fair for October 3-8, 1881 to celebrate the railroad's progress and advertise local productions.[6] By 1945, the population of Albuquerque totaled about 50,000 people with a relatively small Hispanic proportion for the state of 35%, and the town's economy was characterized by a vigorous competition among businesses for trade, and a few monopolies or oligopolies. Among the 28 drug stores in the city, only three were operated under the same franchise; this diversity in competitors was the same in most sectors of small business.[7] This economic picture was distinct from the one that was to develop in the postwar years.

Elsewhere, the railroad also changed a few aspects of New Mexican life as it brought manufactured goods insofar unheard of. In the Española valley for instance, goods such as sewing machines, iron stoves, rice, raisins, and canned sardines appeared on the plazas of small communities like Chimayó, Cordova, or Truchas. In addition to gaining a right-of-way through the Native American reservations, the Santa Fe railroad also employed thousands of Pueblo Indians, mostly from the Laguna and Acoma Pueblos, and these followed the railroad to work in Arizona and California. Proximity to the new national network of railroad lines meant that the remotest places in the country could potentially be reached by outsiders and

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[3] Wood, "The Transformation of Albuquerque," 51.
[4] Simmons, *Albuquerque, a Narrative History,* 329.
[5] *Ibid.*, 332.
[6] Marta Weigle, "Alluring New Mexico: Engineered Enchantment, 1880-1941," in Marta Weigle, Frances Levine, and Louise Stiver, eds., *Telling New Mexico: A New History*, Santa Fe, NM: Museum of New Mexico Press, 2009, 235.
[7] Wood, "The Transformation of Albuquerque," 50.

exploited for the benefit of people living in the expanding American metropolises. Despite this new degree of openness to the outside world and a few additions to the households' comforts, village life in northern New Mexico remained the same as it had been in the eighteenth century: laborious, religious, and simple. Visitors were scarce except from an occasional small circus with clowns, wirewalkers and tumblers, or Gypsies called *las turcas* who told fortunes and stories in exchange for food and drink.[8]

b. Main economic sectors and the Great Depression

On the whole, the territory's demographics changed substantially especially in larger towns where employment and business opportunities multiplied. Small existing villages and pueblos did not necessarily expand much, but new towns emerged and Albuquerque expanded dramatically. By 1910, the 1880 population of 120,000 in the territory had more than tripled, enlarged by unprecedented waves of immigration. In the decade from 1900 to 1910, New Mexico's population growth reached the record of 5.3%, unequalled since then. One could argue that the Anglo conquest actually started belatedly with the railroad rather than the military occupation of the territory in the 1850s. These immigrants' hope was generally to make riches in the most dynamic economic sectors of the area: farming and mining that were helped by the trains as well since they enabled the exportation of goods and the extension of their markets. However,

> Most of these new migrants to New Mexico ended up as farmers or ranchers. Based on the 1910 census, of the 121 thousand 'gainfully' employed people in New Mexico, more than one-half (about 55 percent) were producing crops or raising stock. Up until World War II, agriculture was the most significant economic activity in the state. In the 1930 census, there were over 31 thousand farms in the state. In the same year approximately 41 percent of the employed labor force worked in the farm sector.[9]

Livestock, sheep, and lamb products, wool, and commercial crops consisted in the main exports along with minerals. The same way small communities mushroomed along the train tracks, others sprang up out of the desert ground where coal, silver, gold, zinc, copper, potash, or oil was discovered. Silver City even bore the name of the metal that created it. The production of coal, driven by the demands of the rail, soared in the area of Gallup, Raton, and Madrid replacing gold and silver at the head of the extracting industry until the 1920s when

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[8] Kay, *Chimayó Valley Traditions,* 55-58. A more thorough description of these life conditions will be the subject of the last section of this chapter in which reminiscences from local inhabitants will be reported.
[9] McDonald, *The New Mexico Economy,* 8-9.

deposits of oil were found in the northwest and southeast. In the 1930s, the exploitation of potash started in the south between the towns of Carlsbad and Hobbs and is still a major industry today. Not all mining communities survived the ups and downs of the extracting cycle and the fluctuating nature of these markets; some completely disappeared, and others managed to convert to other industries. These fluctuations, common to the three main markets of the New Mexican economy, call attention to its precarious economic situation in the early statehood period. The heavy weight given to agriculture, livestock, and mining in the region's economy is the reason why historian of the American West Gerald Nash described the West as an "underdeveloped" area. In that regard, New Mexico was wholly part of this entity since "the region's primary emphasis was on the extraction of raw materials to be sent for processing to the older East, where the region also secured its manufactured goods." Despite the population growth and the expansion of the state's main city, the majority of the New Mexican population was still rural in 1940 (355,417 out of 531,818).[10]

The 1930s Great Depression, coupled with a severe drought, immensely damaged New Mexico's fragile economy, intensified its vulnerability, and plunged the population even further into poverty. The price for a galloping dependence on outside markets revealed itself when "in 1931, the state's most important crops were worth only about half of their 1929 value."[11] Additionally, the drought deeply affected the quality of harvests in most of the state to the point where some areas were integrated in the Dust Bowl. Even people who were still cut-off from cash-cropping and national markets suffered from the terrible climatic conditions. In a place where the value of land continued to be so vital, its drop to $4.96 an acre, the lowest in the country, was cataclysmic for many families. Ranchers were deeply impacted as well; plains dried out and ranches could no longer feed cattle.

The value of minerals dropped dramatically, affecting the life of thousands of miners. Statistics of this period show the level of extreme poverty some parts of the New Mexican population had sunk to: the state was among the last in per-capita income ($209 in 1932, 52% of the national average), ranked first in public illiteracy (a third of all schoolchildren did not attend class in 1933), and child and infant mortality.[12] These figures show that in the first

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[10] Richard A. Bittman, "Dependency and the Economy of New Mexico," Master's Thesis, University of New Mexico, Department of Economics, 1955, 39.
[11] New Mexico Museum of Art, "History: the Great Depression and World War II," *New Mexico Art Tells New Mexico History*, http://online.nmartmuseum.org/nmhistory/people-places-and-politics/the-great-depression/history-the-great-depression-and-world-war-ii.html, accessed January 9, 2014.
[12] Michael Welsh, "The Land of Extremes, the Economy of Modern New Mexico," in Richard W. Etulain, ed., *Contemporary New Mexico, 1940-1990*, Albuquerque, NM: University of New Mexico Press, 1994, 67.

decades of its statehood, New Mexico was facing major socio-economic challenges imposed upon it by the industrial demands of the rest of the Union to which it was ill-adapted. As a result, locals struggled to adjust to a market-oriented economy and meet national development standards. They clung more tenaciously to their traditions.

Thus, the arrival of the railroad and the onset of the Great Depression were the two significant events and considerable change factors that connected New Mexico with the rest of the nation over the turn of the century. The railroad increased immigration, gave birth to new communities, and provided employment opportunities both for immigrants and locals who could not rely on land ownership for sustenance while the Great Depression, which the U.S. lived as a common experience, united its citizens in the hardships of the economic crisis. In conclusion to this economic diagnosis, New Mexico much depended on a neo-colonial economy based on the exploitation and exportation of products of the land and on the vestiges of its agro-pastoral sustenance system to provide for its population. Although revolutionized by railroad lines, the area remained very isolated and terribly poor especially when compared to the rest of the country. Gerald Nash attributes this poverty to the proportion of Spanish-speaking people in the state who "lived clustered in small, rural communities […]. Most were poor, engaged as they were in marginal farming. The minority who lived in towns and cities were largely unskilled or semi-skilled workers. If the median income for the state of New Mexico in 1940 was less than that for the United States as a whole, it was largely due to the 40 percent of its population that was of Hispanic origins."[13]

Meanwhile, the industrialization and mechanization of agriculture dealt a massive blow to the rural world. The plight of workers in non-industrial areas was particularly acute as the sources of employment decreased as a result of the Depression, the drought, and the mechanization of work in the fields. Unemployed New Mexicans in the north, for instance, were forced to survive on government relief programs and on what they produced in their gardens. In 1940, New Mexico's population averaged six people per square mile for a total slightly over half a million. In fact, "the largest city, Albuquerque, claimed only 35,000 people, while Santa Fe at 20,000 and Las Vegas at 12,000 ranked second and third, respectively."[14] So, considering the poverty, the economic difficulties, the physical and cultural distance from centers of Anglo-American civilization, a mixed reputation, and the

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[13] Gerald D. Nash, *The American West Transformed: The Impact of the Second World War*, Lincoln, NE: University of Nebraska Press, 1990, 11.
[14] Ferenc M. Szasz, "New Mexico during the Second World War," in Marta Weigle, Frances Levine, and Louise Stiver, eds., *Telling New Mexico: A New History*, Santa Fe, NM: Museum of New Mexico Press, 2009, 294.

wide-spread Frontier mythology, one can wonder who the travelers who ventured into New Mexico were and what attracted them.

2. Attractiveness and immigration

a. Health-seekers

Rather ironically, a substantial part of the immigrating population to New Mexico travelled there as a last resort: they were called "health-seekers" or "chasers" because they came to "chase the cure" and lie down on "chasing chairs" to fully enjoy the curing properties of the New Mexican sun and air. The burgeoning tourism industry rode the wave of health tourism or what became known as the sanatoria movement when it was revealed to the larger public that New Mexico's elevated, dry climate had a curing effect for some respiratory diseases, including tuberculosis or the "white plague," which was the leading cause of death in the early twentieth century United States. A quiet, isolated environment and pure air were long thought to be the only solution to fight the lethal infection. One of the fabulous myths about the region is that diseases were conspicuous by their near-absence; the belief dates to late eighteenth-century accounts reporting that "no diseases have appeared since the settlement of the Province by Spaniards, which can be said to be peculiar to the climate and country" as well as reports of people living much older and in good health.[15] Native American and Hispanic populations had long bathed in the hot springs for ritual and curative purposes in the area of present-day Truth or Consequence, NM. The American Army had even built a hospital close to another spring at Gallinas Canyon near Las Vegas in 1846. The Manby Springs in Taos and others in the Jemez Mountains enjoyed new renown. A few decades later, the railroad and health industry worked hand-in-hand at their beginnings since the A.T. & S.F. Railroad Company created the Las Vegas Hot Spring Company to open a hotel in 1882 named the *Montezuma* after the Aztec king who had supposedly bathed there.[16] Similarly, other tourism companies such as the Fred Harvey Company associated their growth to the railroad by building restaurants, called railroad eating houses and introducing the famous "Harvey Girls" and hotels for tourists along the tracks of the A.T.&S.F with which Harvey had entered into an agreement.[17]

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[15] Kay, *Chimayó Valley Traditions*, 58.
[16] Weigle, "Alluring New Mexico: Engineered Enchantment, 1880-1941," in *Telling New Mexico*, 237.
[17] Harvey Houses could be found throughout New Mexico: in Albuquerque (El Alvarado), in Belen, in Clovis, in Deming, in Gallup, in Lamy (El Ortiz), in Las Vegas (Castaneda Hotel and Montezuma's Castle), in Raton, in Rincon, in Santa Fe (La Fonda), in San Marcial, and in Vaughn (Las Chavez).

The industry's real boom occurred when communication improved and information on the benefits of New Mexico's exceptional climate spread eastward: "by the beginning of the twentieth century, the Territory was gaining national, indeed, international fame, as a haven for health-seekers. In fact, a French medical society issued a statement asserting that, of all habitable places in the world, New Mexico was the area most free of consumption."[18] The high altitude and thin atmosphere relieved the pressure on the patients' lungs, and the dry air facilitated breathing for sufferers of respiratory ailments. Pulmonary specialists of national renown converged to Albuquerque and contributed to its reputation as a medical center. Health-seekers arrived by train at different stages in their illnesses, many of them at a terminal stage even, in the hope that they would be cured from tuberculosis or asthma, hay fever, rheumatism, eczema, psoriasis, dysentery, and even acne. The stream of diseased easterners flowing into New Mexico's largest urban community had a substantial impact on the city: health cottages were built at the University of New Mexico for convalescent students; Chinese elm trees were planted in nostalgic remembrance for the eastern homeland; and the chasers' sophisticated, conservative American middle-class ideas greatly influenced city life toward a more cosmopolitan atmosphere. By 1922, 48 sanatoria were open for business in New Mexico.[19]

b. Artists and the "Land of Enchantment"

Both in Santa Fe and Albuquerque, sanatoria and hospitals offering climatological cures and hot spring treatments proliferated creating a whole new industrial branch with numerous derivatives since many recovering patients were eager to discover the region's marvels. Some of these health-seekers spent the remainder of their lives in New Mexico because they fell in love with the region or feared the return to a more difficult climate; others repeatedly came back to the newly baptized "Land of Enchantment" through the efforts of Joseph A. Bursey, director of the New Mexico State Bureau in the 1930s. Among the most famous were Robert Oppenheimer, the American physicist who would later be chosen as scientific director of the Los Alamos Laboratory and who arrived in New Mexico for the first time in 1921 to recover from dysentery, and Dorothy McKibbin, another important Manhattan Project character, who was diagnosed with tuberculosis in the winter of 1925 and arrived at Sunmount Sanitarium in Santa Fe in December. Like many others, Dorothy McKibbin stayed in New Mexico and

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[18] The information in this paragraph is taken from Marc Simmons's work on the history of Albuquerque on pages 340 to 350.

[19] John D. Wirth and Linda K. Aldrich, *Los Alamos: The Ranch School Years, 1917-1943*, Albuquerque, NM: University of New Mexico Press, 2003, 24.

enjoyed the cultural discoveries that the proximity with Indian pueblos and Hispanic villages enabled. She worked at the Spanish and Indian Trading Company where Indians from the pueblos, Navajo reservation, and Hopi villages came to trade blankets, pottery, and woven baskets; Spanish traders brought hand-carved furniture and religious paintings. She attended and took her son to Indian dances at the San Ildefonso Pueblo and befriended other uprooted Anglos who became New Mexicans by adoption such as Peggy Pond Church of the Los Alamos Ranch School and Edith Warner of Otowi Bridge. Her impressions of her surroundings were reported by her biographer, Nancy Steeper: "I fell in love with the place [Sunmount] because of its beauty and the cultural and intellectual atmosphere."[20]

As a matter of fact, among the people who migrated to New Mexico for treatment at the time, many were artists and writers such as the painters Carlos Vierra and Sheldon O. Parsons, the poets Alice Corbin and Harold Witter Bynner, and the designer Gerald R. Cassidy. Nancy Steeper referred to this group as "an arts colony"; they were indeed some of the early actors of the artistic invasion in Santa Fe and Taos, which became celebrated for their inspiring environment. Actually, the Taos art colony was born much earlier, following Ernest L. Blumenschein's first visit in 1898 and the creation of the Taos Society of Artists in 1914. New Mexican historian and writer Erna Fergusson comments on the effect the New Mexican landscape had on these artist invaders: "Every artist was overwhelmed by the glory of the clear light, the magnificence of mountains, the paintability of strong Indian faces. Such things became the Hallmark of New Mexico's school, it could be called a school; the similarity was always in subject matter, never in method."[21] Artists devoted their art to the expression of local beauties by injecting elements of the region's cultures such as the cadence of Indian dances in poetry or the colors of the New Mexican sky in paintings. Fergusson identifies the legacy of these artist immigrants to New Mexico as a gift of "respectful appreciation" that spurred efforts to save and develop old arts, but she also mentions how some of them jeopardized their muse by going into business when the Spanish and Indian Shop opened in Santa Fe and "artists were known to be met in the pueblos talking a weak-willed Indian into selling ceremonial objects, or in Spanish villages tempting a family's neediest member into giving up the chest that had traveled the Chihuahua Trail."[22]

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[20] Nancy C. Steeper, *Gatekeeper to Los Alamos: Dorothy Scarritt McKibbin*, Los Alamos, NM: Los Alamos Historical Society, 2003, 22.
[21] Fergusson, *Pageant of Three Peoples*, 369.
[22] *Ibid.*, 373.

In economic terms, another attractive feature of northern New Mexico for artists was the cost of living in the state that was among the lowest in the country with rent prices in 1925 as low as $10 a month for a three-room house in the capital.[23] Most of the Santa Fe and Taos artists were poor and welcomed the opportunity to work in this convenient combination of cheap and stimulating conditions; they bought small adobe houses, remodeled them themselves, and completely adopted the New Mexican way of life, learning Spanish in some cases, eating local foods, wearing turquoise jewelry, and spending days in the pueblos to observe rituals. Their vision of New Mexico contributed to its reputation of romanticism. The writers and artists of the Taos school (i.e., Mary Austin, Mabel Dodge Luhan, Willa Cather, and John Sloan) popularized the romantic view of village life in northern New Mexico, and the celebrated artist Georgia O'Keeffe certainly was the greatest contributor to the imagery of the Southwest. These artists saw the Hispanic communal way of life as a poetic ideal that contrasted glaringly with urban life in the eastern cities.

But this vision ignored the dire economic difficulties that New Mexican farmers were facing to maintain a model that was no longer viable in view of the impossible competition with mechanized intensive agriculture. Declining occupations and rising poverty were the greatest challenges faced by these self-sustaining villages; but, while this situation was hardly unique in the West, "what was distinctive was their sense of community, their cohesive social organization, their historical traditions, and their ethnic identity and pride," which appealed to the artists. Many of these villagers would have "to balance the cultural advantages of village life with the economic drawbacks."[24] The words that would be most often used to qualify the region became "picturesque" and "pristine." The same words would later be used by the first inhabitants of the Los Alamos scientific community. This reputation of New Mexico as a recreation state to admire ancient civilizations was best described by the great English novelist, poet, playwright, and artist D. H. Lawrence who, according to Mabel Dodge Luhan, "always felt its [New Mexico's] magic":

> New Mexico, the picturesque reservation and playground of the Eastern States, very romantic, old Spanish, Red Indian, desert-mesas, pueblos, cow-boys, *penitentes*, all that film stuff. Very nice, the great Southwest; put on a sombrero and knot a red kerchief round your neck, to go out in the great free spaces! That is New Mexico

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[23] Steeper, *Gatekeeper to Los Alamos*, 32.
[24] Gerald D. Nash, *The Federal Landscape: An Economic History of the Twentieth-Century West*, Tuscon, AZ: The University of Arizona Press, 1999, 37.

> wrapped in the absolutely hygienic and shiny mucous paper of our trite civilization. That is the New Mexico known to most of Americans who know all about it. But break through the shiny sterilized wrapping, and actually touch the country, and you will never be the same again. I think New Mexico was the greatest experience from the outside world that I have ever had.[25]

Indeed, the images conveyed to the public by the western narrative genre found particular resonance in New Mexico tourism. Judgment and even mockery surface in Lawrence's words to summarize the version of New Mexico that was wrapped in the "absolutely hygienic and shiny mucous paper of our trite civilization," and that many Easterners had of the Southwest. The rest of the article is a demonstration of how his experience went beyond this wrapping but the point of interest here is that the romantic, cinematic, and "hygienic" packaging endured and is still present in the mind of travelers as the a main defining image of New Mexico.

c. The tourist industry and archeologists

The artistic magnetism and the Sanatoria movement truly launched New Mexico's potential as a tourist destination. The contrast its scenery offered to the suffocating industrial world appealed to the wealthier Americans in need for a change of air and exoticism that was provided by contact with the pristine indigenous cultures. The state and its largest town were ideally located to receive the traveling public come to discover the marvels of the Far West. Subsequently, city boosters and big companies sought to promote the nascent industry. Journalists, writers of tourist manuals and government propagandists advertized their community "as a natural paradise for health-seekers": "Albuquerque is one of the cities of the West that is so openly, so rampantly healthy, so gloriously deluged with vivifying sunshine and purified with healing breezes that it invites with open arms the sick and ailing to enter its

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[25] Mabel Dodge Luhan, "Lawrence of New Mexico," and D. H. Lawrence, "New Mexico," *New Mexico Magazine*, Santa Fe, NM, February 1936, 10-11. Lawrence came to New Mexico searching for a place where to found a utopian community called "Rananim." He called this search his "savage pilgrimage" and one of the criteria was a good climate. He owned a ranch northwest of Taos that was offered to him by Mabel Dodge Luhan and that he visited three times between 1922 and 1925. See Henry Shukman, "D. H. Lawrence's New Mexico: The Ghosts That Grip the Soul of Bohemian Taos," *The New York Times*, New York, NY: The New York Times Company, 22 October 2006, http://www.nytimes.com/2006/10/22/travel/22culture.html?pagewanted=all&_r=0, accessed February 2, 2015. The place is now known as the D. H. Lawrence Ranch and belongs to the University of New Mexico, which reopened it to the public in 2014. The Mabel Dodge Luhan House is also famous for its role as a hub for artists, writers, and thinkers. Prominent figure in the arts and society of New York, Mabel Lodge came to the region at the end of the 1910s and built the "Los Gallos" house next to Taos Pueblo between 1918 and 1922 with a Pueblo man named Tony Lujan whom she married shortly thereafter. Her house hosted influential artists and was thus closely connected to the Taos art colony.

portals."[26] But this excessive publicity was to the detriment of the residents who were not enthused to see the streets of their city swarming with ailing people, despite the economic worth they represented to local businessmen who completely ignored the contagious aspect of the disease when it was first revealed. Due to the absence of any quarantine or confinement, all residents were exposed as poorer, sick workers moved about the city looking for unskilled jobs. On the other hand, a large proportion of the new arrivals was comprised of prosperous people who could convalesce without working and employed Indian or Hispano servants in their homes, thus spreading the disease to these populations whose immune systems, having been less in contact with the infectious bacteria, could not fight the consequent infections. According to Albuquerque historian Marc Simmons, death certificates after 1910 showed an increase in deaths from tuberculosis or other respiratory diseases among Spanish-surnamed women, most of them listed as "housekeeper."[27] Prominent residents, politicians, and leading business figures were not discouraged by any of the risks represented by the growing presence of the bacteria among the population. A main pre-World War II objective of these Anglo city-dwellers was to lead their state out of seclusion, entice as many as possible to come participate in its capitalist development, and commercialize its most promising resources—including its native populations' cultures. This strong will for an open and modern state fully integrated in the national economic system appears in a repetitive pattern in the region's recent history and is at the core of its contemporary dilemmas.

The sanatoria movement slowly died out after the discovery of antibiotics in 1941 by Charles Fletcher; and, although some pessimists announced an economic collapse for Albuquerque as a result of the new treatments, the tourist industry had diversified and gradually detached itself from its health orientation to seduce other visitors. Travelers never ceased to believe in the benefits of New Mexico's sunny climate for their general state of health, and this reputation coupled with opportunities for entertainment formed the basis of the state's assets. Tourism professionals capitalized early on all the other attractions that New Mexico afforded for visitors: outdoor activities, fishing, hunting, camp-life, recreational areas, antiquities, ancient arts and crafts, and archeologist interests in prehistoric ruins. In May 1926, the first Indian Detour operated by the Fred Harvey Company, which was a major actor alongside the Santa Fe railway in the development of tourism in the Southwest, left from Las Vegas, NM, stopped at the Pecos Pueblo ruins, and toured the Santa Fe region for tourists to

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[26] Simmons, *Albuquerque: A Narrative History*, 237; 343.
[27] Kay, *Chimayó Valley Traditions*, 345.

observe New Mexico's cultural and scenic richness. These tours would become popular and enhance the commercialization of the southwestern aboriginal cultures. An Indian Detours guide would meet visitors at the Lamy train station, which was the closest from Santa Fe, and then would take them to the La Fonda Hotel in Santa Fe from where they could choose among the many options for trips to Pueblos and Spanish villages.[28]

The charm of southwestern Indian tribes was equaled only by the perspective of being immersed in a frontier atmosphere and venturing to the limits of the civilized world. So at the same time as they sought to get out of isolation, boosters used this feature of an untouched Eden as a selling argument. Among the fervent promoters of the state's attractions, Governor Richard C. Dillon heavily insisted on this "never-trodden-upon" and untapped-resources mystique at the occasion of the building of the U.S. Highway System:

> If you are on a vacation trying to get away from a noisy world, you can find seclusion in New Mexico's vast mountain domain, in beautiful haunts where human foot has never trod, where clear streams flash with trout, where a variety of game is plentiful. You will be exhilarated by a pure, cool and invigorating climate. If you are on a business trip you will find in New Mexico a land of opportunities, where resources in agriculture, fruit growing, cotton, timber, livestock and minerals are practically untouched and awaiting development; also, a fascinating field for artists and writers.[29]

A decade later, one of Governor Clyde Tingley's priorities was to organize the New Mexico State Tourist Bureau to conduct national advertizing campaigns through the publications of brochures and booklets boasting the state's native cultures and occasions for authentic experiences. The image of New Mexico as a foreign, romantic place fixed in time was the chorus of these campaigns.

The inspiration for this image was, in part, the effect of an increased interest in archeology following the lead of specialists such as Edgar L. Hewitt's whose work at Puyé and at the *Rito de los Frijoles* led the Archeological Institute of America to establish in 1907 its first school on American soil after Athens, Rome, and Jerusalem: the School of American Archeology in Santa Fe—later known as the School of American Research. The growth of the Santa Fe art colony was mainly due to the coming of archeologists, ethnologists, and anthropologists in the region. The Pajarito Plateau in the north was one of the main scenes of

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[28] Weigle, "Alluring New Mexico: Engineered Enchantment, 1880-1941," in *Telling New Mexico*, 239.
[29] Richard C. Dillon, "Governor's Message: A Word to Tourists," 1929, quoted by Marta Weigle in "Alluring New Mexico: Engineered Enchantment, 1880-1941," in *Telling New Mexico*, 243.

the upsurge of enthusiasm over prehistoric sites. Adolph F. A. Bandelier, an anthropologist trained by the founder of modern anthropology, Lewis Henry Morgan, was the first to become passionate with the ruins of northern New Mexico in the 1880s. His work on southwestern tribes and particularly the first eras of the Pueblo cultures came to the publication of a fictionalized Pueblo ethnography entitled *The Delight Makers* in 1890, but his research also raised the awareness that there could be avid buyers for the precious dug-up objects and that curious tourists were attracted by the possibility of entering the cave dwellings of a one-thousand-year-old civilization. Hal Rothman explained how jeopardizing these rooky and sometimes disdainful explorers' behavior could be for the preservation of the ruins: "These structures and the artifacts they contained fascinated visitors, and […] the tourists wanted to take what they found with them as souvenirs or curiosities. In the West, this was accepted behavior; Westerners operated on a 'first-come, first-served' basis in almost every aspect of the physical world."[30] Paintings, tools, and art pieces were lost to the disrespect of some visitors. The archeologist Edgar Hewitt dedicated his efforts to the protection of the buried past and actively pursued the establishment of a national park in northern New Mexico because it was the only legislative solution to prevent the expropriation of relics from federal land. Yet, convincing local constituencies, who saw any kind of federal intervention with a wary eye because of the limitations it represented on economic expediency and individualism, was no easy task. In the end, the park was never created, but a monument named after Bandelier was established in 1916.

On the eve of World War II, New Mexico's attractiveness had immensely increased. Tourists, artists, writers, and archeologists joined the swelling Anglo communities keen to consume what the state had to offer them—its climate, inspiring views, prehistoric ruins, isolated wilderness, and potential romanticism. While some fully embraced the local way, blended in to become true *Nuevo Mexicanos*, and adapted to their new homeland's particular pace; others strived to accelerate modernization and capitalized on the rise of communication and transport means to promote the state's profitable resources. Even if native communities were affected by this presence, their gains from it remained rather limited and did not alter their economic orientation or daily concerns. So by the 1940s, the economy of New Mexico worked on two speeds: while rural populations perpetuated the ways of former generations, city boosters looked for ways to diversify activities and attract more immigrants. The one

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[30] Rothman, *On Rims and Ridge*, 42.

thing these two worlds had in common, however, was their reliance on New Mexico's secluded situation, low demographic density, exploitable land, and rich past. Therefore, in many ways, the images of a rugged frontier clung to the Land of Enchantment. Nonetheless, the gradual permeation of changes brought by population growth and Anglo-American influences introduced new challenges and turned into seeds for an economic revolution.

3. The "seeds" of an economic revolution

If New Mexico was still cut off from the rest of the country and seemed to share little of the Industrial Revolution, which had changed the face of the eastern states, what made it so conducive to welcoming a new industry, specifically the nuclear industry, after the War? A combination of a few specific factors led New Mexico on the path of desperation for an economic revolution after the 1930s Great Depression. Before World War II, New Mexico seemed to have footing in two worlds at the same time: one in its millennia-old agricultural past and the other in America's industrial dream. Both sides were characterized by the struggles of people looking for ways to improve their economic situation. The introduction of a cash economy and a growing federal and military presence in the state paved the way for the installation of a new economy because these two factors made New Mexico ideally prepared for a radical transformation. That is why they can be labeled as "seeds." The demonstration of this argument will be presented in two points: first, a theoretical approach based on the works of specialists on land issues in New Mexico in the early twentieth century—William DeBuys, John R. Van Ness, Charles Briggs, Malcolm Ebright, Roxanne Dunbar-Ortiz, and Maria E. Montoya—and the second point will be a report of the memories of northern New Mexicans of the valley of Española who were interviewed in the oral history project of the University of New Mexico called "Impact Los Alamos."[31]

a. The introduction of a cash economy

Outside of the urban business circles that gathered the heads of big tourist, railway, mineral, and ranching companies, local people had the same concerns as their forbearers: their land. Yet they, too, were impacted by the "seeds" that materialized in the addition of paid employment to the list of resources they already competed for. The economic repercussions of losing land ownership were dramatic for New Mexican farmers in the early twentieth century. On the San Miguel del Vado Grant, for example, the common land were opened to

[31] "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006.

homesteading in 1916 and by 1940, "the original residents and their heirs constituted 83 percent of the population on the grant but held only 5 percent of land, while a few Anglo-American homesteaders controlled the remainder."[32] According to Roxanne Dunbar-Ortiz,

> The means by which the subsistent land-tenure system of New Mexico was destroyed under capitalist control was through the introduction of mercantile capitalism, followed by monopoly capital supported by the U.S. government. In the process, the agricultural producers were effectively stripped of their means of production and transformed from the owners of the means of production to a laboring class—as surplus, cheap labor force, dependent on capital for their existence.[33]

The new uses of land introduced by some of these new Anglo landowners triggered a process of impoverishment for Hispanics and Native Americans who had hardly ever had to work for anyone else but their own families before. These New Mexicans produced most of what they needed themselves, traded for the rest, and rarely had any need for money then. As consuming goods seeped into their world and the fruits of the land diminished because of various circumstances, these autonomous villages entered the cash system.

This cash system is the first of the so-called "seeds" and dates back to the territorial period and the land issue. The introduction of a cash economy and the necessity to look for paid jobs for New Mexicans in rural areas are directly linked to the superimposition of the American property system on top of the Spanish-Mexican system. Indeed, the consequences of the land struggles of the territorial period directly contributed to New Mexico's readiness to welcome new forms of employment. Many families in the 1930s and 1940s could no longer solely live off their land. By 1940, land exhaustion resulting from overpopulation, overgrazing, overexploitation of resources, and erosion became a serious problem. Many parcels of cultivable land were lost to erosion, deforestation, and overuse: *arroyos*[34] are the proof of this excessive activity. According to John R. Van Ness, the loss of the land grant system is responsible for this situation. The villages' social organization centered on a corporate exploitation of land and water—with the commonly-maintained irrigation system of *acequias*—combined private and common land grants in a system that guaranteed a

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[32] Dunbar-Ortiz, *Roots of Resistance*, 121.
[33] *Ibid*., 7-8.
[34] *Arroyos* are natural ditches dug by flows of water which are usually signs of an imbalance between nature and human activity. The soil can no longer retain rainwater as it did before human overexploitation, and this gives the impression of a deficit in moisture when the water levels are actually not lower than before.

sustainable exploitation of resources. Stripped of this macrostructure, villagers had no recourse to preserve their fragile environment.

As the U.S. imposed its legal definition of property, many natives of New Mexico lost portions or the entirety of their land to speculators, manipulators, and opportunists who did not abide by the same community laws and who built the first fences to separate their private properties from their neighbors', thus preventing grazing of their land by livestock they did not own. The apparition of these first fences enabled a few individuals to monopolize scarce sources of water and fertile pastures. This problem pertains again to the geography of New Mexico: resources are unequally distributed; therefore, if boundaries become rigid and impervious to those who own land but lack water resources for instance, exploitation becomes difficult. As a result, the equilibrium between man and the environment provided by the land grant system of self-sustenance was disrupted. Van Ness relies on Arnold Strickon's study of the Euro-American ranching complex[35] to argue that this shift from self-sustenance to a capitalist exploitation of the land is to blame for land exhaustion in northern New Mexico: "the commercial rancher usually tended to overgraze the land because the larger his animal unit, the lower his production costs, and therefore the greater his potential for profit."[36] Meanwhile, the population was growing, and parcels of irrigable land were excessively divided with each new generation.

With the collapse of the land grant system, the loss of land to Anglo immigrants, to corporations, or to the Federal Government—mostly through the national forests system—and the exhaustion of pastures, money became a more desirable, even necessary resource. Initially, cash was mostly used to pay property taxes levied by the county governments and, later, when manufactured goods started to arrive by train from eastern factories, Westerners slowly turned to consumerism. Due to the remoteness of certain areas, changes in households were extremely slow since cars or stoves were still scarce and agriculture machinery was almost inexistent in 1943. The gradual shift from the former barter system between villagers to a cash economy confronted people with the need to earn money. The dollar became the key to purchasing comfort items for some but also to surviving for others. The influx of Anglo consumers and traders in New Mexico had expanded the market for crops and meat, so landowners who once produced only what their families needed began to produce in excess in

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[35] Arnold Strickon, "The Euro-American Ranching Complex," in Anthony Leeds and Andrew P. Vayda, eds., *Man, Culture, and Animals: The Role of Animals in Human Ecological Adjustments*, Washington, DC: American Association for the Advancement of Science, 1965, 229-258.
[36] Van Ness, "Hispanic Land Grants," in *Land, Water, and Culture*, 194.

order to sell their products and make money. Breadwinners had to leave to go find work in the Colorado mines in Gilman, Leadville or in the copper mines. They would leave to work as sheep herders in Montana or as seasonal farm laborers in Arizona. Some employment was also available in New Mexico in the extracting industries—silver, coal, zinc, copper, potash, oil—but the largest employer assuredly was the railroad that also compelled workers to leave their homes on the countryside or in the mountains to come into town. In spite of the availability of these jobs and those generated by the development of the tourist industry, New Mexicans struggled to find work and often had to go far away to obtain ways to supplement their meager incomes from agriculture: "It has been estimated that before the Depression some seven to ten thousand workers from villages in the Middle Rio Grande Valley left each year to work in sheep camps or to harvest crops in Colorado, Utah, Wyoming, Montana, and other Western states."[37]

Despite these communities' efforts to preserve their agricultural past, the pressure of the outside world was growing with the influx of Americans. While some stayed in the villages to perpetuate traditions and keep up the local production, men and women were sent away in search of the currency that would supplement or substitute to the work of the land. This tendency accelerated during World War II since "the census estimated that fully one-third of young Hispanic men under 25 years of age left northern New Mexico during the War to seek work outside the state. One effect of the War, therefore, was to hasten the decline of the small, self-sufficient farm in New Mexico."[38] Likewise, Native Americans had to leave their reservations to earn money. Many joined the Army or went to look for employment in other states. According to Gerald Nash, these departures and subsequent intercultural contacts had a decisive impact on the reservations as it "widened the gap between traditionalists and modernists […], as military service and wartime jobs expanded the world in which Indians lived. At the end of the War at least one-third of those who had left the reservations chose not to return, but went to live in New Mexico towns and cities."[39] The words of local people who lived in northern New Mexico in the 1920s, 1930s and, 1940s, bear witness to some nostalgia for a time when life was simpler and closer to nature or, at other times, a form of relief that these days are over.

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[37] Kay, *Chimayó Valley Traditions*, 65.
[38] Gerald D. Nash, "New Mexico since 1940: An Overview," in Richard W. Etulain, ed., *Contemporary New Mexico, 1940-1990*, Albuquerque, NM: University of New Mexico Press, 1994, 6-7.
[39] *Ibid*.

b. Testimonies of life in northern New Mexico in the 1940s

The interviews of inhabitants of the Española and Chimayó Valley who experienced village life in the 1940s when these communities still were self-sufficient units show how frugal their existence was, how little importance was given to material comforts, and how much people centered on family, solidarity, and religious values. Most of these people were later hired by the Los Alamos Laboratory. Their testimonies are precious to paint images of life in northern New Mexico in the decades before the birth of the Lab but also to illustrate the how the hardships they were confronted to conditioned them in many ways to welcome the establishment of the Lab and the employment opportunities it represented as life-saviors. Many repeatedly said that, before the Lab, there was nothing. Others expressed regrets. In order to retain the authenticity of their reminiscences, these are transcribed here in the simplest manner as a first-hand illustration of the situation analyzed above.

Bernadette V. Cordova's family (the Vigils and the Montoyas) has been in New Mexico for three generations. Her paternal grandparents were from Sombrio, and her father, Gusman Vigil, was a rancher like her maternal grandparents. Vigil went to work alone in Colorado, in potato fields and ranching, and in the mines of Arizona every summer. His children—seven brothers and two sisters—went to California to work in San Jose to pick tomatoes, prunes, and grapes. She and her sister were thirteen when they went to work in the Californian fields with Chinese and Filipino workers; they missed September and October at school to help their father earn money. While they were at home, they would farm to produce cereals (e.g., wheat, corn) and raise goats, cows, and chickens.[40]

Hipolita Fernandez who was born in Truchas, remembered that a lot of people in that time lived from ranching, and she pointed out that the land seemed to produce much more. Fields, livestock, and pasturage were much healthier in the past according to her. Her husband, Delfido Fernandez, worked on a ranch, in the CCC camps and in the mines of Colorado in 1937 like other inhabitants of Truchas who also worked on the railroad sometimes.[41]

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[40] Bernadette V. Cordova, Interview by Peggy Coyne, Española, El Wache, NM, 29 February 1996, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 33-34.

[41] Hipolita and Delfido Fernandez, Interview by Troy Fernandez (their grandson), Chimayó, NM, 27 February 1994, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM:

Ramon Fresquez was born in San Pedro in 1920. His great grandparents were related to the Vigil family who owned the famous eponymous land grant. His grandfather was a homesteader who owned about fourteen acres of land but who had to give it up to the Indians who claimed it belonged to them. His grandparents could not produce any proof that it was theirs. His parents raised cattle on twenty acres of land they farmed and had pastures for their livestock. They took their cattle to the public domain of Valle Grande (great valley) during the summers around 1925 and 1930. Everybody used to go there, and it worked well but had become private by the time of the interview in 1995 so that people needed a special permission or permit to go there.[42] Fresquez used to be an altar boy, and he would go up to Valle Grande with the priest, José Cubell of the Holy Cross parish in Santa Cruz, who went to say Mass for the Ranch School at Los Alamos. The Ranch School would later play a pivotal role in the history of the Manhattan Project. Fresquez recalled there was a lot of game (deer) at the time, but, now, there were not so many. His father mostly farmed. They had a credit account at the grocery store in Española; they would go to [Boneno] store to get their groceries and would pay their bill with the *chile* they produced and dried. He would also go to Taos and to the pueblo with his uncle to sell the produce they farmed on their land such as apples and melons. At the time, there were no restrictions on the plaza or the pueblos for selling things. [43]

Florida Martinez also recalled the exchanges between the small communities of northern New Mexico. She was born in 1944 and grew up in Truchas, the home of three of her grandparents. Her grandmother, Juanita Martinez, who had just turned 100 years old at the

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Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 36-37. This interview was in Spanish.

[42] Valle Grande is the largest grass valley in the volcanic caldera in the Jemez Mountains which became a unit of the National Forest System. "In 1976 the National Park Service bought 3,076 acres (1,244 ha) of the southeast corner of the grant as an addition to Bandelier National Monument. The National Park Service, the Forest Service, and the Fish and Wildlife Service began studies in 1979 with a view to acquiring the Baca Location for the public." The Federal Government eventually purchased the Baca Location from the Dunigan Companies in October 1999. Since the Valles Caldera Preservation Act in 2000, the historic Baca Ranch of New Mexico's Jemez Mountains of 89,000 acres belongs to the Federal Government. It has become the Valles Caldera National Preserve (See Figure 1). From Kurt F. Anschuetz and Thomas Merlan, "More than a scenic mountain landscape: Valles Caldera National Preserve Land Use History," General Technical Report RMRS-GTR-196, Fort Collins, CO: United States Department of Agriculture, Forest Service, and Rocky Mountain Research Station, September 2007, 28-29, http://www.vallescaldera.gov/about/trust/docs/trust_landuse-history.pdf, accessed April 19, 2015. For further reading: Craig Martin, Valle *Grande: A History of the Baca Location No, 1*, Los Alamos, NM: All Seasons Publishing, 2003.

[43] Ramon Fresquez, Interview by Kenneth Salazar, San Pedro, NM, 14 March 1995, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 42-43.

time of the interview, was from Chimayó and moved to Truchas to marry her grandfather, a blacksmith. On the Sandoval side of the family, her grandfather was a farmer. She grew up speaking Spanish with her parents, but, later in mission school, the authorities did not want their students to speak Spanish. When she was younger, the people from Chimayó would come to Truchas and sell their melons and their fruits. Her mother would wait for them and would can their goods. Her father made enough money to raise the children. About half of the Truchas population was able to stay in the village and made money cutting wood among other activities.[44]

Armanda Lopez Jackson's family, on the other hand, did not have much money. She was born in Rodarte in 1924. Her family has been in New Mexico for six generations. She told her interviewer that they were very poor when she grew up but that her mother grew food on their farm (e.g., pumpkins, beans, potatoes) and she also had hay and a few milk cows. She reared her children by providing whatever she could raise in the farm while the older brothers and sisters who went away would send money to buy shoes for the younger ones. She recalled that there were no cars or restaurants in Rotarde when she was growing up. She went to school with nuns and reached the twelfth grade.[45]

Genaro Martinez' memories from the life in Chimayó before Los Alamos confirm that there was no money so that each family had to plant every corner that they had and people would help each other build their houses.[46] Similarly, Lebeo Martinez of Dixon explained that, despite the absence of money, there was plenty of food because everybody had a big garden. When he was attending high school, there were no cars, no pavement, no electricity, and no phones. His father, who was born in 1886, went to work in the fields in Colorado and

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[44] Florida Martinez, Interview by Carlos Vásquez, Chimayó, NM, 27 October 1991, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 58-59.

[45] Armanda Lopez Jackson, Interview by Peggy Coyne, Española, NM, 21 March 1996, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 53-54.

[46] Genaro Martinez, Interview by Peter Malgren, Chimayó, NM, 16 November 1995, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 60-61.

on the railroad in the 1930s; then, after World War II, he went to work in the *chile* fields in California; as he got older, he farmed at home[47].

Joe Montoya had a particular connection to Los Alamos when he was young. He was born in 1928 in Española and never left New Mexico. All his grandparents were farmers. His uncle, Adolfo Montoya, lived in Los Alamos long before the Project started. Adolfo was a gardener for the Ranch School and Joe used to visit him as a boy. Joe grew up in San Pedro where there were few homes but a lot of farming (corn fields, alfalfa fields, orchards). They would pasture cows up on the river and also kept a few turkeys. He described Española as a beautiful place. Similar to Genaro and Lebeo Martinez, he said they grew just about everything they needed. He learned English at school, but his father, who was a clerk at the Bond Dweller store for 35 years, learned English at the store because he had many Anglos coming in and he taught Joe a little before school. Before that, his father also worked on the train in Denver, not on the tracks, although many people did. Joe recalled the Depression period when his step brothers left to the CCC camps and went to war related industries in California. He thought that the CCC camps were a nice experience for his brothers. According to him, there was no depression in the valley before the War because it had already been depressed before that. He did not think people suffered so much from hunger; it did not make any difference to them because they didn't know any better. After the War, people started building up and moving into the region.[48]

Jose Benito Montoya was born in Nambe in 1929. He described Nambe as a very poor community without automobiles, only horses. The children would walk to school. In his memory, "a lot of people had to go out of state because there was nothing there." His grandparents had come to the region about a hundred and fifty years before, his grandmother from Spain and grandfather from Mexico. They farmed, worked for the railroad, and exchanged with other farmers for things they did not raise. His father bought his first car for $25 after the War when his son was eighteen. Jose Benito explained that having a car was considered as an accomplishment. The car could only take three passengers, and his father

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[47] Lebeo Martinez, Interview by Dot Waldrip, Albuquerque, NM, 18 November 1995, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 62-63.

[48] Joe G. Montoya, Interview by Carlos Vásquez, Cundiyo, NM, 29 July 1994, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CDs 7-8.

was not a good driver, but there was not much traffic since only six people in Nambe owned cars. On the other hand, his parents never got a television.[49]

For Nick Salazar who was born in Chamita and grew up in San Juan (now also called Ohkay Owingeh Pueblo), another event was also considered noteworthy by the youth in the community: going to see a movie, which was considered a "big thing." Both his grandfathers and father were in the sheep business and helped one another. When his grandfather died, his father and brother went into the cattle business. They used the national forest for the cattle to graze. Nick worked with them while studying at a Catholic school. He gave examples of how poor life was when he was young. Among these he recounted how he and his friends had to "pile" in a car or walk when they wanted to watch a movie in Española or how he owned a single shirt growing up and washed it every day. In Chamita, there were neither rich nor poor people; there were just about four families who had more material possessions (wagon, horses, and clothes). He added that the yearly fiesta was a notable event for his community.[50]

Contrary to most New Mexican farming families who remained in their communities most of their lives, Josefita Velarde's family moved a lot around New Mexico and Colorado. Because they did not own any land, the family survived by living a migratory life from one job to the next. Her grandmother on the Pacheco side was from Chimayó; the other on the Sanchez side, from Salazar, NM, a locale that no longer exists. Her father was a teacher in Chimayó and other schools such as Chiquito. His health was poor because he suffered from malaria. She was born in Chimayó in 1911 and started school there in 1917 before moving to Colorado a year later to clear their debts. They moved to Albuquerque in 1919 and back to Chimayó in 1920. Getting a steady job with a future was impossible, so they returned to Leadville, Colorado, to work in the coal mines until 1944 when she and her husband came back to New Mexico. Life was easier in Colorado because they had electricity, stores, and good schools whereas in northern New Mexico, electricity came after the War, you ate what you grew, the men all had farms and stock, and the families would keep cows in the house for

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[49] Jose Benito Montoya, Interview by Steve Fox, Pojoaque, NM, 8 August 1994, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CDs 9-10.
[50] Nick Salazar, Interview by Carlos Vásquez, San Juan Pueblo, NM, 29 July 1994, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CDs 27-28.

heat. She was proud of her first job as a doctor's assistant after she finished high school at age nineteen.[51]

Like Josefita Velarde, Ruben Montoya was born in Santa Fe in 1923 into a non-farming family. He told the story of his grandparents and the house they owned in Santa Fe, which was a closely tied community before the War. His grandfather was a teacher—he taught English and Spanish at the pueblos—and did a lot of tin work and carving while his grandmother rented rooms in her house near the Chili line[52] through the Depression. He did not get anything from his grandfather, so, when he taught himself how to carve, he made sure his children would have first choice to get pieces so that they would get something from him. He reminisced where he grew up on Jefferson Street in downtown Santa Fe, where the railroad used to run. The house had been built by his grandfather's ancestor about three hundred and fifty years before. They used to leave the doors unlocked and things outside because they knew no one would steal anything. He added that he knew everyone in town.[53]

This past, the traditions, the community atmosphere, the poverty, and simplicity of life did not only affect pre-war generations but also their children who were inspired by their families' histories. The children learned from the hardships that their parents and grandparents had known how to be grateful for the life-changing circumstances brought by the Manhattan Project in the region. The chance to stay in New Mexico, find work, and make one's family comfortable was valued above all things by the offspring of the hard-working and poverty-stricken New Mexican farmers and migrant workers. Nelson Kevin Vigil, for instance, was born in Santa Fe after the War, in 1957, but his parents were from Chimayó and his grandparents from the Rio Chiquito area where they grew and sold wheat. His parents lived in Santa Fe but did not like the city life so they moved back to Rio Chiquito to build a house. His father had started working as a sheep herder in Wyoming when he was eleven; he worked on the railroad at fifteen, and then in California. He later became a barber and finally worked at Los Alamos. He recounted his memories and commented on his family's traditions. He

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[51] Josefita Velarde, Interview by Peter Malmgren, 20 November 1995, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CDs 40-43.

[52] The Chili Line went from Antonito, Colorado, to Santa Fe and stopped in Tres Piedras, Taos, Embudo, Alcalde, and Española. The official name of the line, which was operated by the Denver and Rio Grande Railway, was the Santa Fe Branch but it was nicknamed after the *ristras* hanging on the front porches along the route. It was built in 1880, first to Española and then to Santa Fe in 1886 with the Texas, Santa Fe, and Northern Railroad. It was closed in 1941 because of competition from road transportation.

[53] Ruben Montoya, Interview by Carlos Vásquez, Santa Fe, NM, 9 August 1994, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CDs 11-13.

expressed his amazement at the old-timers' ability to make the most of the tools they had, such as a ten-mile ditch for irrigation:

> Now mobile homes are the only things that grow on fertile land, but at the time there was nothing to waste. They would terrace their land to grow food and they would build their house on the hill sides. […] You had to show utmost respect to everyone, especially the older people. We would use *usted*.[54] You had to be hard-working. There were rites of passage into maturity. For men it was when you would go work on the ditches alone for the first time with your shovel. For young women it was the first time they made a good tortilla.

He also recalled his experience in the eastern states when he was in service and how the mindset he had integrated through his Hispanic education clashed with the Anglo-American views in the East. According to him, this mindset was also the foundation of traditional lifestyles in New Mexico even though it has been fading away:

> I joined the service. It was hard but I matured a lot, traveled a lot, and learned. It's very infuriating to go back East and be looked down upon. They thought we were still part of Mexico, couldn't pronounce my name right. Called us Mexicans… Not that we are ashamed of our ancestors but we are Americans. The Hispanic mindset is 'live and let live'. It's not 'go out and conquer,' 'grab anything you can'. We take care of the land. Now we have to get permits or licenses to the Game and Fish agency to hunt and fish. This is all subsidies for the government; it doesn't go back to the people of New Mexico. It doesn't make sense to me. I think the mindset has changed; people don't help each other as much.[55]

The changes alluded to here by Nelson Kevin Vigil were part of the results from the social and economic revolution that occurred during and after the War throughout the state. These testimonies, which reveal the region's agricultural past in a most straightforward way,

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[54] *Usted* is the polite, more respectful version of "you" in Spanish.

[55] Nelson Kevin Vigil, Interview by Carlos Vásquez, 3 November 1991, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CD 44. In a 1949 article in *The National Geographic*, Mason Sutherland and Justin Locke listed quotes from Easterners who go to New Mexico thinking it was still part of Old Mexico. A New York-born storekeeper in Santa Fe gave them these quotations to illustrate the travelers' ignorance: "Be sure to give me change in American money. I don't want Mexican money."; "Where did you learn English? I thought everybody here spoke Spanish."; "How much duty will I have to pay to ship this package back to the U.S.A.?"; and "When do you hold the bullfights here?" Mason Sutherland and Justin Locke, "Adobe New Mexico," *The National Geographic Magazine*, Tampa, FL, December 1949, 826, Ralph Carlisle Smith Papers on Los Alamos 1924-1957, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS149BC, Box 1, Folder 62.

serve as a picture of life in northern New Mexico before the nuclear boom; it is the starting point of the state's metamorphosis. They emphasize the fact that land was the main source for sustenance and autonomy. Mothers raised their children by growing fruits, vegetables, and cereals in their gardens; fathers farmed, raised sheep or cattle, or left to find work elsewhere to supplement their income. All had to work as soon as they were of age. Communities relied on solidarity and exchanges. One of the most difficult aspects of life that appears repeatedly in these and other interviews is that of having to leave and be separated both from the community and from other family members. One can also notice several instances where the people who had left came back to their original homes, showing their attachment to the region. With similar potency as statistics and historical analyses, the memories of these interviewees illustrate the dual nature of life for New Mexicans who, on the eve of World War II, struggled to maintain traditions of self-sustaining communities while slowly entering the capitalist realities of industrialized America.

c. Increased federal presence

Before moving on to a more specific depiction of the place where the scientific conquest began, I need to examine a second determining "seed" of the economic revolution. Several interviewees referred to the New Deal CCC camps as one of the limited job options they or other family members had in the 1930s. These camps were the physical manifestation of an increasingly conspicuous federal presence in the state, as they were in most of the West. As a matter of fact, in parallel to the gradual introduction of the dollar, the actions of the Federal Government around the same period at the beginning of the twentieth century—the development of the National Forests and National Parks Systems, the series of Homestead Acts, the New Deal policies including relief program, and the installations of the first military bases—also prepared New Mexico for the events of World War II insofar as the state grew more accustomed to relying on the government for its economic development. People in the West were originally wary of federal intervention in their communities, but, as they simultaneously experienced the economic crisis and a terrible drought, the concept of "big government" imposed itself as their best option to salvation. This acceptance of governmental help open a new chapter in western thought.[56]

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[56] Federal influence in the West has traditionally been substantial because Western states were first territories under government and military control. A telling example of this role, put forward by William Turrentine Jackson, was the building of public roads and high-ways to replace the inadequate road system in the territories. The relation between the territories and the Federal Government was already based on a "win-win" situation as,

In *Enchantment and Exploitation: The Life and Hard Times of a New Mexico Mountain Range*, William DeBuys argues that the United States conquered New Mexico twice: first by "traders, miners, ranchers, and speculators—'rugged individualists' who served only themselves" and secondly by "soldiers, scientists, and other professionals who represented the United States as a collectivity," referring to the United States Geological Survey, the National Park Service, and the Forest Service. What I call the scientific conquest of New Mexico has its roots in the second conquest DeBuys writes about. He also calls this second American conquest a "great, collective treasure hunt" represented by the Wheeler Survey in the 1870s that was meant to do an inventory of resources west of the 100th meridian.[57] The potential of New Mexico did not appear right away, and the reputation of New Mexicans as indolent individuals who did not know how to profit economically from their resources enticed government officials to take a paternalistic position and entrust all this land to the safe care of the government. Concepts that the United States was a collectivity and that the resources of the West should be used for the greater good is one of the precepts on which the transformation of New Mexico in the second half of the twentieth-century was based.

The federal presence had indeed been felt more and more strongly because of the role the government played in the land issue. Land grabbing was not reserved to ambitious Anglo immigrants; the Federal Government caused enormous land losses to Hispanics, including land traditionally used for grazing purposes, when national forest reserves were established.[58] The government took an active part in the struggle at the time of its great national survey and later when it instituted grazing regulations in the 1910s to consolidate public lands to national forests. To preserve what it saw as an eroding landscape, the Forest Service put restrictions on grazing seasons and herd numbers. The agency presented itself as the protector of public lands and sought to shield those lands from the ravages of overgrazing. Ranchers faced the controls of permits, fires, and lumber trespasses. The decrease in sheep and cattle permits and the ban on grazing goats in some areas deeply impacted livestock activities because more animals competed for less grazing land, which was fenced and privately owned. So while protecting

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"In aiding New Mexico residents, the government would likewise provide for its own needs. The opening of such roads would speed military operations in the area as well as decrease the high cost of shipping military supplies over inadequate routes." "Federal Road Projects in New Mexico Territory, 1853-1860," in William Jackson Turrentine, *Wagon Roads West; A Study of Federal Road Surveys and Construction in the Trans-Mississippi West, 1846-1869*, Berkeley, CA: University of California Press, 1952, 109.

[57] Desbuys, *Enchantment and Exploitation*, 163.

[58] Knowlton, et al., "Causes of Land Loss," 11.

the land, restrictions imposed on public lands jeopardized traditional ways of life and the restrictions could also jeopardize the environment when the Service could not keep control.

Agriculture had been a dear topic in Washington since the Jefferson administration. The Founder and future President had written to James Madison in 1787, "I think our governments will remain virtuous for many centuries; as long as they are chiefly agricultural; and this will be as long as there shall be vacant lands in any part of America."[59] What should one understand by "vacant" land? In nineteenth-century thinking, this adjective could mean "unsettled by a permanent private owner" rather than "devoid of inhabitants." The Jeffersonian agricultural philosophy prompted the national surveys and Congressional enthusiasm to offer land to American citizens, states, and corporations. The homesteading era was the culmination of this urge to implant farms and ranches in all the corners of the nation. Kenneth W. Karsmizki writes in the introduction to John Campbell's *Magnificent Failure: A Portrait of the Western Homestead Era* about the way "settlers in addition to helping themselves, became agents of the Federal Government. […] They increased the value of raw land through construction of homes and outbuildings and through the cultivation of the land."[60] A few Hispanics also took advantage of the Homestead Acts to recover the land they had lost. In their case, however, homesteading was an activity of subsistence. These Hispanic homesteaders opposed "recreational homesteaders," properties set up by idealists who wanted to get away from eastern cities and live a peaceful rural life. According to the typology proposed by Campbell, these homesteaders encompassed the last and largest group of homesteaders: business farmers who saw homesteading as a path to economic gains. Five million out of seven million homesteaders failed.[61] Fomerly all eastern New Mexico was dotted with homesteads of the Great Plains of buffalo grass in the first decades of the twentieth century. Union County in the north-eastern portion for instance was once a propitious farmland, but the disaster happened with the combination of the Great Depression and a terrible drought that affected the county in 1931.

As already mentioned, the 1930s economic crisis and drought plunged the population even further into poverty, but this period also ushered in the concept of "big government" in

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[59] "Thomas Jefferson to James Madison (20 December 1787)," Vol. 1, Chap, 18, Doc, 21, Epilogue: Securing the Republic, *The Founders' Constitution,* Chicago, IL: University of Chicago Press, 1987, http://press-pubs.uchicago.edu/founders/documents/v1ch18s21.html, accessed on February 5, 2014.
[60] Kenneth W. Karsmizki in John M. Campbell, *Magnificent Failure: A Portrait of the Western Homestead Era*, Stanford, CA: Stanford University Press, 2002, 3.
[61] John M. Campbell, *Magnificent Failure: A Portrait of the Western Homestead Era*, Stanford, CA: Stanford University Press, 2002, 29.

the state through Roosevelt's New Deal policies and the CCC camps that mushroomed throughout the state between 1933 and 1942. For example, the CCC worked on Tom McDonald's ranch in the Tularosa Basin where the Trinity "Gadget" was to be assembled a few years later. In 1934, the Taylor Grazing Act was meant to control the degradation of public grazing land by preventing overgrazing and soil deterioration, thus stabilizing the livestock industry that depended on those lands. All the ranches in that area fell under the category of degraded lands, and the drought, "which was of such magnitude that the government paid ranchers a dollar a head for the privilege of putting their cattle to death, may have fostered more stringent enforcement of the Taylor Grazing Act."[62]

Farmers and ranchers were not the only ones to suffer from the economic crash; the mining industry was also in difficulties. In Gallup, for example, over 50% of miners had little or no work in 1933.[63] That was the moment when a portion of the New Mexican population began to turn to the Federal Government for sustenance. This economic resort thus entered the general consciousness in the state and served as precedent for the building of federal institutions on New Mexican soil. Acceptance of "big government" considerably helped smooth the path for the expansion of the nuclear industry during and after the War.[64] Historian Hal Rothman called the New Deal a "godsend" for the West because "it offered what had been lacking both before and after the stock market crash: a backbone for tenuous local economies and many opportunities for employment."[65] In many ways, one could say the same for the arrival of the Los Alamos Laboratory: it was a godsend for the first generation of workers because they had just lived through a terrible economic crisis and difficult climatic conditions, they were increasingly in need of employment to supplement their small revenues from the land, and they had grown accustomed to seeing the Federal Government as a savior of suffering economies:

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[62] David McDonald, Interview by Jane O'Cain and Beth Morgan, The McDonald residence, NM, 4 June 1997, "Farm and Ranch Folks Project," Oral History Program, Las Cruces, NM: New Mexico Farm and Ranch Heritage Museum, New Mexico Department of Cultural Affairs, Research and collections, http://www.nmfarmandranchmuseum.org/oralhistory/detail.php?interview=207%27, accessed February 15, 2014.

[63] Sarah Deutsch, "Labor, Land, and Protest since Statehood," in Marta Weigle, Frances Levine, and Louise Stiver, eds., *Telling New Mexico: A New History*, Santa Fe, NM: Museum of New Mexico Press, 2009, 276.

[64] See James T. Sparrow, *Warfare State: World War II Americans and the Age of Big Government*, New York, NY: Oxford University Press, 2011. Sparrow analyzes how the American government grew exponentially during the War, and how it legitimized its new role to the population. This process created new expectations among Americans who came to accept more government interventionism readily.

[65] Rothman, *On Rims and Ridges*, 178.

> New Deal money and programs reinforced the tendency of local people to see their predicament as the result of circumstances beyond their control and to look to the Federal Government for sustenance. With the Great Depression, employment in the mines, sawmills, and sheep camps drastically decreased. By the mid-1930s, 60 to 70% of northern New Mexicans were on relief.[66]

In sum, when the U.S. was on the brink of war, New Mexico was just as secluded as ever and terribly impoverished by droughts and the Depression; however, its small communities still clang to their ancient ways. The Anglo populations mostly consisted of city-dwellers, health-seekers, artists, businessmen, and a few homesteaders and ranchers who also relied on land ownership. In spite of the apparent continuity, seeds for an economic revolution had been planted, and the recent addition of employment as an increasingly vital resource was one of the keys for the successful establishment of a new industry. Economic difficulties, growing rivalries, and dwindling resources had prepared New Mexico for an economic revolution. Despite the little impact that the industrial revolution had on the state, the arrival of the railroad and health tourism in combination with the overuse of the land had gradually introduced new values and concepts in the region. Changes were slower in New Mexico history than in the rest of the U.S. since the pace of modernization and acceptance of national living trends correlated the state's remoteness, especially in its northern part. Although this isolation began to thin out at the turn of the century, it still acted as a substantial brake on exterior influence. The pace of evolution could have remained as slow were it not for the government's need for isolated locations to pursue its atomic enterprise.

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[66] DeBuys, *Enchantment and Exploitation*, 210.

CHAPTER 3: THE IRONY OF ISOLATION

1. The Pajarito Plateau

In July 1853, the Governor of the territory of New Mexico, General Edwin Vose Sumner (1797-1863), gladly left the region, concluding after a year in the Southwest "that New Mexico was worthless for Anglo agriculture and industry, that New Mexicans were ignorant, indolent, and slothful, and that federal territorialism would fail miserably in the Southwest." Furthermore, he doubted that the effort to incorporate New Mexico and assimilate its peoples "was worth the cost in federal dollars and American blood."[1] These thoughts on the value of New Mexico endured and nourished a reputation of singularity, of foreignness. To this day, some American citizens believe New Mexico to be a Mexican province rather than an American state. Once the territory finally reached statehood, it was still regarded more as a burden than an asset by Washington administrators. The Catholic, Spanish-speaking population was still the overwhelming majority along with over twenty Native American tribes. Thus, ethnic tensions regarding land ownership were far from dying out, and the region's reputation as an uncivilized world on the Frontier was still much alive in spite of the growth of its tourist industry or the indisputable impact of the railroad.

One event during World War I serves as a significant example of the utility of New Mexico as a "dumping" ground and a foreign land. On July 12, 1917, "1,140 striking copper miners from Brisbee, Arizona found themselves dumped unceremoniously in the desert of southern New Mexico near the town of Columbus." The press named the event a "deportation"; New Mexico was seen as "a place to which people could be 'deported.'"[2] Although it was now an American state, the region remained thought of as a borderland at the edge of the civilized world to which people were reluctantly sent or lured by their curiosity for the "Wild West." Perceptions of this region were formidably ambivalent for they oscillated from rejection to attraction, interestingly for the same reason—it belonged to a strange, unfamiliar world. World War II and the Manhattan Project gave New Mexico an opportunity to change this reputation of foreignness. The state finally had something the government urgently needed: isolation. One of the most isolated locations in New Mexico and, by extension, in the United States, was a place called the Pajarito Plateau in northwestern New Mexico. Historian Jon Hunner, a specialist of the history of Los Alamos, sees in fact a

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[1] Ball, "The U.S. Army in New Mexico, 1848-1886," in *Telling New Mexico*, 179.
[2] Deutsch "Labor, Land, and Protest since Statehood," in *Telling New Mexico*, 269.

form of continuity in the Army's interest in the Plateau. He argues that the presence of the Army in New Mexico was almost a tradition dating back to the time when the Army stationed in the territory cost a lot to the government: "[General Leslie] Groves and [J. Robert] Oppenheimer were merely the point men for a new wave of military and industrial influence and expenditure in the region."[3] The difference was that previous military conquests were generally accompanied by scientific research, but the science was secondary. Now in Los Alamos, science was the main purpose and the Army was the means.

a. History

Of all places in the nation, in the 1940s, the Pajarito Plateau was one of the remotest. Nothing in its description suggested suitability for the establishment of a high-tech company town that would eventually become the richest county in the state. Its remoteness was precisely what made it so attractive to Manhattan Project officials. The history of the Plateau occurred indeed in waves: the very first permanent inhabitants of the plateau were Native Americans; they were followed by Hispanic farmers who had, by 1942, become homesteaders. The Los Alamos Ranch School (LARS), along with the Anchor Ranch, was the most conspicuous Anglo presence on the plateau. The people living on the ranch, homesteads, and at the LARS were the first to have their lives disrupted by the Manhattan Project in New Mexico.

Pajarito means "little bird" in Spanish for it was the location of an ancient village called *Tsirege*, the Place of the Bird People. It lays 35 miles (56 kilometers) northwest of Santa Fe at an elevation of 7,300 feet (2,200 meters) and is part of the eastern margin of the Jemez mountain range facing the Sangre de Cristo Mountains[4]. The plateau is 25-miles (40-kilometers) long from Clara Peak in the north and Cochiti Canyon in the south. The other large canyons that separate the area into mesas are Guaje, Los Alamos, Pueblo, and Frijoles. Originally, the mesa was used by groups of hunter-gatherers to find game and plants; the Pueblo Indians also used it for religious purposes. The pueblo cliff-dwellers, ancestors of the Keres people, were its first inhabitants from around 1175 until 1250. Then, a second wave of Tewa-speaking Puebloans arrived on the plateau from Mesa Verde, CO, and Chaco Canyon, NM, around 1300. After about fifty years, they left to settle in the valley, probably as the

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[3] Hunner, *Inventing Los Alamos*, 15.
[4] The name of the Sangre de Cristo Mountains, meaning "Blood of Christ," is derived from a legend about Spanish missionaries who were massacred by Pueblo Indians as the missionaries sought to convert the Indians to Catholicism. The crimson color of the range in the sunset was interpreted as a sign of God.

result of a severe drought and raiding Navajos and Utes.[5] Marjorie Bell Chambers writes that "there must have been some magnetic attraction to the Pajarito Plateau." The Pueblo of Tsirege was the second largest in New Mexico and the fact that archeologists found ten *kivas* signifies there were a great number of clans living there.[6]

Under Spanish rule, the plateau became part of the Land Grant system. In 1742, Viceroy Gaspar Domingo de Mendoza (1737-1743) granted this land to a former soldier, Pedro Sánchez, from Santa Cruz de la Cañada in the Española valley. José Ramón Vigil bought the grant in 1851, and the U.S. Congress confirmed it in 1860. At the same time, the Baca Location #1 was approved as a land grant in the Jemez *valle* area to the west where many local herders used to go with their sheep and cattle.[7] This tract of land was a frontier against attacks and a first target in case of assaults by marauding bands of Natives called the *indios barbaros*—Ute, Navajo, Apache, and Comanche—who raided villages in the valley to steal crops and take captives. Until 1880, the plateau remained open to whoever sought it. That is, under the informal rules of the Land Grant system, whichever member of the community needed the available extension of land could use it.

Because of repeated fires of natural or human origin on the plateau, the forests had transformed into grassland; timber and soil composition changed to the advantage of livestock raising, and "when Stephen E. McElroy and Daniel Sawyer surveyed the Ramon Vigil Grant for the General Land Office of the Department of the Interior in 1877, they found appealing land." Their report read "valuable for its excellent grazing capacity and its large timber supply."[8] The grant was later purchased by Oregon lumberman Henry Buckman. He started exploitation for timber on the southern part of the plateau in 1898 and was the first source of employment on the plateau. However, he did not stay long. By 1902, he sold his sawmill and machinery. His succession ended in a five-year-long lawsuit (Sánchez v. Fletcher). At the same period, the United States Forest Service also acquired land on the plateau: all of its unclaimed land, except the Vigil Grant was included in the Jemez Forest Reserve, which was created by presidential proclamation in 1905. Ten years later, "the Forest Service merged the

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[5] Southwest Crossroads Spotlight, "The Pajarito Plateau and Los Alamos," *Cultures and Histories of the American Southwest*, Santa Fe, NM: SAR Press and School for Advanced Research, 2006, http://southwestcrossroads.org/record.php?num=891, accessed March 7, 2014.
[6] Marjorie Bell Chambers, "Technically Sweet Los Alamos: The Development of a Federally Sponsored Scientific Community," Doctoral Thesis, University of New Mexico, Department of History, 1974, 10.
[7] Dorothy Hoard, "Historic Transportation Routes on the Pajarito Plateau," LA-UR-06-3550, Los Alamos, NM: Los Alamos National Laboratory Ecology Group, Environmental Stewardship Division, May 2006, 4-5, http://permalink. lanl.gov/object/tr?what=info:lanl-repo/lareport/LA-UR-06-3550, accessed April 19, 2015.
[8] Rothman, *On Rims and Ridges*, 16.

Jemez and the Pecos national forests to form the Santa Fe National Forest."[9] In the way it was handed from one owner to the next, surveyed, and divided many times into smaller units, the plateau epitomizes the complexity of land quarrels in the southWestern states.

b. Homesteaders on the plateau

In the second half of the nineteenth century, New Mexican Hispanics who were dispossessed of their land by Anglo newcomers fought in all possible ways to reclaim these losses. The series of Homestead Acts gave them a legal path to recuperate land. 1887 marked the beginning of the homestead era on the Pajarito Plateau between the Santa Clara Canyon and the Vigil Grant. The first successful homesteader was Juan Luis Garcia of Guachupangue who applied that year and received patent in 1892. In the end, there were about 36 homesteaders on the plateau with a majority of Hispanic farmers and ranchers.[10]

	Patentee Date Filed Date	**Patented**	**Acres**	**Location**	**Seller to government**
Garcia, Juan Luis	03/30/1887	06/13/1892	160	Garcia Canyon	Garcia, Juan Luis
Quintana, Benigno	11/23/1892	09/11/1894	160	Western Area	LARS
Gonzales, Pedro Gomez y	02/08/1893	10/04/1898	120	Golf Course	Gomez, Elfego
Romero, David	02/28/1893	07/20/1901	160	TA-55, TA-35	Romero, Francisquito
Gonzales, Juan N.	03/06/1893	09/11/1894	120	Golf Course	Grant O.O.; Montoya Ernesto and Adolfo
Duran, Efren Gonzales de	10/24/1898	06/14/1904	160	South Mesa TA-3	
Gomez, Donaciano	03/04/1899	04/18/1905	160	Twomile Mesa	Gomez, Donaciano
Sanchez, Miguel	03/08/1899	09/28/1904	160	TA-6 area	Montoya, José Elfego
White, William Carpenter	03/18/1899	04/18/1905	160	Western Area	LARS
Loomis, James S.	04/11/1899	05/08/1901	164	TA-6 area	Ross A.C., Anchor Ranch
Gonzales, Severo	06/06/1899	02/07/1902	79	TA-6 area	Ross A.C., Anchor Ranch
Moses, William	06/01/1900	07/31/1903	40	TA-6 area	Grottenhaler, Walter V.

Fig. 7: Homestead Patents on the Pajarito Plateau: 1887–1900. Source: Dorothy Hoard, "Historic Transportation Routes on the Pajarito Plateau," LA-UR-06-3550, Los Alamos, NM: Los Alamos National Laboratory Ecology Group, Environmental Stewardship Division, May 2006, http://permalink. lanl.gov/object/tr?what=info:lanl-repo/lareport/LA-UR-06-3550, accessed April 19, 2015, 21, and Judith Machen, Ellen McGechee, and Dorothy Hoard, *Homesteading on the Pajarito Plateau, 1887-1942*, 54.

[9] Hoard, "Historic Transportation Routes," 19.
[10] Judith Machen, Ellen McGechee, and Dorothy Hoard, *Homesteading on the Pajarito Plateau, 1887-1942*, Los Alamos, NM: Los Alamos National Laboratory, 2012, i.

	Patentee Date Filed Date	Patented	Acres	Location	Seller to the government
Brook, Harold H.	08/01/1908	03/06/1914	150	Los Alamos Mesa	LARS
Hopper, William M.	08/05/1908	03/06/1914	130	Canyon Road	LARS
Quintana, David	07/19/1909	08/20/1913	151	North Mesa	LARS
Montoya, Jose Albino	01/05/1911	06/21/1915	90	Sigma Mesa	Montoya, Jose Albino
McDougall, Robert G.	01/05/1911	06/14/1914	108	Pajarito Rd bend	Roybal, Ramón
Gonzales, Estanislado	12/12/1911	02/18/1916	140	Barranca Mesa	Gonzales, Estanislados & Cirilio
Romero, Victor	02/25/1913	03/28/1916	15	TA-55	Romero, Victor
Gonzales, Federico	02/26/1913	05/04/1917	73	Rendija Canyon	Gonzales, Federico
Vigil, Miguel	03/25/1913	11/10/1916	63	Trailer Park	Durán, Ramón
Brook, Martha	08/11/1913	11/28/1914	150	DP Road	LARS
Lujan, Martin	01/27/1914	06/17/1918	160	North Mesa	Luján, Martin
Martinez, Andres	09/08/1914	07/16/1920	63	Rendija Canyon	Sena, José & Fidel
Gonzales, Francisco	10/16/1914	09/15/1919	22.5	Urban Park	Gonzales, Francisco Estate
Garcia, Esequiel	12/24/1914	12/04/1922	58	Garcia Canyon	Garcia, Esequiel
Martinez, Roman	04/22/1915	10/21/1919	30	Guaje Pines Cemetery	Grant, Ottie Oman
Vigil, Fermin	05/07/1915	07/16/1920	60.31	Mortandad Canyon	Vigil, Fermin
Archuleta, Locadio	06/10/1915	04/01/1921	53	Lociado Sandia Canyon	Archuleta, Sanaida
Garcia, Jose L.	11/27/1915	08/15/1922	36	Chupadero Canyon	Garcia, José L.
Roybal, Noberto	07/31/1916	11/04/1920	125	Barranca Mesa	Royabl, Noberto
Gonzales, Donaciano	12/01/1916	09/20/1920	13	Barranca Mesa	Gonzales, Estanislado & Cirilio
Durán, Ramón	03/02/1917	08/15/1922	10	Pajarito Road	Durán, Ramón
Archuleta, Hipolita	07/17/1917	08/31/1922	156.74	Garcia Canyon	Garcia, Adolfo
Connell, A.J.	01/21/1921	exchange	40	Mesa Library area	LARS
Garcia, Adolfo	03/15/1921	12/08/1924	55	Garcia Canyon	Garcia, Adolfo
Sánchez, Pedro					
Gomez, Pedro					
Guebara, Nicolas Ortiz					

Fig. 8: Homestead Patents on the Pajarito Plateau: 1908–1922. Source: Dorothy Hoard, "Historic Transportation Routes on the Pajarito Plateau," LA-UR-06-3550, Los Alamos, NM: Los Alamos National Laboratory Ecology Group, Environmental Stewardship Division, May 2006, http://permalink. lanl.gov/object/tr?what=info:lanl-repo/lareport/LA-UR-06-3550, accessed April 19, 2015, 21, and Judith Machen, Ellen McGechee, and Dorothy Hoard, *Homesteading on the Pajarito Plateau, 1887-1942,* 54.

President Abraham Lincoln signed the first Homestead Act in 1862 that stated that any U.S. citizen over 21 years old could file a claim for 160 acres and receive the deed to that land if they completed the requirements for ownership. The perspective of building a home on a land that would eventually be theirs was appealing to many because property represented freedom for immigrants and a way back to old ways or a legal protection of their rights for local Hispanics. A homestead[11] was the challenge of a completely autonomous life. After a five-year period, if the family who had filed a homestead claim had managed to make improvements on their land and established themselves as permanent occupants, they could fill in the documents to request ownership. They had to produce witnesses who would account

[11] Homestead comes from the Old English term *hamstede* meaning home (*ham*) and place (*stede*).

for their improvements and permanent residence to be granted a land patent by the U.S. government. Determination of boundaries and land distribution were based on Jefferson's 1785 Land Ordinance which divided the territory into townships. Another survey system, known as "metes and bounds," was also used for lands not suitable for the rectangular system. However, the grid system had the major defect of ignoring topography and, as a result, one section might have plenty of water and fertile soil but the next might be on a dry hill too steep to farm. The Enlarged Homestead Act of 1909 corrected the problem by increasing the maximum size of claims to 320 acres in areas where the land could not be successfully irrigated for lack of a close enough known water source. The 1912 Homestead Act reduced the number of years to request a patent to three years, thus motivating even more claimants to apply and bringing the number of applications to a peak in 1913. The industrialization of the country meant that "subsistence agriculture was no longer as appealing as it once was. No longer did the yeoman farmer epitomize America; images of industrialists took his place."[12] The homesteading movement thus reached the end of its appeal, but, on the plateau, the homestead era lasted until World War II.

In New Mexico, homesteading was similar to the rest of the nation with the difference that it was superimposed on the Spanish traditions of individual and shared lands. Nonetheless, the 1912 Act turned out to be very useful to the Pajarito Plateau homesteaders as well because it allowed them to be absent from their homesteads for a period up to five months. The provision suited them because they instituted a system of seasonal migration between the valley and the plateau twice a year. They used a narrow wagon road to go up to the plateau every March and go down in the valley in November. That meant, "economically speaking, homesteading on the Pajarito Plateau was a survival strategy used by Hispanics to supplement the subsistence living they practiced on their farms in the nearby Rio Grande Valley."[13] Accordingly with the traditional New Mexican lifestyles I described in the previous chapter, they produced everything they needed (clothes and food) and bartered for the rest; the only purpose of money was to pay the annual property tax. To make the most of the little water brought by the semiarid and continental mountain climate of the plateau, they resorted to dry farming techniques. Beans and corn were the primary cash crops while wheat, squash, pumpkins, watermelons, apricots, peaches, cherries, melons, potatoes, peas, beets, and turnips were grown for personal consumption on the plateau. They also gathered local plants,

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[12] Machen, et al., *Homesteading on the Pajarito Plateau*, 3.
[13] *Ibid*., 26.

culinary, and medicinal herbs during the summer such as wild strawberries, wild plums, yucca root, oregano, *quelitas* (wild spinach), *podillo, chimajá, piñons,* and *yerba buena.*[14] Each family had built a wooden cabin and a concrete cistern for them to live nine months a year. During the homestead period, farmers also hired Pueblo men to help with the plowing and harvesting. It was a life of physical hardships and dependence on the natural elements.

In 1986, eighty-three-year-old Don Marcos Gomez shared his memories of homesteading on the Plateau in a newspaper article entitled "Los Alamos: He Lived on the Hill Before It Meant 'The Bomb'." He said they led happier lives back then even if he acknowledged that his existence as a rancher, laborer, sheepherder, and cowboy was an arduous one. Gomez remembers, "the land was very fertile […] and there was never a shortage of rain or *ojitos*, natural springs for watering livestock." They herded sheep and cows in Valle Grande, planted corn, beans, peas, potatoes, peaches, and apricots on the farm and then would go down the thirteen difficult miles (21 kilometers) to the valley with mules to sell some of their production. "We'd buy the only things we couldn't harvest ourselves […]—kerosene, matches, coffee, sugar." He talked about the fighting wild animals on the mesa—wolves, bears, mountain lions—and keeping rattlesnakes as pets but what he insisted on was the solidarity and conviviality among families and the respect for elders.[15]

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[14] Gail D. Tierney and Teralene S. Foxx, *Historical Botany of the Romero Cabin: A Family Homestead on the Pajarito Plateau*, Los Alamos, NM: Los Alamos National Laboratory, 1999.

[15] Jim Sagel, "Los Alamos: He Lived on the Hill Before It Meant 'The Bomb,'" *Albuquerque Journal North*, Albuquerque, NM, 1 February 1986, and Sue Tester, Los Alamos Bureau, "Homesteaders: The pioneers of Hilltop city," Santa Fe, NM, 27 March 1977, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Los Alamos, NM—Impact of Manhattan Project on Area Communities, Homesteaders on Pajarito Plateau, 1942.

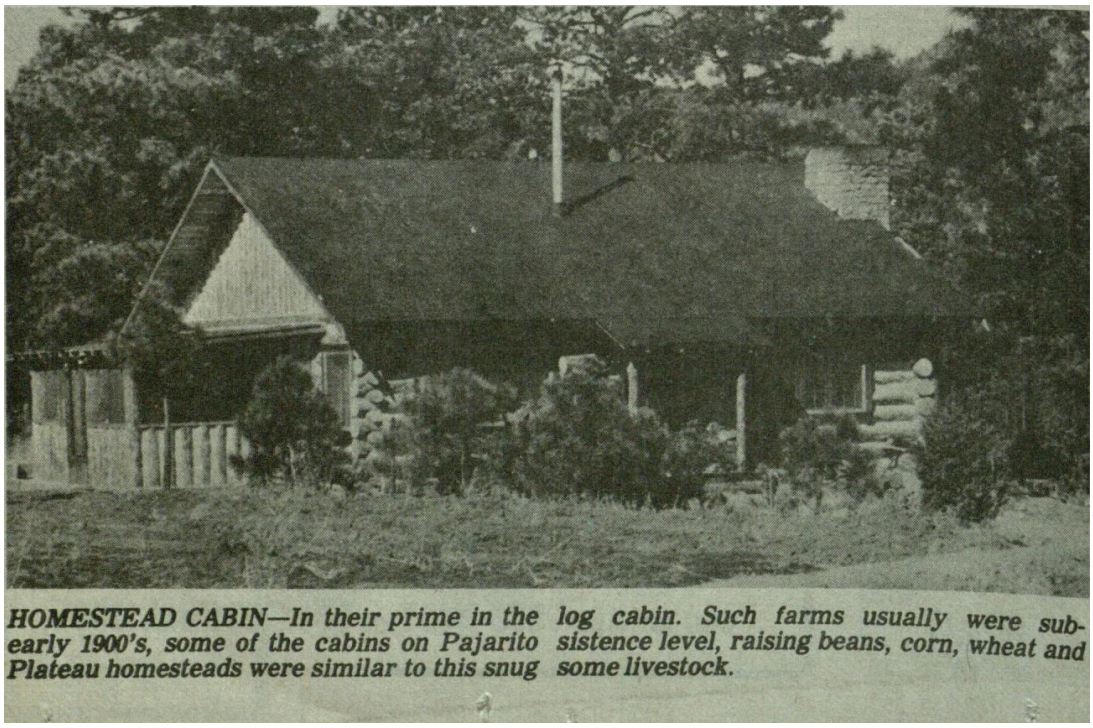

Fig. 9: Homestead Cabin. Source: Sue Tester, Los Alamos Bureau, "Homesteaders: The pioneers of Hilltop city," Santa Fe, NM, 27 March 1977, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Los Alamos, NM—Impact of Manhattan Project on Area Communities, Homesteaders on Pajarito Plateau, 1942.

c. The Los Alamos Ranch School

A few homesteaders on the plateau were Anglo-American. William Hopper, for instance, was from Yorkshire and became a naturalized American citizen in 1900. He filed for a homestead on the plateau in 1908. The same year, one of the greatest homesteaders on the plateau, Harold H. Brook, also filed for a homestead as he was looking for a cure for tuberculosis he had contracted a year earlier. His ambition was to succeed as an agriculturalist; thus, "he brought with him an innovative, entrepreneurial spirit, faith in the scientific technology of the Progressives, and technical expertise far beyond that of his neighbors […] he was the first to believe that the region held the potential for more than subsistence."[16] He stayed on his claim year-round and soon started acquiring other lands around him.[17] He married a widow, Katherine Cross Brown of Santa Fe, nicknamed Cassy, whose son from her previous marriage, Frank Brown, would later be employed by the Zia Company. Brook's ranch was called the Los Alamos Ranch, a name meaning "the cotton woods" suggested by Cassy Brook. In spite of his efforts, Brook could not make viable business of his farm and became deeply indebted. He was first a director of the Ramon Land

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[16] Rothman, *On Rims and Ridges*, 96.
[17] Brook acquired Hopper's homestead and the Benigno Quintana Homestead (both 160 acres), added 20 more homesteading acres to his land, and his mother, Mattie, applied for 150 acres on his advice.

and Lumber Company; and, when that went bankrupt, he formed a partnership with Ashley Pond to manage the Pajarito Club founded by Pond and other Detroit businessmen. Brook eventually sold his ranch to Pond because their partnership was not working and sold his mother's land to Edward Fuller. Fuller was the disabled son of Philo Fuller from Michigan whom Pond called upon for financial support and who accepted to join with him to form the school. Brook left the plateau in 1917 and died of tuberculosis in Las Cruces, NM. These names would later be remembered in the atomic age as a reminder of the life on the plateau before science brought the last wave of invasion. Meanwhile, the names of the Hispanic homesteaders and other families who lived or participated in this life on the plateau fell into oblivion for over fifty years.

According to specialists of the Homestead era on the plateau, Judith Machen, Ellen McGechee, and Dorothy Hoard, Anglo-Americans generally had more difficulties as farmers or ranchers on the plateau than Hispanics who enjoyed a valuable community support: "For the local Hispanic families, the plateau was not a desolate and isolated place; rather, it was a loose extension of their valley village life, which was the 'safety valve' to which they could always return during hard times."[18] There was always the possibility to stay with a brother, a sister, or a cousin in the valley when conditions became too difficult. Their families formed a network of solidarity that was a major asset to survive the harshness of this life; another was the fact that they knew the land intimately from being in the region for several generations. For the Anglo immigrants who took a chance in coming to establish themselves in this environment, life was hard and lonely. This adventuring spirit is probably the main reason why Anglo owners succeeded each other rapidly rather than establishing a family heritage passing down generations as opposed to the Hispanic model.

Apart from a few homesteads, the two main pre-LANL Anglo properties on the plateau were the Anchor Ranch and the LARS which were both acquired in the late 1910s. The other difference with the seasonal Hispanic homesteaders was the fact that these properties were occupied year-round because their owners had the technological means to irrigate, farm, and ranch throughout the year thanks to the latest methods they used. Anchor Ranch was the 322 acres patented by Severo Gonzales and James Loomis. The land went from one owner to the next until Alexander C. Ross from a wealthy New York family bought it. He was mentally impaired and declared incompetent in 1915; so, although he was a permanent resident of

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[18] Machen, et al., *Homesteading on the Pajarito Plateau,* 106.

Anchor Ranch, he did not personally oversee its operations, which were in the care of the Smithwick family.

In 1914, a group of industrialists from Detroit—Roy Chapin, Henry B. Joy, David L. Gray, Paul R. Gray, and Ashley Pond—bought the Ramón Vigil grant and founded the Pajarito Club. Harold Brook helped manage the estate until 1916 when he and Pond formed a partnership to build Pond's dreamed boarding school for boys after acquiring the other businessmen's share of the Vigil grant. The school opened its doors in the spring of 1917 and started to flourish under the directorship of Albert J. Connell, a former Forest Service ranger and scoutmaster in the Jemez Forest Reserve. The school called itself the "outdoor school" and was designated under the category of "fresh air schools"[19] because most students were eastern urban boys with fragile constitutions who were sent by their wealthy families to discover the joys of nature and toughen up thanks to the outdoor activities built into the curriculum and the rough conditions of high-altitude life. They slept on a screened porch at the Big House, wore shorts year-round, and were each assigned a horse to care after. Their activities included arts and crafts (such as carpentry), community work, hunting and fishing, cooking, sports (tennis, baseball, polo, handball, ice-skating, skiing, swimming, hockey), riding trips to Pueblo ruins, and weekend pack trips to Camp Hamilton or Camp May. Here is the description one could find in an advertizing booklet published by its director, A. J. Connell in 1937:

> Los Alamos Ranch School is a six-form college preparatory school for forty-four boys 12 to 18 years of age. The men on the permanent faculty are of varied academic training and diverse intellectual interests. All are experienced in outdoor life, sports and travel. Families from all parts of the country have sent their sons to the school. Graduates have prepared for and successfully carried on their college courses at Harvard, Yale, Princeton, Cornell, Williams, Amherst, Dartmouth, etc. A well-planned curriculum, an unusual diversity of valuable recreational interests, in a well equipped plant amid healthful and beautiful surroundings make Los Alamos particularly fitted to give a comprehensive education.[20]

Interestingly, the last page of this booklet features two pictures of Native Americans: young Apache children ready for a fiesta and Pueblo Indians ready for the Children's Dance

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[19] Wirth, et al., *The Ranch School Years*, 3; 28.
[20] Los Alamos Ranch School, *Los Alamos Ranch School*, Otowi, NM: The School, 1937.

at Cochiti. The school drew a parallel between its education and that of local natives, possibly capitalizing on the new attractiveness of colorful, close-to-nature native peoples also put forward in tourist brochures.

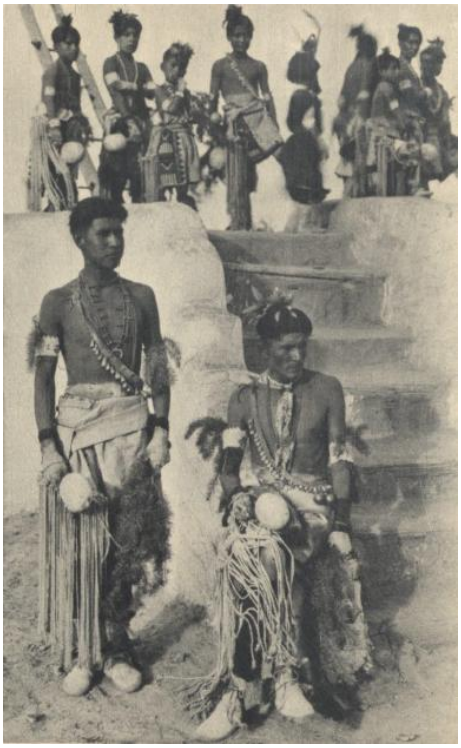

Fig. 10 a: Before the Children's Dance at Cochiti Pueblo **Fig. 10 b: Apache Native Americans before a fiesta**

Source: Los Alamos Ranch School, *Los Alamos Ranch School*, Otowi, NM: The School, 1937.

The whole concept of the school relied on a form of nostalgia for a simpler, rural way of life inspired by the New Mexican environment and populations, but the time students spent there remained a parenthesis. These boys were not destined to lead such lives after graduation; a majority attended ivy league universities and became prominent industrialists, businessmen, bankers, and lawyers. Important people were LARS alumni: the presidents of General Motors, Quaker Oats, Sears and Roebuck, Bill Veek, owner of the Chicago White Sox and Oakland Athletics, and authors such as George Vidal and William S. Burroughs.[21] While most eastern boarding schools had religious origins, the LARS was different because "its roots lay […] in Progressive-era concerns about children and health."[22] Parents of well-off families became increasingly attentive to the purification of their children's minds and bodies: hygiene and physical education became considered as important components of a successful upbringing. Both Pond and Connell had first come to New Mexico because of their poor health: Pond had

[21] Hunner, *Inventing Los Alamos*, 16.
[22] Wirth, et al., *The Ranch School Years*, 10.

suffered from typhoid fever and other ailments when he was young, and Connell had a severe case of bronchitis when he was in his twenties. So the belief that the unpolluted air of the plateau and outdoor activities had a fortifying impact on the boys' immune systems was inspired by their own experience in the state.

The Ranch School relied first and foremost on its ranch for food because it was so isolated and providing healthy local foodstuff for students was another selling point for parents. Only one Hispanic and one Native American student attended LARS in its twenty-six-year history, but the School was useful to surrounding populations for other reasons. The Hispanic homesteaders on the plateau could sell their crops there and sometimes find employment: "In addition to those who looked after the livestock and gardens, the Ranch School employed a night watchman, electrician, plumber, auto mechanic, and several general laborers. As buildings were added, carpenters and stonemasons were employed."[23] They also employed cooks, landscapers, dairymen, bookkeepers, and people to maintain the water supply, sewer, and power plant.[24] It became a partnership between the school and local families from Hispanic villages; homesteads and a few workers also came from nearby Pueblos.

Rubel Montoya, son of Adolfo Montoya who homesteaded on the plateau and supplied meat to the school, was the first Hispanic scholarship student to attend LARS. The Gonzales family also worked for the school. The wives, Elisa Montoya and Ernestina Gonzales helped with baby deliveries of other wives on the plateau, and their children "were assigned various chores at home and for the Ranch School." [25] One of these children, Raymond Bences Gonzales, wrote a small book called *A Boy on the Hill* to commemorate his childhood on the plateau in the 1930s. His father was the manager of the trading post and the post office for the school; he ordered the groceries, clothes, and equipment for the students. This little book is a collection of childish anecdotes, pranks, games, and mischief that give a humorous, joyful account of an innocent life on the mesa before it became a secret atomic laboratory.[26] He recollects, "We all knew each other and lived like one big, happy family, many of us

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[23] *Ibid.*, 36-37.
[24] Raymond Bences Gonzales, A *Boy on the Hill*, Ed. Judith Gursky, Los Alamos, NM: Los Alamos Historical Society, 2001, 3.
[25] Wirth, et al., *The Ranch School Years*, 189.
[26] Raymond Gonzales's father, Bences Gonzales, joined the Manhattan Project during the War. He worked at the post Commissary. The family stayed in Los Alamos and Raymond was one of the early graduates of the Los Alamos High School in 1945. He was also hired at the Lab to do technical jobs. Gonzales, *A Boy on the Hill*, 39-41.

related."[27] Gonzales also describes the type of work they, as children, were asked to do on the ranch: milking cows, taking care of the horses, raising and selling poultry, hunting and fishing. In several instances, Gonzales mentions the ties and cohesion between the different communities. His cousin Amador, who was an assistant at the school for Los Alamos employees, and his brother, who taught at the San Ildefonso Pueblo School, organized softball and basketball teams to play games at Los Alamos and at the Pueblo. His reminiscences portray an atmosphere of cheerful and simple carelessness in a microcosm of close families who relied on mutual help:

> I have wonderful memories of the good times I had growing up in Los Alamos. The people that worked for the ranch school were all local people and the families were all very close, helping each other out and sharing goods with each other. It was a quiet and peaceful community, and everyone who lived here was very important to the school because they helped to make it a success.[28]

Gonzales's memories also provides us with a list of the people he knew who worked for the Ranch School that confirms that instead of hiring individuals, the school employed families.

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[27] Gonzales, *A Boy on the Hill*, 4.
[28] *Ibid*., 26-27.

Names	Occupation
Adolfo Montoya	head gardener
Pedro Gonzales	head carpenter
Juan and Casimiro Montoya	carpenters and painter
Jim Womelsduff	superintendent over everything
Frank Womelsduff	first school teacher in log cabin schoolhouse
Floyd Wodelmsduff	in charge of the power plant
Patricio Conzales	Mechanic for power plant, cars, trucks, and machinery
Pat Gonzales	Assistant to superintendent
Crestino and Candelario Montoya	Cut hay, delivered and stored ice and firewood, general handymen
T.K. and Rufus Knievel	Night and day watchmen
Ted Mathews	Head horse wrangler
Lee Gomez	Wrangler, assistant to Mathews
Edna Rousseau	School teacher
Francis Rousseau	Head bookkeeper
Eugene Gonzales	Assistant bookkeeper
Amador Gonzales	School teacher
Fred Harris	School teacher
Helen Schuler	Head nurse for Ranch School and school workers and families
Rosco Blevins	Head dairyman
Eugene White	Assistant to Blevins
Joe Vigil	Cook
José Montoya	Waiter
Henry Montoya	Waiter
Ernest Montoya	Waiter
Bences Gonzales	Manager of Trading Post and cook for summer camp

Fig. 11: List of people who worked at the Ranch School and lived in Los Alamos with their families. Source: Raymond Bences Gonzales, A *Boy on the Hill*, Ed. Judith Gursky, Los Alamos, NM: Los Alamos Historical Society, 2001, 30-32.

Gonzales's reminiscences of an idyllic, secluded world in the mountains counterbalance the harsher images of life on the plateau. Behind the romantic vision of Pond's or Brook's dream of a life close to nature, however, there remained the realities of a difficult climate and degrading economic conditions. The school was under financial pressure, the Anglo homesteaders struggled to make it in spite of technology, and the Hispanic population was affected by the general impoverishment in the valley. Their survival was the fruit of constant hard work and community cohesion, which enabled the "boy on the Hill" to fondly remember this period.

One person does not appear in the table of people working on the plateau, yet she is remembered in Gonzales's little book and is a major figure of the Los Alamos history. Edith Warner lived at the boxcar railroad station of the Denver & Rio Grande "Chili Line" next to Otowi Bridge. Connell gave her the job to look after freight in 1928. She was responsible for taking deliveries of supplies and receiving mail for the people who lived on the plateau. She also transformed the little house into a tearoom. She depicted her house in her manuscript as

standing beside "a bridge between two worlds,"[29] and she was indeed a link between the Hill and the San Ildefonso Pueblo. Warner befriended Peggy Pond Church, the daughter of the founder of LARS, Ashley Pond, and wife of Fermor Church who taught at the school. She wrote *The House at Otowi Bridge* about her friend in 1960 and described her house as standing "in the shadow of Los Alamos, the mushrooming shadow of violent change in which all of us now must go on living."[30] Hers is not the only characterization by those who used to live on the plateau of the arrival of scientists as a "violent change"; however, hers is one of the most eloquent.

Edith Warner left Pennsylvania in the fall of 1922 because she was apparently depressed and in a poor health. She was determined to find a way to make a living in New Mexico. She first stayed at John Boyd' Frijoles Lodge, a guest ranch. Historian Peter Hales called her "the quintessential transplanted romancer." He qualified her dreams of racial cooperation and reconciliation with Native Americans as "the fantasies of an expatriate on this picturesque frontier."[31] In fact, she succeeded where so many other immigrants had failed or resisted doing in the region: she merged into the local culture and environment instead of altering them to meet her needs. Maria and Julian Martinez, the famous San Ildefonso painters and potters, owned the house at Otowi and allowed her to live there. She later lived with her great friend Atilano Montoya who was Maria Martinez's uncle, former Governor and elder at the Pueblo. Before she turned it into a tearoom, Edith would sell gasoline, drinks, and sandwiches.

A woman living alone in an isolated place was a strange thing for Pueblo Indians who were always with the community. Even though she would never fully be one of them, she was often in their company and, thus, became close to them, attending ceremonial dances and adopting aspects of their world view. She writes in her journal in 1933, "What we do anywhere matters but especially here. It matters very much. Mesas and mountains, rivers and trees, winds and rains are as sensitive to the actions and thought of humans as we are to their forces." She understood the meaning of the dances was not to control these forces but a way to harmonize human lives with the world surrounding them.[32] The time she spent in Otowi and with her Pueblo friends gave her the knowledge of this environment's fragility and she

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[29] Peggy P. Church, *The House at Otowi Bridge; the Story of Edith Warner and Los Alamos*, Albuquerque, NM: University of New Mexico Press, 1960, 5.
[30] *Ibid.*
[31] Hales, *Atomic Spaces*, 14.
[32] Church, *The House at Otowi Bridge*, 25.

later pointed out the irony behind the selection of Los Alamos as a site to build weapon of unprecedented destruction. Choosing such a fragile and remote space to build something so powerful and so paramount in the history of mankind has often been commented on by the witnesses of the history of Los Alamos. Her friend Peggy Pond Church notes,

> How strange it seemed that the bomb which had created such waste and such suffering had been made on the plateau where the ancient people for so long invoked their gods in beauty. In the smallest atoms of dust the forces that hold the worlds together lay slumbering. Long ago men had learned to call them forth with prayer, with the prayer of dancing bodies, of soaring voices, making themselves one with the need of earth for rain.[33]

Edith Warner died of leukemia[34] at 57 in 1951 in her new house at the San Ildefonso Pueblo where she was buried.

2. The Manhattan Project

a. Background: connecting local and global histories

In order to retrace how the names of Ashley Pond, Albert J. Connell, and Edith Warner came to be associated to that of the Manhattan Project, some background information on the Project itself seems requisite. Furthermore, the magnitude of the enterprise must factor in the point that the poor Hispanic families in Los Alamos were obliterated from official histories of the Project. They were integrated in a gigantic military and scientific machine that was born out of necessity and prioritized success of the mission above all, and relied on people's patriotism and sacrifices in support of the war effort. Local histories were thus crushed by world history at Los Alamos and in other places affected by the Manhattan Project. In a few years the plateau connected New Mexico, one of the remotest places in America, to the global trajectory of the world and for long, the momentousness of what happened there kept local repercussions in the dark.

Looking for the genesis of atomic bombs, one could go back to the origins of chemistry when Leucippus and Democritus first conceived the theory of the smallest irreducible and

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[33] *Ibid*., 111.

[34] Although some have wondered whether Warner's disease was radiation-induced or whether she was "an early downwind victim of Los Alamos testing" there is no information available on the origin of her disease. Vincent B. Price, "Edith Warner in the Shadow of Los Alamos," Provincial Matters, *New Mexico Mercury*, NM Mercury, 19 August 2013, http://newmexicomercury.com/blog/comments/provincial_matters_8_20_2013, accessed January 30, 2014.

invisible particle of matter they christened "atom." Plato originated a philosophy that expanded on an atomic theory in which senses and emotions were the shadows of mathematical forms beyond human perception. The advent of alchemy based on the Aristotelian theory of the four elements (i.e., earth, water, air and fire) put research on the atom on hold until the end of the eighteenth century and the works of French aristocrat Antoine-Laurent de Lavoisier and English Quaker John Dalton. The actual basis for nuclear weapons was the fruit of the work of other French and British scientists at the turn of the nineteenth and twentieth centuries. In a few decades, physicists were able to make fundamental additions to Russian chemist Dimitri Mendeleev's table of elements and get a better picture of how an atom is structured. In November 1895, German physicist Wilhelm Conrad Röntgen announced the existence of x-rays—his name was later used as a radiation unit, the roentgen—and, from this discovery, Antoine Henri Becquerel found out about the rays emitted by uranium: radiation. Two years later (1897), English physicist Sir Joseph John Thomson reported the existence of electrons in the atomic structure, making him a pioneer of experimental atomic energy. Polish/French physicist Marie Curie famously added radioactive radium to the number of known elements in 1898. In 1911, New Zealander Lord Ernest Rutherford, one of J. J. Thomson's pupils, confirmed the existence of a nucleus in the atomic structure; he named its positively-charged particles "protons" and managed to split the atom in 1919. His pupil at the Cavendish Laboratory, James Chadwick, further decomposed the atom and confirmed the existence of neutrons in 1932. The neutron would become the most important particle in the history of nuclear weapons for its capacity to penetrate an atom's nucleus would become the way to producing a nuclear chain reaction.

The experiments of early twentieth-century atomic scientists were dedicated to man's oldest quest of reproducing and conquering the forces of nature. This quest was referenced by President Truman in his announcement of the atomic bombing of Hiroshima: "It is an atomic bomb. It is a harnessing of the basic power of the universe. The force from which the sun draws its power."[35] Thus, in dissecting matter to the core and studying molecular reactions, scientists not only tried to unfold mysteries of the universe but also to become the masters of these reactions. The first step toward creating a chain reaction was to achieve nuclear fission; that is, the disintegration of a heavy nucleus into two lighter nuclei of approximately equal size. After succeeding in unleashing artificial radiation, the French partnership Joliot-Curie

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[35] Truman, "Statement by the President of the United States, The White House, Washington, DC, August 6, 1945."

concluded fission would be realizable with uranium-235. Indeed, about a year before Nazi Germany's invasion of Poland, in December 1938, German chemists Otto Hahn and Fritz Strassman achieved fission of U-235 by bombarding it with neutrons to obtain barium in their Berlin laboratory. On the eve of World War II, the scientific world was also on the brink of unleashing the most powerful source of energy ever known from the smallest fragments of our planet.

Concerned scientists who envisioned what these recent discoveries would mean in times of war took steps to warn allied forces of the dangers involved if atomic knowledge were to fall in the wrong hands, namely Adolph Hitler's. Austrian-British physicist Otto Frisch contacted Danish Nobel laureate physicist Niels Bohr who was on his way to a conference in the United States. There, the latter met with Italian Nobel-Prize-winning and refugee Enrico Fermi who was the first to hypothesize a theory on chain reaction and Hungarian Leo Szilard who demonstrated the validity of Fermi's suppositions.[36] Alarmed by the prospect of German atomic bombs, Szilard and Fermi understood that an allied opponent to the Nazis in the race to build these new, extremely powerful weapons would be crucial. Despite how little information was available on Hitler's interest in atomic weapons which, as it turns out, was minimal, it seemed clear that the only solution to combat an enemy with such power would be to be similarly armed.[37] The United States appeared as an obvious choice even though, at the time, the country held an isolationist position and had not entered the War. Considering fascist ambitions, the likelihood of a German atomic supremacy put at risk the future of all free nations, including the U.S. That fact could not be ignored. The two physicists tried to alert the highest American spheres of power through the Navy but were unsuccessful.

Szilard then turned to his old friend from his years as a doctoral student at the University of Berlin, the celebrated German-born Nobel laureate Albert Einstein who signed a letter drafted by Szilard to U.S. President Franklin Delano Roosevelt. That letter, dated August 2, 1939 informed the American president of the possibility of building atomic bombs, gave notice of the advances made by German atomic physicists, and outlined the worrying fact that Germany had stopped sales of uranium from its new satellite nation Czechoslovakia. The letter also counseled to help finance experimental atomic research in American university

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[36] Ronald E. Powasky, *March to Armageddon: The United States and the Nuclear Arms Race, 1939 to the Present*, New York: Oxford University Press, 1987, 3.
[37] Richard Rhodes, "The Atomic Bomb in the Second World War," in Cynthia C. Kelly, and the Atomic Age Foundation, eds., *Remembering the Manhattan Project: Perspectives on the Making of the Atomic Bomb and Its Legacy*, Hackensack, NJ: World Scientific, 2004, 19.

laboratories and open communication channels between the scientists working in the labs and the government.[38] Roosevelt was persuaded and, in utter secrecy, the American government became the sponsor of atomic physics. That partnership was taken over by the War Department after the Pearl Harbor attack on December 7, 1941, and the subsequent U.S. entry into World War II. The part played by these noteworthy scientists is essential because these men emigrated to the state of New Mexico three years later as pioneers of the scientific conquest and changed the culture of the state. Their foresight and their commitment to the ideological battle against the powers of the Axis were pivotal in the American decision to fully invest in atomic power. The acquisition of this power determined the course of American history in the postwar decades as the atomic bombings in Japan were called, by British physicist Patrick Blackett in 1949, the last event of World War II but also the first event of the Cold War.[39] Recounting the history of atomic power is the demonstration of how the Manhattan Project and its crucial phase in New Mexico produced impact waves that propagated at different historical levels. As mentioned above, part of the complexity of analyzing New Mexico's nuclear story is that it is interlocked with the intricacies of world and local histories where even the most isolated populations and places were affected by the incidents of an international range and reciprocally.

Before the launch of the Project, American atomic research was embryonic. At the end of the 1930s, various university laboratories benefited from the arrival of brilliant European refugee scientists fleeing the Nazi threat. After receiving Einstein's letter, Roosevelt followed his advice and made funds available under the supervision of a committee headed by Lyman J. Briggs, Director of the National Bureau of Standards. In June of 1941, the Office of Scientific Research and Development, directed by Vannevar Bush, took over the atomic program until America's entry in the World War and the intervention of the Army Corps of Engineers in December. The Army was mostly needed for funds to buy uranium, graphite, and heavy water—commonly used neutron moderators. Funds also came from the Navy and from the Carnegie Institute and were committed for work at Columbia, Harvard, Princeton, Cornell, at the Universities of California-Berkeley, Minnesota, Chicago, and Virginia; and other sites. In June 1942, when the Army took over the Project, Colonel James C. Marshall

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[38] Albert Einstein, Letter to President Roosevelt, August 2, 1939 (Document A2), Michael B. Stoff, Jonathan F. Fanton, and R. Hal Williams, eds., *The Manhattan Project: A Documentary Introduction to the Atomic Age*, Philadelphia, PA: Temple University Press, 1991, 18-19.

[39] Patrick M. S. Blackett, *Fear, War, and the Bomb*, New York, NY: Whittlesey House (McGraw Hill), 1949, 138–139.

was selected District Engineer; by September 1943, he was replaced by his Deputy Engineer, General Leslie Groves, and sent overseas. Marshall's headquarters were installed on the island of Manhattan in New York, hence the name of "Manhattan Project," short for the Manhattan Engineering District (MED) which was first considered to be named "lab for the development of substitute materials."[40] On December 2, 1942, Chicago Pile Number One, or CP-1 for short, on the University of Chicago campus, Fermi and his fellow physicists achieved the first controlled and sustained chain reaction. From that breakthrough on, the Project's pace greatly accelerated.

Because the Project necessitated colossal financial and labor resources, its facilities were scattered all over the country. The uranium coming from the Eldorado Gold Mines in Canada needed to be enriched and processed to produce plutonium. Enrichment processing was an inevitable step to extract isotope U-235 from natural uranium as it is the only isotope of uranium fissionable by neutron irradiation even though U-235 accounts for only 0.72% of natural uranium. Plutonium is a transuranium element detected in 1941 by Glenn T. Seaborg, Joseph W. Kennedy, and Arthur C. Wahl at the UC-Berkeley Laboratory by bombarding uranium-238, which accounts for the remaining 99.27% of natural uranium, with the nucleus of heavy hydrogen. Both uranium and plutonium were produced because scientists were pursuing two different lines of research for bombs. In the end, they managed to build one gun-type bomb functioning with uranium—the Hiroshima bomb christened "Little Boy"—and two implosion bombs functioning with plutonium—the Trinity "Gadget" and the Nagasaki "Fat Man" bomb. Two of the greatest Manhattan Project sites in fact were dedicated to supplying enriched uranium and plutonium to experimental physicists. The pilot plant to enrich uranium later known as Oak Ridge National Laboratory was opened near Knoxville, Tennessee, to carry out the isotopic enrichment of uranium through electromagnetic separation and gas and thermal diffusion: it was called the X-10. Production of plutonium was first ensured by the Metallurgical Laboratory at the University of Chicago headed by Arthur H. Compton; however, because the required quantity of plutonium soon asked for greater and more powerful reactors, Center W, later renamed the Hanford Nuclear Reservation, was built on the Columbia River in Washington state.

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[40] Jones, *Manhattan, the Army, and the Atomic Bomb*, 43.

b. Selection of a site for Project Y

In 1942, the creation of Project Y was meant to accelerate scientific progress on the conception of the bomb because, to date, the components for this weapon had been geographically separated in the country and compartmentalized for security reasons. It would be a facility that would centralize all the work on the design and building of the bomb that had been insofar conducted in university labs throughout the country—mostly in Chicago and UC-Berkeley. Oppenheimer and Compton first considered settling the lab at the Clinton Engineer Works in Tennessee or in Chicago, but neither location was isolated enough. The creation of a space dedicated to this purpose, reproducing an academic atmosphere cut off from the rest of the world where scientists could share freely, was originally Oppenheimer's and John Manley's idea. In "appealing directly to Groves' obsession with security, Oppenheimer proposed that all the research be consolidated in a single laboratory, located in an isolated region, where the scientists could converse freely among themselves and secrecy could still be maintained."[41] General Groves responded positively to the suggestion, and, by October 1942, he was looking for a director. Ernest Lawrence would have been his first choice had he not been wanted at Oak Ridge. The name of Hans Bethe was suggested by Edward Teller, but Groves refused to have a foreigner in charge of a national project of this magnitude. Thus, despite his leftist inclinations, the F.B.I.'s reluctance, and the lack of a Nobel Prize, Groves selected "Oppie," J. Robert Oppenheimer. When later asked about this controversial choice, Oppenheimer would simply say he was chosen "by default" because "the obvious people were already taken and […] the project had a bad name."[42] Once a director was named, a location was needed. Groves favored the proposed location for Project Y over other sites because he was searching for isolated areas where "nearby communities would not be adversely affected by any unforeseen results from [their] activities." Site Y would welcome a crowd of "highly talented specialists, some of whom would be prima donnas"[43] who would be more demanding as to their working and living conditions.

Nonetheless, isolation remained the key criterion in the selection of the Pajarito Plateau because of security obsessions. The very things that made New Mexico a foreign, distant, almost unwanted region of the U.S. suddenly became fundamental assets. Land grabbing entered a new phase with the atomic age. Now the Federal Government needed "empty" land

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[41] Jennet Conant, *109 East Palace: Robert Oppenheimer and the Secret City of Los Alamos,* New York, NY: Simon & Schuster, 2005, 37.
[42] *Ibid*., 40.
[43] Groves, *Now It Can Be Told*, 64.

for its atomic and nuclear pursuits, and government officials generally perceived the West as just that: a reserve of wastelands that finally became valuable. Groves appointed Lieutenant Colonel John H. Dudley of the MED to investigate possible sites. He recalled the criteria he had to base his search on without knowing the purpose for which the site would be used in *Reminiscences of Los Alamos, 1943-1945*. First, the site had to support an estimated population of 265 people. Oppenheimer had imagined that six scientists assisted by a few engineers, technicians, and draftsmen would be enough. Thinking of families, plumbers, electricians, guards, storekeepers, and school teachers, Dudley raised the number to 450; by November 1942, it had become 600. Second, the proposed laboratory would have to be built at least 200 miles (322 kilometers) inland because coastal locations or one abutting foreign borders would pose too many threats on safety from enemy attacks. Third, the climate in winter should be mild to allow year-round experiments and construction. Fourth, the location needed to have some already existing housing facilities to enable the first six scientists to start work immediately. Fifth, though isolated, the place would have to be accessible with ready transportation to permit cars and trucks to deliver people and material to the lab. And, last, in this spirit of isolation and security, the topography of the area should be a natural bowl surrounded by hills close-by to put up fences and install guards at the top.[44] Beside these obvious requirements, other criteria included access to power, fuel and water; adequate testing grounds; sparse local population; easy acquisition of the land, and a local labor force.[45] A site near Los Angeles, California, was first considered, but Groves thought it did not meet with the security requirements because the area was too populated and would pose a chance that some scientists would be tempted to socialize with the faculty at the California Institute of Technology. He also rejected a site near Reno, Nevada. The best places Dudley found were Oak City, Utah, which was rejected because of the number of farmers and their families who lived there, and, then, Jemez Springs, NM.[46]

Dudley looked to the West because "his superiors had determined that the West was remote, its spaces large, the population sparse, the land cheap, the whole of it pockmarked by

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[44] John H. Dudley, "Ranch School to Secret City," in Lawrence Badash, Joseph O. Hirschfelder, and Herbert P. Broida, eds., *Reminiscences of Los Alamos, 1943-1945*, Dordrecht, Holland: D. Reidel Publishing Company, 1980, 1-11.

[45] Jones, *Manhattan, the Army, and the Atomic Bomb*, 83.

[46] Percival C. Kieth was a member of the planning board for the government's Office of Scientific Research and Development set up in December 1941 to supervise engineering procurement and plant production of the Manhattan Project. He had two sons, Percival and Christopher, who were summer campers at LARS. He wanted to locate the laboratory and the uranium enrichment facilities in New Mexico from the beginning and he made sure the option was kept on the table. Wirth, et al., *The Ranch School Years*, 155.

regions ripe for acquisition and development [...] Dudley and his superiors were only the latest in a long string of warriors who had come to conquer the region," according to Peter Hales who, in that instance, corroborated Jon Hunner's assertion of continuity in the region's colonial history. Hales presents the area as unattractive, a mixture of dust and ashes from a volcanic explosion thousands of years before, "a place on the edge between wilderness and civilization—a place on the frontier."[47] While I will later argue that the region's past influenced the scientific conquest of the Pajarito Plateau and paved the way for the spread of this conquest to other parts of the state, the arrival of the Manhattan Project in northern New Mexico was nonetheless a violent rupture in an already inhabited, organized world. Despite the influence of the past on the way these new "warriors" conquered the land, this third conquest profoundly and speedily revolutionized New Mexico. Continuity is primarily found in the colonial mindsets of the people who participated in the scientific conquest, be it the Army or the scientists. The notions of emptiness and of a place on the edge of civilization only exist in the point of view of the conquerors; but, as demonstrated above, the local New Mexicans had a wholly different view of their world before this third, new colonial wave hit the region. This mindset is again the reason why the Hispanic homesteaders were "barely noted" by Dudley when he assessed the locale although they would be the majority of expatriated residents at Los Alamos. Yet, "because they were not 'authentic,' in nostalgic Anglo terms—that is, not reservation-dwellers, pottery-making Indians, but small-time capitalists, cultural half-breeds who eked out their livings on marginal lands—these residents of the mesa hardly existed in the Western mythology invented by the emigrés who surrounded them."[48] And existing outside of the Western mythology, which was then the sole identity of places such as New Mexico in the conquering mind, meant falling into ignorance.

Jemez Springs (35.7708° N, 106.6925° W), a deep canyon west of Santa Fe, was the first site Dudley selected in New Mexico; however, when Groves came to visit on November 16, 1942, he immediately rejected it because of too many farmers to dispossess and the mesas surrounded the canyon and would be an obstacle to expansion. Oppenheimer also thought the cliffs would have a depressing effect on the scientists' morale and the sound of test explosions would probably reverberate against these walls.[49] Groves wanted to avoid at all cost having trouble disposing the owners of the land the government needed; his main concern with

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[47] Hales, *Atomic Spaces*, 13.
[48] *Ibid*., 16.
[49] Chambers, "Technically Sweet Los Alamos," 52.

finding locations in the West was to avoid Indian presence. He repeatedly mentions this point in his memoir, *Now it can be Told*. Recounting his first visit to New Mexico, he writes, "As we went along the road to the north, we drove by many small Indian farms, and I began to have misgivings about the troubles we would have in dispossessing the owners." In searching for a test site in 1944, he comments, "I added one special prohibition: that it should have no Indian population at all, for I wanted to avoid the impossible problems that would have been created by Secretary of the Interior Harold L. Ickes, who had jurisdiction over the Bureau of Indian Affairs."[50] In the end, no difficulties were encountered with Native Americans in the early years of LANL but its presence became increasingly problematic for its neighboring Native communities in the following years.

After inspecting Jemez, the small group went to evaluate the school on the plateau following Oppenheimer's suggestion that it would be an adequate location. Los Alamos did not meet all criteria. For one, it was no natural bowl prompting Dudley to initially discard the area. Nevertheless, the bowl concept was inverted; the cliffs around the mesa made the site just as inaccessible and the altitude permitted views important to both Oppenheimer for anti-depressant reasons and to Groves for security reasons. Physicist Edwin M. McMillan was present on November 16, 1942 when they visited the Ranch School and remembered Groves saying that it was the right place as soon as he saw it.[51] The excellent air and rail facilities in Albuquerque, which would facilitate shipment of material, were also a criterion that tipped the scales toward the choice of Los Alamos. In fact, "the Army's Albuquerque Engineering District—a branch of the Army Corps of Engineers—was assigned the task of building the laboratory and living quarters for the scientists who would be working on the hush-hush Manhattan Project."[52] General Groves later noted that the only real problems with Los Alamos, which revealed themselves a few months into the Project, were the water supply because controlling the residents' use of water was almost impossible, the road because it was ill-adapted to heavy vehicles, and the lack of skilled labor in the vicinity.[53] But low-skill labor was plentiful and turned out to be an indispensible help to the Project.

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[50] Groves, *Now It Can Be Told*, 65; 289.
[51] Edwin M. McMillan, "Early days at Los Alamos," in Lawrence Badash, Joseph O. Hirschfelder, and Herbert P. Broida, eds., *Reminiscences of Los Alamos, 1943-1945*, Dordrecht, Holland: D. Reidel Publishing Company, 1980, 15.
[52] Simmons, *Albuquerque: A Narrative History*, 367.
[53] Groves, *Now It Can Be Told*, 66; 155.

c. Oppenheimer's love story with the "Land of Enchantment"

One element in the selection of Los Alamos that has been repeated and insisted on is that Oppenheimer suggested the area. The fascination with this detail possibly comes from his special relation to the Land of Enchantment and how this relation produced the greatest happenstance in the selection process. Oppenheimer loved New Mexico and dreamed of joining his love of the desert and his love of physics. As he had written a friend, "My two great loves are physics and New Mexico, it's a pity they can't be combined."[54] But the height of irony is that this selfish desire led him to irreversibly alter or even destroy precisely what he loved about the region and that is probably why the anecdote became legendary. Much of the nuclear centers of research and development, high-technology facilities, and military installations in New Mexico are the result of Oppenheimer's decision to take Groves to visit the LARS. His role is even commemorated in the town: there is an Oppenheimer Avenue, the J. R. Oppenheimer Memorial Committee organizes lectures in Los Alamos to honor the memory of the great physicist, and in 1983, LANL renamed their scientific library the J. Robert Oppenheimer Study Center. He also received an honorary degree from the University of New Mexico in 1947.

Oppenheimer's first trip to New Mexico was in 1922 at age eighteen. Like many other Anglo-Americans who travelled to the state at that time, he came to recover his health. After graduating from the Ethical Culture Fieldston School in New York in 1921, he contracted trench dysentery on a prospecting field trip to old mines in Germany. He then contracted a case of colitis that kept him bedridden and cancelled his entrance at Harvard. His father asked his son's former English teacher from Fieldston, Herbert W. Smith, to take Robert with him on his summer trip to the Southwest. They stayed for two months at the *Los Piños* guest ranch in Cowles, NM, run by Katherine Chavez Page. Katherine taught Oppenheimer to ride horses and took him on lengthy riding trips throughout the region's wilderness. On one of these trips, they went from the village of Frijoles to the Pajarito Plateau through Valle Grande. That is when he saw Los Alamos for the first time.

Oppenheimer was able to resume his studies in the fall and, after Harvard, went on to study at Cambridge and Göttigen. He came back to the U.S. with his Ph.D. in physics and was awarded a fellowship at California Institute of Technology before accepting a professorship at

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[54] Kai Bird and Martin J. Sherwin, *American Prometheus: The Triumph and Tragedy of J. Robert Oppenheimer*, New York, NY: A.A. Knopf, 2005, 81.

UC-Berkeley. In 1928, he was diagnosed with a mild case of tuberculosis and had to return to New Mexico where he and his brother, Frank, asked their father to rent a ranch in the upper Pecos Valley that they called *Perro Caliente*—hot dog. Oppenheimer eventually purchased it in 1947. All his summers during the 1930s were spent there; he found "with the coming of summer, he craved the exhilaration and invigorating calmness induced by *Perro Caliente*. There was a rhythm now to his life: intense intellectual work […] followed by a month or more of renewal on horseback in the Sangre de Cristo Mountains of New Mexico."[55] In the summer of 1937, Oppenheimer also stopped for the first time at Edith Warner's tearoom on a pack trip with his brother and sister-in-law. His love for New Mexico expressed itself through his yearly sojourns there, his career choices since California enabled him to be closer to the desert he cherished, through his letters and poetry. His first impression of the desert lingered with him until he was able to return and a poem he wrote in 1928 clearly shows his attachment to the natural settings of northern New Mexico:

> It was evening when we came to the river
> with a low moon over the desert
> that we had lost in the mountains, forgotten,
> what with the cold and the sweating
> and the ranges barring the sky.
> And when we found it again,
> in the dry hills down by the river,
> half withered, we had
> the hot winds against us.
>
> There were two palms by the landing;
> the yuccas were flowering; there was
> a light on the far shore, and tamarisks.
> We waited a long time, in silence.
> Then we heard the oars creaking
> and afterwards, I remember,
> the boatman called to us.
> We did not look back at the mountains. [56]

The figure of Oppenheimer has fascinated many historians and biographers because of his many faces: the romantic, the genius, the hero, the leftist, the activist, and the fallen scientist. His relation with New Mexico is interesting because it combines many faces of his complex personality and because it represents the paradox of many travelers to New Mexico (i.e., tourists, health-seekers, and artists) who cherished the state, but, through their actions,

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[55] *Ibid*., 80.
[56] J. Robert Oppenheimer, "Crossing," *The Hound & Horn: A Harvard Miscellany*, Portland, ME: The Hound & Horn, Inc., Vol. 1, No. 4, June 1928.

contributed to its degradation. After the War, a few of his words suggest that he was aware of having compromised the beauty of the place he loved and perhaps felt some regrets. He wrote a LARS headmaster, "I am responsible for ruining a beautiful place."[57] And Edward Teller claimed that Oppenheimer's answer to the question "what should be done with Los Alamos" after the bombing of Hiroshima was "Let's give it back to the Indians."[58] On the other hand, the presence of the Laboratory at Los Alamos, and especially its development and influence over the region after the War, launched an exceptional and much needed economic renaissance in New Mexico.

3. Conclusion to Part 1

In the end, it was a conglomeration of chance and determined circumstances that designated New Mexico as the ideal recipient of a scientific revolution. Not only did the state fulfill almost all the criteria set by the Army in 1942, but also New Mexico seemed ripe for yet another but different conquest, one that would bring new economic opportunities. The consequences of the first American military conquest were still taking a toll on the state's economic base as it was transferred from subsistence agriculture to dependence on far-off markets. Industrialization was slow and virtually absent outside of the urban areas; poverty was rampant throughout the state, forcing the population to migrate regularly across its borders to find employment. Yet, many New Mexican rural families maintained their ancestral lifestyles based on the land when they were able to retain their rights to their land grants or through the homestead legislation and if they could rely on the strength of their communities. As shown by the testimonies of early LANL workers from the Española valley, traditions, solidarity, and hard work were valued above all; the most grueling experience was the regular separation forced upon these families to survive in the expanding cash economy. By the 1940s, the region's readiness, or even desperation, for a new source of economic growth and employment also resulted from additional economic difficulties inherited from the Great Depression and the general dwindling of resources due to erosion and overexploitation of the land that remain so essential to New Mexico's cultures and traditions. Meanwhile the accepted increase in federal presence paved the way for the establishment of more federal control over the region. World War II changed New Mexico beyond compare, providing this economic boom, but, in so doing, it revived tensions and disrupted the village life of

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[57] Wirth, et al., *The Ranch School Years*, viii.
[58] Bird, et al., *American Prometheus*, 437.

traditional communities. Larry Torres, Taos educator and historian remarked on the transition from seclusion to nuclear science and high technology:

> When you consider that the last Moorish stronghold at Granada fell in 1492, and that the Spanish start coming to conquer Mexico, and up to the Rio Grande valley, they are coming straight out of the Middle Ages. They have not undergone the Renaissance, so that the people here are isolated for centuries. Our religion, our traditions, our customs, our way of looking at people are very medieval, still reflected in the language of today, which is very archaic. Taos Spanish is three hundred years out of fashion, so that we have scholars from Spain, who come here to study the language of Cervantes here among us. What happens when you have a society that goes from this to that with no transition or stages?[59]

Torres's question will be central in the following parts of this dissertation as I will begin analyzing the manner in which the conquest worked its way into New Mexico and how it impacted local populations. The principle of internal colonialism provided a framework to reinforce western mythologies and consolidate the region's role in the nation as a reservoir of resources to fuel national growth. In and after World War II, the West also became the main engine of America's supremacy but remained subservient to the rest of the nation in the Anglo-American mindset.

The New Mexican Anglo population, already traditionally associated with science and high technology, integrated a new population of immigrant scientists and engineers into society at the top of the socio-economic scale during the scientific conquest. Meanwhile, the native Hispanic and Indian peoples retained the same place as before in the newcomers' view as conquered peoples. Nonetheless, the local people participated too in the scientific revolution and were dramatically affected by it. A striking illustration of this delineation between the three groups can be found in the West Wing of the Zimmerman Library on the campus of the University of New Mexico. The *Three Peoples Murals* completed in 1939 by Kenneth Adams depict the three main cultures of New Mexico and the last mural represents their union:

> Adams was given specific instructions for the content of the murals. In his proposal for the Carnegie grant, President Robert F. Zimmerman stated that the murals would

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[59] Joseph Masco, *The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico*, Princeton, NJ: Princeton University Press, 2006, 166.

> represent each of the three major cultures in New Mexico and their contributions to civilization, with the fourth mural depicting the union of the three cultures in the Southwest. In the first panel the Native American cultural contribution is indicated by the arts, featuring basketry, jewelry, pottery and weaving. The Hispanics in the second panel are engaged in agriculture and architecture. Anglo progress through science is the theme of the third panel. The final panel, The Union of the Three Peoples, looks to the future with Native, Anglo, and Hispanic united through a symbolic handshake.[60]

These paintings have been the subject of controversies and criticism because of their racist connotation, especially the last panel. This panel centers an Anglo man, facing the viewer and looking ahead with blue eyes while the two other characters are painted from the side, their heads turned to the Anglo man; they do not have any eyes as if they were blind and needed guidance. These paternalistic images correspond to the thinking of the 1930s and have been modified since, but they conditioned and shaped in many ways the development of the nuclear industry in New Mexico.

Fig. 12: *Three Peoples Murals*, 1939 at the west wing of the University of New Mexico Zimmerman Library. Source: Personal pictures by Lucie Genay, October 2013.

[60] Carroll Botts, "Celebrating Zimmerman at 75: Zimmerman Library Artwork," *University of New Mexico University Libraries*, Albuquerque, NM: University of New Mexico, http://library.unm.edu/zimmerman75/art.php, accessed March 3, 2014.

PART 2: THE SCIENTIFIC CONQUEST (sacrifices, encounters, and patriotism)

CHAPTER 1: THE MILITARIZATION OF NEW MEXICO

1. Internal colonialism

a. A domestic nuclear empire?

The transformation of New Mexico during and after World War II is a story of westward migration; it is a story of shaping an environment to meet a nation's needs, and a story of local people adapting to a socio-economic order established by the authority of a powerful government and a novel migration wave. The circumstances of war permitted the Federal Government to build a nuclear American West and, thus, further its legacy of military and economic control over the region. During World War II and then the Cold War, "barren" land in the Western states was deemed perfect for military bases, bombing ranges, test sites, silos, underground control centers, and storage sites. The combination of all these installations created a militarized landscape. The military industry was granted locales, as well as governmental protection and support and was guaranteed enormous profits; this guarantee also meant a boom in defense-related jobs throughout the West. The Nevada Test Site with its 928 atmospheric and underground nuclear tests between 1951 and 1992[1] can be singled out as the epitome of the nuclear West. The nuclear waste generated in the nation's power plants is now being dumped in disposal sites mostly present in Western states; the lone exception is one in South Carolina. The Waste Isolation Pilot Plan (WIPP) in New Mexico houses transuranic nuclear waste;[2] the sites in Richland (Washington), Clive (Utah), and Andrews (Texas) take in low-level radioactive waste,[3] and the Yucca Mountain site (Nevada) receives high-level radioactive wastes. In collective conscience the West that had been associated with deserts, cowboys, and Indians has become associated with mushroom clouds, countdowns, and radioactive logos.

The militarization of the West is rooted in western history of internal colonialism. In order to be valued, the West had to be exploitable, and from the start the area proved most

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[1] "Nevada Test Site Overview," *Online Nevada Encyclopedia*, Reno, NV: Nevada Humanities, http://www.onlinenevada.org/articles/nevada-test-site-overview, accessed March, 31, 2014.

[2] Material contaminated with transuranic elements—artificially made, radioactive elements, such as neptunium, plutonium, americium, and others—that have atomic numbers higher than uranium in the periodic table of elements. Transuranic waste is primarily produced from recycling spent fuel or using plutonium to fabricate nuclear weapons. (Definition from the NRC)

[3] Low-level waste includes items that have become contaminated with radioactive material or have become radioactive through exposure to neutron radiation. This waste typically consists of contaminated protective shoe covers and clothing, wiping rags, mops, filters, reactor water treatment residues, equipments and tools, luminous dials, medical tubes, swabs, injection needles, syringes, and laboratory animal carcasses and tissues. (Definition from the NRC)

useful as a national reserve for commodities and space. In the mean time, tourists would travel west as if it were a foreign country that was not completely estranged; they would be in search of exoticism while staying within the boundaries of their comfort. In that sense, western territories—and then states—were ideal colonies: useful but not powerful, marginal and familiar. Bernard DeVoto underscores the importance of the colonial status of the West in the nation's identity when he writes: "One of the facts which define the United States is that its national and its imperial boundaries are the same." DeVoto's thesis introduced the idea of an American "internal domestic empire" that contributed to the shaping of the United States as an exception and as an industrial power.[4] Although historians of the American West have long excluded the region from comparisons with imperialist or colonialist nations because of the United-States' own colonial past within the British Empire, academic works in the late twentieth century have included the era of American westward expansion in the field of colonial and post-colonial studies "within a paradigm that sees the United States for what it was—an imperial, colonizing state that incorporated the western half of its present-day territory under some rather unequal terms of entry,"[5] in the words of historian and Land Grant specialist Maria Montoya. Montoya studied conflicts over land in the American West and illustrated this issue with her study of the Maxwell Land Grant, the largest grant in New Mexico. She argues that the actions of the U.S. government in New Mexico were similar to the imperial and colonial ways of Europeans. Moreover, it can be pointed out that New Mexico's extended territorial period also meant that, for over sixty years, appointed governors were in control of the region rather than elected representatives.

The question that will be raised in this dissertation is can one possibly speak of a nuclear conquest of the West or of a domestic nuclear empire after 1942 and the start of the Manhattan Project? I argue that the development of nuclear sites in the American West fits the concept of internal colonialism. Although the motives and circumstances differed, the creation of America's nuclear complex did follow a blueprint set by nineteenth-century expansionism. As mentioned in Part 1, historians such as Jon Hunner and Peter Hales have noted continuity in the history of the Manhattan Project in the West. My purpose will be to confront western mythologies and the mindset of the colonial rulers to the experiences of local residents. On the one hand, the actions of the Army, the Federal Government, and the scientists hinged on

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[4] Louis P. Masur, "Bernard DeVoto and the Making of the Year of Decision: 1846," *Reviews in American History*, Baltimore, MD: The Johns Hopkins University Press, Vol. 18, No. 3, September 1990, 443.
[5] Maria E. Montoya, *Translating Property: The Maxwell Land Grant and the Conflict over Land in the American West, 1840-1900*, Lawrence, KS: University Press of Kansas, 2005, 8; 9.

these mythologies and were influenced by this mindset, thus creating this continuity; on the other hand, the arrival of nuclear science was perceived as a rupture in the state's history by local populations who first saw science and progress—the spearhead of this singular conquest—as their way to a more prosperous and autonomous society until the rise of activism in the 1970s. As in every colonial situation, the colonized have a tendency to internalize the vision of the ruler. This internalization did not result in their sharing the newcomers' view of the West, but many New Mexicans absorbed the new philosophies of nuclear science and the lure of sustainable prosperity through nuclear jobs. Both the plight of New Mexicans before the War and the unprecedented opportunities provided by the scientific conquest guided local population toward voluntarily accepting a status that has remained that of a colonized people.[6]

The image of the West as a reservoir of "empty" land at disposal in case of need and its traditional use for military purposes constitute pivotal factors in the Army and government's decision to look westward to build its nuclear empire. Throughout its history, the West has been an appealing recipient for national mythologizing. The founding American myth of the "land of opportunities" or of the "American dream" was projected onto the West; and by World War II, even if the Frontier had been closed for fifty years, its reputation as a place where anything is possible had not rubbed off. Hope is a key ingredient in myths pertaining to the American West because migrants' motivations often rested on their hope for a fresh start, for riches, for freedom, or for escape. As a result of these often disproportionate or overly optimistic longings, the region has been a place where individuals either thrived or fell in misery; it has a contrasted history of great failures and successes, and this black or white heritage can account for the fact the region has remained a predilection choice for individual and collective enterprises with high expectations and equally high risks—such as the huge Manhattan Project or "the greatest scientific gamble of history."[7]

Furthermore and in keeping with its quality as a convergence point for hopes, the West has been the representation of America's faith in progress: in the words of the coiner of the

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[6] For further analysis of internalized colonialism, see E. J. R. David, ed., *Internalized Oppression: The Psychology of Marginalized Groups*, New York, NY: Springer Publishing Company, 2014. David writes, "Postcolonial scholars argue that internalized oppression, or specifically, internalized colonialism, is the major psychological effect of colonialism. [Frantz] Fanon argued that the sustained denigration and injustice that the colonized are subjected to often lead to self-doubt, identity confusion, and feelings of inferiority among the colonized. […] Further, the colonized may eventually feel a sense of gratitude and indebtedness toward the colonizer for civilizing and enlightening the colonized." (8)

[7] Truman, "Statement by the President of the United States, The White House, Washington, DC, August 6, 1945."

Manifest Destiny phrase, John O'Sullivan, "We are entering on its untrodden space, with the truths of God in our minds, beneficent objects in our hearts, and with a clear conscience unsullied by the past. We are the nation of human progress, and who will, what can, set limits to our onward march?"[8] These words were inspired by the unwavering faith in the progress of civilization. In turn, many believers in scientific progress of the 1940s were dedicated to a similar faith and saw their work as pioneering: the West has been a stage for their experiments motivated by the belief that going forward is in indisputable equation with the guarantee of mankind's improvement. Secondly, the Manifest-Destiny desire to transform inhospitable lands into thriving communities that could be celebrated as the proof of human's mastery of elements was perfectly in line with the purpose of the atomic enterprise. Los Alamos flagrantly exemplifies this desire to conquer nature both in its practical feasibility and its atomic purpose. Jon Hunner presented Los Alamos as following western traditions:

> The lure of the West—of opportunity, innovation, and invention—made the region seem like a good match for the location of the Manhattan Project's central laboratory. […] The frontier of science, plopped down on a high desert plateau in New Mexico in 1943, preserved the tradition of the western part of the United States as a place of invention and vitality, of path-breaking innovations and pace-setting projects. The Atomic West, by creating a new age, furthered the legacy of the frontier that had rejuvenated the nation time and time again throughout its history.[9]

The idea that the West is a place where everything is possible was even put forward by Westerners to attract individuals in search for these western promises. When soldiers arrived at the small Alamogordo railroad station to reach the military base there in the 1940s, the first sight they had was that of the town's sign across the station, which read "Alamogordo. New Mexico. Little City of Big Trees and Opportunities."[10]

b. The "Atomic West"

It was in the 1990s that historians of the American West began to be interested in atomic history because they realized that the history of nuclear weapons could be apprehended in regional terms. The point of this dissertation is to go further down that path by

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[8] John O'Sullivan, "The Great Nation of Futurity," *The United States Democratic Review*, New York, NY: J. & H. G. Langley, [etc.] Vol. 6, No. 23, November 1839, 427.
[9] Jon Hunner, *J. Robert Oppenheimer, the Cold War, and the Atomic West*, Norman, OK: University of Oklahoma Press, 2009, 229.
[10] Max Coan, "Exile from Enchantment," *New Mexico Magazine*, Santa Fe, NM, March 1947, 21.

using a geographical entity, New Mexico, and trying to determine the reasons, the manner, and the consequences of its metamorphosis into what can be called a dominion of the nuclear industry. As New Mexico is part of a wider entity, the West, it would be inconceivable to go on without addressing the historiography of the American West and, more precisely, of the Atomic West. John M. Findlay, professor at the University of California, Berkeley, and Bruce Hevly, associate professor at the University of Washington, Seattle, have led the way with their publications of *The Atomic West* in 1998, which collected papers presented at the University of Washington in 1992, and *Atomic Frontier Days: Hanford and the American West* in 2011 in which the authors wove together the local, regional, and national history of the Hanford Engineer Works site in Richland, Washington, that was used to produce plutonium for the Manhattan Project. They explored the more sinister sides of the story including radioactive contamination of the population and their environment and the region's dependence on federal subsidies; but they also analyzed how the local population positioned itself, driven by an eagerness to contribute to the biggest scientific experiment of the twentieth century in which they saw a way to break with their past of undeveloped economy and failed attempts at gaining in autonomy. The authors underscored the Westerners' desire to be done with a reputation of a lack of sophistication and prosperity.

In the introduction of *The Atomic West*, Findlay and Hevly explain why organizations and agencies in charge of nuclear weapons, whether it was the Army, the Atomic Energy Commission (AEC), the Energy Research and Development Administration (ERDA), or the Department of Energy (DOE) chose the West to establish centers to pursue their atomic endeavors, "especially the dirtier ones": they considered the region's emptiness and undeveloped lands as a possible buffer between people and "the dangers associated with making and testing weapons and storing hazardous wastes."[11] Terms such as "barren," "empty," "undeveloped space," "uninhabited," and "desert" repeatedly appear when tackling questions on how the West was historically used—for atomic and other purposes such as removals or deportations. The preconception of emptiness, which has since been challenged because the West's "emptiness" could only stand in comparison to the more crowded East, is completely anchored in the ideological heritage of westward expansion.

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[11] Bruce W. Hevly and John M. Findlay, eds., *The Atomic West*, Seattle, WA: University of Washington Press, 1998, 4.

The expression "Atomic West" was originally coined by Patricia Nelson Limerick in an essay she wrote on the Hanford site in 1992.[12] But Limerick's main contribution to the historiography of the American West is her work on the legacy of the Frontier in *Something in the Soil: Legacies and Reckonings in the New West* in 2000 and *The Legacy of Conquest: the Unbroken Past of the American West* in 2006. Her definition of the American West is a list of common points between Western states that justify their grouping under one denomination. Among these characteristics, a few memorable ones are: the remarkable presence of the Federal Government—visible in the immensity of federal lands or in the subsidizing of private businesses—the boom and bust economies often in the extraction field, "intentional mythologizing of the West as a place of romantic escape and adventure" on which its tourist industry is based, and the West as a dumping ground. She puts under scrutiny the continuance of certain western traits and issues, such as the struggles that marked the nineteenth century and continued in the twentieth century: "conflicts over water use, public lands, boom/bust economies, local authority versus federal authority," and ethnic relations. She vigorously defends the use of the term "conquest" in the context of American expansionism that, according to her, is just as appropriate as the word "Frontier" that the West has been associated with. Using this term was a way of "clearing the fog" on the region's status as a colony that is justified by its transformation "as the seizure of resources and the imposition of colonial dominance, along with often more benign processes of collaboration, intermarriage, and syncretism, [which] have reshaped the lives of native people."[13] After a long period of mythmaking and Manichean visions of western history, historians started to diversify their analyses by introducing the complexity and plurality of western voices.

The main break Limerick makes with previous historians such as the field founder Frederick Jackson Turner is that she argues that, while the Frontier was declared closed by the U.S. Bureau in 1890, it did not close for Westerners. Turner wrote in his 1893 essay "The Significance of the Frontier in American History" that the disappearance of the Frontier marked the end of the first period in American History.[14] But Limerick takes the opposite

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[12] Hevly and Findlay explain that they borrowed the term from Patricia N. Limerick to use as the title of their work (See Patricia N. Limerick, "The Significance of Hanford in American History," in David H. Stratton, ed., *Washington Comes of Age: The State in the National Experience*, Pullman, WA: Washington State University Press, 1992).

[13] Patricia N. Limerick, *Something in the Soil: Legacies and Reckonings in the New West*, New York, NY: W. W. Norton & Co., 2000, 24-25; 19; 2.

[14] Frederick Jackson Turner, "The Significance of the Frontier in American History, 1893," Annual Report of the American Historical Association, The Bobbs-Merrill Reprint Series in History, H-214, Indianapolis, IN: The Bobbs-Merrill Company Inc., https://archive.org/details/significanceoffr00turnuoft, accessed March 20, 2014.

stance by developing her argument on the legacies of the Frontier. She compares the conquest to slavery, contending that conquerors and conquered were affected by the conquest like slaves and slaveholders were affected by slavery; both had a foremost impact on a region but also left a mark on the nation's history. Yet, while slavery and the South have been recognized in history, Limerick argues that the conquest stayed rooted in common stereotypes about brave Indians and American pioneers or frontiersmen, a game of adventures for children to play and a source of inspiration for Hollywood films. White English speaking men were the heroes of western history, obscuring Indian, Mexican, or female actors. In Turner's interpretation of the West, the Frontier, and the West were a process of civilization gaining new territories over savagery. Turner's successors started studying particular places and people and they discovered a complex history of minorities.[15] Limerick pleads that courses on the American West should not stop in 1890. She finds that the closing of the Frontier did not mark the end of Western history because, if one looks at it as a region rather than a process, the West is still alive and post-Frontier events have their importance: they are part of western history.

c. The "Nash thesis"

On the point of continuity, Patricia Limerick also departs from another of her predecessors, economic historian Gerald Nash who inaugurated historiography in the field of studies on the post-1900 West in the 1970s. He emphasizes the colonial function of the region before World War II and its new postwar face as a dynamic pacesetter in the nation. The "Nash Thesis" centers on a rupture in western history: World War II was the major turning point that revolutionized the region's economy. In *The American West Transformed* and *World War II and the West* Nash demonstrates how Western states were internal colonies under the yoke of eastern states that would then be considered as the metropolis. This concept of internal colonialism was initially used as an American theory of race that inspired African

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Turner presented his "Frontier thesis," which became the foundation for modern historical study of the American West, at a gathering of historians in Chicago three years after the United States Census Bureau announced the disappearance of a continuous frontier line. He associated the Frontier with the process of Americanization, making it the source of American development and introducing it as a key to understand American history. His thesis has been debated and contested countless times by historians of the American West, but it had, nonetheless, a significant impact on the perception of the region in popular history as "free land," or, in other terms, as "empty" land. See Richard White, "Frederick Jackson Turner and Buffalo Bill," in *The Frontier in American Culture*, Ed. James R. Grossman, Berkeley, CA: University of California Press, 1994, 7-65, for an analysis of how Turner's and Buffalo Bill's contrasting accounts of the Frontier and its closing "came to be so culturally dominant and persistent." White writes that "Turner often placed himself and his audience not in the West but in popular representations of the West." (13)

[15] Patricia N. Limerick, *The Legacy of Conquest: The Unbroken Past of the American West*, New York, NY: W. W. Norton & Co., 2006, 18.

and Mexican Americans beginning in the 1950s until the 1990s. The Chicano writer Mario Barrera, for example, defines both colonialism and internal colonialism in *Race and Class in the Southwest: a Theory of Racial Inequality*. He construes the former as "a structured relationship of domination and subordination, where the dominant and subordinate groups are defined along ethnic and/or racial lines, and where the relationship is established and maintained to serve the interests of all or part of the dominant group." And *internal colonialism* he interprets as "a form of colonialism in which the dominant and subordinate populations are intermingled, so that there is no geographically distinct 'metropolis' separate from the 'colony'."[16]

But Gerald Nash puts forward economic rather than racial or ethnic arguments to apply this concept to the West prior to World War II. His own definition of *internal colonialism* is based on the classical economic relation between a colony and the mother country: the West shipped its raw materials out to be processed in the East that profited from the production of manufactured goods. In 1940, manufactures accounted for less than 5% of the West's income as it mostly produced raw materials to be sent eastward. Nash goes as far as calling the West "America's Third World" because of the colonial economy that characterized it with a focus on agriculture, livestock, and extraction industries.[17] According to his definition, New Mexico was absolutely part of this "third world" as farming, ranching, mining, and tourism were at the forefront of the state's economy in the early 1940s. The need for capital brought small businesses in the West under the sway of eastern bankers, investors, and industrials. Those who suffered the most from this economic system based on outside dependence were the people who tried to perpetuate self-sufficient communal ways of life in villages. The lack of industrialization left no alternative to farmers who lost their agricultural occupations to economic and environmental circumstances.

The core of Nash's argument is that World War II ended internal colonialism in the West and marked the beginning of a period of longed-for prosperity, with substantial help from the Federal Government, which only started to have its first setbacks in the 1980s. My argumentation will take a different turn to show that the economic revolution in New Mexico gave locals the illusion of prosperity and autonomy but that it was a new, more complex phase

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[16] Mario Barrera, *Race and Class in the Southwest*, 2nd ed., Notre Dame, IN: University of Notre Dame Press, 1979, 193; 194. Barrera's definitions will be used again when addressing discrimination issues within New Mexico's nuclear complex.
[17] Nash, *World War II and the West*, 2.

in the state's colonial history.[18] The 1980s were a period of disillusionment and new awareness of the colonial mechanisms. The great difference with previous phases was that the benefits, especially in terms of education, gave local populations more opportunities to impose their voices and their scrutiny. On the other hand, Nash also argues that the War "revitalized" the myth of "The American Dream of unlimited opportunity in the West" that had almost disappeared during the Great Depression.[19] In the case of the construction of Los Alamos, these myths were not only revived, but they also had a major influence on the whole organization of the Project; they set a framework for the experiences of the first atomic immigrants to New Mexico.

2. The militarization of New Mexico

Historian Richard White, who agrees with Nash that the Federal Government was the main actor in setting the western economy free from eastern markets and capital, adds the dimension that changes "came in manner very much shaped by the western past" and "flowed through familiar channels."[20] The first "familiar channel" was the military. The special circumstances of the War shed a new light on the West as military planners came to see its old liabilities as virtues. The region's vastness, low population density, isolation, and arid climate that had previously seemed detrimental to economic development now became significant assets for the location of military bases. From 1941-1945, the War Department located 21 separate military bases, training centers, prisoner-of-war, and Japanese internment camps in New Mexico.[21] The selection of these sites was very similar to that of Site Y in Los Alamos. The military channel was familiar because the West had already been a military asset as a

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[18] See Paul Rhode, "The Nash Thesis Revisited: An Economic Historian's View," *Pacific Historical Review*, Berkeley, CA: University of California Press for the American Historical Association, Pacific Coast Branch, Vol. 63, No. 3, August 1994, 363-392. Rhode contested Nash's idea that World War II transformed the West into a "pacesetting society," focusing primarily on California, which is central to Nash's thesis. The state, however, was already as large as, or even larger than the rest of the West combined both in population and income in 1940. Therefore, rather than a rupture, Rhode found continuity in the region's postwar industrial economy. One can add here that the development of California is not comparable to most Western states and certainly not to New Mexico, whose historical development within the United States was much slower and less autonomous than California's (see Part 1, Chapter 1, Land transfers to Anglo immigrants).

[19] Nash, *World War II and the West*, 2; 17.

[20] Richard White, *"It's Your Misfortune and None of My Own": A History of the American West*, Norman, OK: University of Oklahoma Press, 1991, 461-462. On the role of the Federal Government in the West, White writes that the American West "is a creation not so much of individual or local efforts, but of federal efforts. More than any other region, the West has been historically a dependency of the Federal Government." Citing the Bureau of Indian Affairs, the U.S. Geological Survey, and the Forest Service, White argues that these federal agents "were often more powerful than local political interests in the West" and "federal power could expand so rapidly in the West because rival sources of political power in the states, local communities and political parties were so weak." He designates these weak existing local communities as Indian and Hispanic, who "were conquered peoples." (57-58)

[21] Welsh, "The Land of Extremes," in *Contemporary New Mexico*, 70.

protective barrier against foreign powers in the eighteenth and nineteenth centuries. The region was dotted with military forts at that time, but, by the beginning of the twentieth century, these forts had been deserted. Although the West had not lost its association with the military, it was no longer directly used as a military advantage and was mostly seen as an economic burden. In New Mexico, this re-discovery of the West's usefulness in the nation's military power during the War originated a network of military facilities that, only two or three years later, would turn out to be very valuable to the continuance of the Manhattan Project. Some of these facilities were eventually integrated in the scientific complex and became centers for cutting edge research and development of technology so that the new economy merged the three components: science, the Army, and corporate industry. That is why the impact of the Manhattan Project in New Mexico and the wartime militarization of the state are linked. The military landscape created precedent for land acquisition and considerably eased the atomic enterprise. An article in the *New Mexico Magazine* of June 1941 announced the state's newfound usefulness: "A new use has been found for New Mexico lands—at least, those areas heretofore thought to be useful only for grazing of sheep or goats, which thrive where even a longhorn cow would starve. The Army flying corps has discovered that such lands—waste or practically that—are admirably suited for bombing practice."[22]

a. Air Force Bases

The sudden renewed military enthusiasm for the New Mexican desert underscored how the state had already been heavily militarized prior to the Manhattan Project. This militarization manifested in the establishment of four Air Force Bases (AFBs) and one Army Base. The Walker AFB near Roswell was created as an Army Air Corps flying school in 1941. In the postwar years, it became the Roswell Army Air Field and then the Walker AFB. This base closed in 1967 for financial reasons when expenses on the Vietnam War were at their highest. Its units were relocated outside of New Mexico, and, since then, the facility has been known as the Roswell International Air Center where aircrafts are stored and where the

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[22] H. R. Rodgers, "Land Provided for Bombing Range, Resources Unlimited, New Mexico Aids National Defense, A Department of Information and Reports of the State Land Office," *New Mexico Magazine*, Santa Fe, NM, June 1941, 31.

Eastern New Mexico University built a campus. The remaining of the base land and buildings has been left abandoned.[23]

The other three bases are still active and have become substantial contributors to the New Mexican economy. The Cannon AFB near Clovis came to be in 1942 on the site of the Clovis Municipal Airport, which was built in the 1920s as Portair Field, a civilian passenger terminal. The base named Clovis Army Airfield was used as a training ground for heavy bomber pilots during the War. The name "Cannon" was chosen in 1957 in the honor of General John K. Cannon; and, although its operations have changed and its existence has been periodically threatened by Congressional action, the base remains open. In late 1942, the taking of lands for the establishment of an aerial gunnery range for the Clovis Air School was decried in a letter to Governor John J. Dempsey (1943-1947) in December 1942. The authors of the letter, Seth and Montgomery, Attorneys and Counselors at law, warned Dempsey that they took the matter very seriously "as the area takes in what is probably the best grazing land in New Mexico […]. The establishment of the range would involve the elimination of about 35,000 head of very good cattle. The area produced in 1942 over ten million pounds of beef. […] Some of the leading cattle men of the state are involved."[24] The Farmers & Stockmens Bank also wrote a text with the same line of thought in an attempt to pressure the state government into opposing the War Department on its choice of location for the range:

> I am handing to you a copy of the protest signed by 458 citizens owning 631,300 acres of land, 31,000 head of cattle from which was produced practically ten million pounds of beef in the year 1942. With all the waste land there is in New Mexico it seems absurd to us for the government to select one of the best cattle raising districts within the state to take from the food production which is so badly needed at this time.[25]

This example of resistance to a military establishment is important to prove that militarization did not go without resistance especially when it threatened the pillar of the state's economy—agriculture. The advancement of military projects, therefore, did not only

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[23] This abandonment illustrates how much military installations are dependent on federal budgets and can thus disappear due to budget cuts, along with the activity they generate in the area, as fast as they appear in time of war.

[24] Seth and Montgomery, Attorneys and Counselors at Law, Letter to Governor John Dempsey, Santa Fe, NM, 28 December 1942, Governor John Dempsey Papers, 1936-1958, Santa Fe, NM: New Mexico State Records Center and Archive, Collection 1959-046, Box 13144, Folder 6, World War II Bases New Mexico Military.

[25] The Farmers & Stockmens Bank, Letter to Governor John Dempsey, Clayton, NM, 30 December 1942, Governor John Dempsey Papers, 1936-1958, Santa Fe, NM: New Mexico State Records Center and Archive, Collection 1959-046, Box 13144, Folder 6, World War II Bases New Mexico Military.

depend on their importance and the means that were put into them but also on the population's capacity to contest decisions and resist the taking of valuable lands. In Clovis, the project of a bombing range was abandoned under the pressure of the cattle industry, but further south the establishment of the huge White Sands Missile Range (WSMR) did not encounter the same obstacles because the area was considered as "wastelands" despite a scarce but productive rural population.

In Albuquerque, the history of Kirtland AFB began in the late 1920s and is interestingly intertwined with the early days of aviation: the qualities that made Albuquerque an aerial hub were partially similar to those given by the Army for selecting sites in the state. In 1927, Charles S. Lindbergh had crossed the Atlantic; as a result, Americans became "air minded."[26] Pilot training schools, aerial taxi services, and transportation of passengers and freight were developed everywhere in the country. Following Lindbergh's success, Frank G. Speakman, an employee of the Santa Fe Railroad who homesteaded a ranch at the foot of the Manzano Mountains, became interested in aviation. He and his partner William L. Franklin, a Santa Fe Railroad colleague, leased 140 acres of flat land on the East Mesa in Albuquerque to build an airport in 1928. The then mayor of Albuquerque, Clyde L. Tingley (1922-1935), supported the project because he believed in his city's potential as an aviation center for the southwest. To thank the city for the mayor's help, the airfield was first named Albuquerque Airport.

Then James G. Oxnard, a New York air transportation promoter, bought out Franklin's share and established the Aircraft Holdings Inc. to operate both the Albuquerque site and another one in Texas. From then on, the airport grew with more clients, more pilots, and more companies. The "favorable year-round weather and plenty of open space for emergency landings" were promoted by famous pilots such as Arthur C. Goebel.[27] In 1929, a part of the airport's activities was moved to a new site on West Mesa, and a year later the original Albuquerque Airport was abandoned in favor the West Mesa Airport.[28] The airfield on East Mesa became known as Oxnard Field and resumed its status as a private, general aviation airport managed by Speakman who welcomed many national celebrities during the golden age of air racing and record setting in the 1930s. At the end of the decade, now Governor Tingley

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[26] Don E. Alberts and Allan E. Putnam, *A History of Kirtland Air Force Base, 1928-1982,* Kirtland Air Force Base, NM: 1606 ABW Office of History, 1982, 1.
[27] *Ibid*., 8.
[28] Two competing airlines operated at the Albuquerque Airport: Western Air Express (WAP) and Transcontinental Air Transport (TAT). WEP moved its activities to its new facility on the west side of town first in 1929, leaving TAT on the east side, and then the two airlines merged to form Trans-World Airline (TWA) in 1930, deserting the Albuquerque Airport. The West Mesa airport closed operations in 1967.

(1935-1939) used federal funding through the New Deal Works Progress Administration (WPA) to build a new public airport, the Albuquerque Municipal Airport, later known as the Sunport, next to Oxnard field.

As early as 1939, the Army had become interested in Albuquerque to establish a training base for aircrews. The Army leased two thousand acres from the city on the East Mesa, close to Oxnard Field, a land that "was wanted for a radio station and A. W. McCormick, who had a grazing lease on it, was persuaded to relinquish it."[29] The Army set up the bombardier school, which was designated as the Air Forces Advanced Flying School on this Albuquerque Air Base. In 1942 the base was renamed Kirtland Field in honor of Colonel Roy C. Kirtland, one of the nation's pioneer Army aviators. That same year the Army began condemnation proceedings offering $80,000 to Airport Holdings, Inc. However, Frank Speakman and James Oxnard objected to the amount and eventually obtained $95,000: "Transfer of Oxnard Field to the Army took place on May 12, 1942, and ended Frank Speakman's pioneering efforts in behalf of early Albuquerque aviation."[30] This new example demonstrates that, given the possibility to negotiate, landowners were able to raise the price of their compensations. This was not the case, however, for all New Mexicans who lost land to the Army during the War or in later years as will be discussed below. The bombardier school remained the base's chief activity during the War; but, as early as March 1945, this acquisition proved very commodious to the Los Alamos scientists who needed to make sure the atomic weapon would be a viable airborne weapon. The military property subsequently became an extension of the Los Alamos Laboratory when its Z division was moved to Albuquerque in 1947. Speakman's aviator dream became the locale of what is now the Sandia National Laboratories.

Finally, the last Air Force Base which, was also created in 1942, is Holloman AFB, west of Alamogordo in the Tularosa Basin. First named the Alamogordo Army Air Field, the base was also established as training grounds for aircrews.[31] In 1948, the installation became Holloman Air Force Base, in honor of the late Colonel George V. Holloman, a pioneer in guided missile research. Missile research and testing became prime objectives of the base in the postwar years because of its proximity to the area now called WSMR. The range was initially intended as an extension of the airfield; however, the bigger weapons became, the

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[29] Rodgers, "Land Provided for Bombing Range," *New Mexico Magazine,* 31.
[30] Alberts, et al., *A History of Kirtland Air Force Base,* 26.
[31] "Holloman Air Force Base History," *Holloman Air Force Base*, United States Air Force, 25 July 2008, http://www.holloman.af.mil/library/factsheets/factsheet.asp?id=4361, accessed March 31, 2014.

more land was needed to test them. The history of the White Sands military reserve is a symbol, along with that of the Los Alamos Homesteaders, of how the Army imposed its will on local people, expropriating them in the name of the war effort and national security and contributed to the western myth of emptiness and the region's status as an internal colony.

b. White Sands Missile Range

The area first known as the Alamogordo Bombing and Gunnery Range (1941), then the White Sands Proving Grounds (1945), and finally White Sands Missile Range (1958), WSMR is the largest overland military test range in the United States (3,200 square miles or 5,150 square kilometers). White Sands is the epitome of the wartime militarization of New Mexico not only because of the impressive size of the military reservation but also because of the postwar issues entailed by land acquisition. In addition, WSMR also represents the connection between militarization of the state and the Manhattan Project since the range turned out to be of great service when the Los Alamos scientists needed more space to test their "gadget."[32] Interestingly, the second largest military reservation in the U.S., Fort Bliss Military Reservation, also spreads over southern New Mexico in Otero County, but its headquarters are in El Paso, Texas. Fort Bliss created in the 1850s, has primarily impacted the economy of El Paso even though 80% of its lands are situated in southern New Mexico. The presence of this military land dating back to the period of westward expansion can be interpreted as the physical representation of White's "familiar channel."

[32] The plutonium bomb tested at Trinity in July 1945 was dubbed the "Gadget."

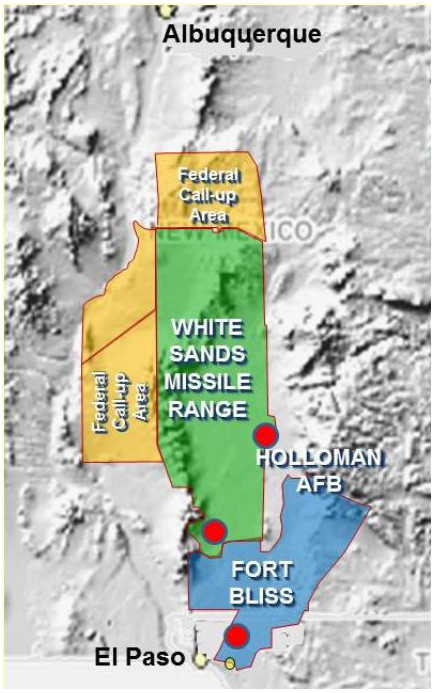

Fig. 13: Fort Bliss and White Sands Missile Range. Source: "Fort Bliss—Regional Military Complex," Defense and Homeland Security, El Paso, TX: The BorderPlex Alliance, http://www.borderplexalliance.org/industries/primary/defense-homeland-security, accessed April 10, 2014.

WSMR is a combination of various lands that were handed over to the Army during World War II: it is comprised of Fort Bliss Antiaircraft Firing Range, Dona Ana Target Range, Castner Target Range, and Alamogordo Army Field's Alamogordo Bombing Range.[33] In 1942, the first step toward its creation was the acquisition of both public and private lands to establish the Alamogordo Bombing Range. The Army was interested in over one million acres (1.267 exactly) out of which 21% were state owned but contained sections under lease for grazing, 2% were in private hands, and the rest was public domain.[34] During acquisition proceedings, the State of New Mexico and, especially, the New Mexico Land Office "used its influence and good offices in helping it to make satisfactory arrangements for the leasing of privately owned or leased parcels."[35] The Army was generally able to rely on the state's support; but, when it came to taking such a vast portion of land in the Tularosa Basin, the negotiations between New Mexican Governor Dempsey and Secretary of War Henry Stimson showed state concerns about giving up some of the state's best grazing areas.[36] On January 8,

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[33] "How it all began," *White Sands Missile Range New Mexico*, San Diego, CA: MARCOA Publishing Inc., 2007/2008, 8-9.
[34] H. R. Rodgers, "Bombing Range Negotiations Progress, Resources Unlimited, New Mexico Aids National Defense, A Department of Information and Reports of the State Land Office," *New Mexico Magazine*, Santa Fe, NM, January 1942, 39.
[35] Rodgers, "Land Provided for Bombing Range," *New Mexico Magazine*, 31.
[36] The Tularosa Basin was a traditional grazing area for Hispanic New Mexicans and Anglo, particularly Texan immigrants in the mid-1800s. A few families owned thousands of sheep, goats, cattle, and horses at that time.

1943, Stimson wrote to Governor Dempsey about land acquisition by the War Department for temporary and permanent installations in areas embracing grazing rights and privileges including Alamogordo Bombing Range, and the Roswell, Hobbs, Carlsbad, and Kirtland field practice bombing ranges. According to the War Department policy, the exercise of federal and state grazing privileges had to be suspended; but, in the case of rights derived through a lease from the State, a railroad, or private owners, consent of the lessor was required (contrary to leases of the Public Domain): "This is accomplished by purchasing from the lessee a sub-lease for a specified period of years, containing a provision suspending the exercise of the grazing privileges *for the period of the lease and any renewal thereof*."[37] This regulation implies that the taking of land was initially meant to be temporary and that grazing rights and privileges would be resumed after termination of the Lease and Suspension Agreement. Stimson enclosed this Agreement with his letter:

> The Grantor hereby leases, releases, and delivers possession to the Government of all rights or privileges he possesses to the following described premises […] together with all other lands and rights, privileges, and interests on lands, owned or controlled by the Grantor within the presently established boundaries of the X Project. […] The Grantor agrees to continue paying the taxes, State or other lease fees, other overhead costs, and permit fees unless payment of said fees is cancelled or forgiven by the Government.[38]

According to this section, landowners who signed the agreement with the government not only had to relinquish their rights to the land but also had to continue paying taxes on the land they leased but could no longer use. This was the case until the government purchased all the land in the 1970s. The Agreement also stated that the government had the right to make modifications and additions to the land but that it could be required by the grantor, before the expiration or renewal of the agreement, to "restore the artificial improvements on the premises to the same condition" as upon entering the agreement.[39] This document, which had

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The "open range" system disappeared with the new public land laws and the spread of the cash-based economy. Yet, ranching remained a very important source of income in the county before World War II (See the section on White Sands ranchers below).

[37] Henry L. Stimson, Secretary of War Letter to Governor John Dempsey, Washington, DC, War Department, 8 January 1943, Governor John Dempsey Papers, 1936-1958, Santa Fe, NM: New Mexico State Records Center and Archive, Collection 1959-046, Box 13144, Folder 6, World War II Bases New Mexico Military. Italics added by Lucie Genay.

[38] Lease and Suspension Agreement, War Department, Office of the Chief of Engineers, Construction Division, Real Estate Branch, CR-Form 143, 24 September 1942, Governor John Dempsey Papers, 1936-1958, Santa Fe, NM: New Mexico State Records Center and Archive, Collection 1959-046, Box 13144, Folder 6, World War II Bases New Mexico Military.

[39] Rodgers, "Land Provided for Bombing Range," *New Mexico Magazine*, 31.

to be signed by all who ceded land, gives the clear impression that the owners, be they private or State, would eventually be able to recover their property in the state that they had left it to the Army. The moment the grantor signed the agreement, he granted "to the United States the right of immediate occupancy and use of the land hereinabove described, for any purpose whatsoever." Stimson also mentioned in the letter the lands that were to be acquired for permanent installations such as "airfields, auxiliary landing fields and ordnance storage areas which will completely destroy its value for grazing purposes": in these cases, the government would acquire a fee simple title[40]. Finally, Stimson asked whether the Governor would prefer exchanging state lands for other public lands or acquisition by condemnation.

In his answer, dated January 27, 1943, Governor Dempsey strongly emphasized the importance of these lands not only for the New Mexican economy, which still relied heavily on agricultural and livestock activities at the time but also for the basic functioning of the state since these institutional lands contributed to the financing of education, charitable, and penal institutions: "In fact, it might be said that the orderly management and development of these lands is fundamental to the economy of New Mexico, both with respect to the institution concerned, and to the livestock and agricultural industries."[41] When mentioning the ranchers around Alamogordo, the Governor estimated that the transaction was going well and that there should be no difficulty in returning the land to them after the War:

> It is found that the Lease and Suspension Agreements entered into with ranchers holding state grazing leases in the Alamogordo Bombing Range, have already been approved by the Commissioner of Public Lands, and the Commissioner advises that this procedure meets with his approval on lands of this type and where bombing, or temporary improvements, are the only damage to the surface. It is also found that in this area, practically the only rights to be acquired were grazing right. For this reason, the livestock men in this area may be rehabilitated after the war, and further there is no oil development in this area and no loss of revenue to the institution.[42]

The Governor's words and provisions in this letter reflect the anxiety that some New Mexican citizens communicated to him while the negotiations were under way. Several

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[40] Fee simple is a legal form of ownership under which the owner has absolute ownership of the whole property and is free to make additions or alternations to it without having to get the consent of neighboring property owners.

[41] Governor John Dempsey, Letter to Secretary of War Henry L. Stimson, 27 January 1943, Governor John Dempsey Papers, 1936-1958, Santa Fe, NM: New Mexico State Records Center and Archive, Collection 1959-046, Box 13144, Folder 6, World War II Bases New Mexico Military.

[42] *Ibid*.

telegrams addressed to Dempsey called upon him to prevent construction of the ranges. One telegram by a Mr. White argued that a bombing range in eastern New Mexico would render 60,000 acres of the state's best grazing land useless and that "vast stretches of waste land exist in New Mexico where no industry vital to war effort would be affected."[43] This telegram is striking because it reveals that some Westerners were equally influenced by the preconceptions of emptiness, believing that if the area where they had settled did not fit the description, another neighboring area would.

The fearful anticipation of how the disappearance of ranches and farms would affect the economy of New Mexico also appeared in the correspondence of Lewis N. Gillis, President of the Alamogordo Chamber of Commerce, who wrote in August 1943, to the El Paso Chamber of Commerce to warn against the economic impact of the range on its surrounding region and to seek support against construction. Governor Dempsey received a copy of the letter that read:

> The establishment of this Range will seriously and adversely affect Alamogordo and Otero County and we think, deprive El Paso business houses of a great deal of business which they have heretofore enjoyed from this area. The area involved is the best livestock grazing area in Otero County and one of the best areas in the Southwest. Many large cattle and sheep ranches lie within the proposed area and most of the owners transact their business in El Paso and several of them live and make their headquarters in El Paso. […] The Records of this County show that we will lose over $500,000.00 in taxable values, or almost 10% of the taxable wealth of the County. This will probably result in the reduction of Otero County to a Fourth Class county. […] We do not want to impede the war effort in any way, but after a careful survey, we are convinced that the establishment of this Range in this County will require a sacrifice on the part of our citizens far beyond the necessity of or value to the war effort.[44]

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[43] A. E. White, Western Union telegram to Governor John Dempsey, New York, NY, 4 February 1943, Governor John Dempsey Papers, 1936-1958, Santa Fe, NM: New Mexico State Records Center and Archive, Collection 1959-046, Box 13144, Folder 6, World War II Bases New Mexico Military.

[44] Lewis N. Gillis, President of the Alamogordo Chamber of Commerce, "Proposed Bombing Range in Southwestern Part of Otero County, New Mexico," Letter to the El Paso Chamber of Commerce, Alamogordo, NM, 18 August 1943, Governor John Dempsey Papers, 1936-1958, Santa Fe, NM: New Mexico State Records Center and Archive, Collection 1959-046, Box 13144, Folder 6, World War II Bases New Mexico Military.

Fig. 14: Otero County. Source: Google Maps, Mountain View, CA: Google, Inc.

In his answer, Chris P. Fox, Executive Vice-President and General Manager of the El Paso Chamber of Commerce, heartily thanked Mr. Gillis for his letter and shared his knowledge on the subject but could not offer more information on the decision taken by the War Department.[45] In the end, the negotiations did not go in the direction that Gillis desired. According to the January 1942, *New Mexico Magazine*, the procedure as regards the ranchers living in the area of the future Alamogordo Bombing Range was:

> the ranchers were notified, under date of October 16, by the Albuquerque office of the land acquisition division of the Soil Conservation Service that the War Department desired their ranches within the next several months and removal of livestock recommended 'at that time'. The notice added that it was believed appropriations would be available to reimburse them for their losses within 30 days, and that immediate steps would be taken to acquire the land.

One may note that some of the ranch holdings coveted by the Army in 1942 were famously owned or had been owned by former politicians—first New Mexico senator and former Secretary of the Interior Albert Bacon Fall (1921-1923) and his successor as senator, Holm O. Bursum (1921-1924).[46] The same article also addressed the issue of fair

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[45] Fox writes, "I know that the Congressional delegation from your state have all expressed a desire to try and avoid a usage of this land, under the conditions outlined, or until it has been fully established that there is no other way out and that these lands is absolutely necessary to the furtherance of the war effort. Of course I do not know what response your delegation has had from the War Department – if any." Chris P. Fox, Executive Vice-President & General Manager of the El Paso Chamber of Commerce, Letter to Lewis N. Gillis, President of the Alamogordo Chamber of Commerce, 20 August 1943, Governor John Dempsey Papers, 1936-1958, Santa Fe, NM: New Mexico State Records Center and Archive, Collection 1959-046, Box 13144, Folder 6, World War II Bases New Mexico Military.

[46] Rodgers, "Bombing Range Negotiations Progress," *New Mexico Magazine*, 39.

compensation for ranchers because, although they could move their animals, they would not be able to move "their lands, range rights, dwellings, bunkhouses and water-tanks." That was the reason why the Commissioners of Public Lands, H. R. Rodgers, went to Washington on their behalf; he declared upon his return that the War Department was sympathetic to their situation and gave assurance that "every consideration would be given to the problem and to the welfare of the people involved."[47] A following article in May 1942, gave more detail on the Commissioner's position that stressed the dilemma faced by the state and individuals alike in the years 1942 and 1943 when so much New Mexican land was passed under military control:

> While his office is willing to do everything it can to aid in bringing the war to a successful conclusion, this, if at all possible, should be accomplished without placing any additional handicap on the livestock producing interests which also have their part to play in the waging of a successful war. There is no idea of standing in the way of the project merely that of trying to prevail upon Uncle Sam not to dislodge the cattlemen, sheepmen, farmers, and others now located on the site with the minimum of inconvenience for the conduct of their business and enabling them to continue it in the interest of the war effort without undue interruption.[48]

Rodgers' idea was to make an exchange that would replace the portion of grazing lands owned by the state by some other lands elsewhere and simultaneously seek "suitable remuneration for the private owners." While nothing could be done for the individuals who had grazing permits on federally owned land that were cancelled by the Department of the

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Albert Bacon Fall moved to New Mexico Territory to practice law in 1889. He suffered from respiratory problems and chose the mild climate of New Mexico for that reason. He was elected to the U.S. Senate in 1912. The ranch he owned on the eastern side of the Tularosa Basin near the northwest corner of the Mescalero Apache Reservation was called the Three Rivers Ranch. Between 1912 and 1923, "Fall managed to expand his holdings at Three Rivers by a factor of ten." Over the same period, he made repeated efforts to take Mescalero land for a national park.

Holm O. Bursum was first elected Sheriff of Socorro County in 1894. He then became chairman of the Republican Party Territorial Center Committee in New Mexico from 1904 to 1911. Over this period he was instrumental to New Mexico's access to statehood. Then, in 1921, he was appointed by Governor Merritt C. Mechen to fill Albert B. Fall's vacated seat at the Senate. Bursum and Fall (now Secretary of the Interior) worked together to revive "national park proposals, opening of Indian lands to mineral exploration, quieting title to Pueblo Indian lands contested by non-Indian owners, and easing of federal restrictions on western resource development." Both politicians, therefore, were active in the "colonial" past of New Mexico and particularly through their attempts to quiet Indian land claims (the Bursum bill). Michael Welsh, "Dunes and Dreams: A History of White Sands National Monument," Professional Paper No. 55, Santa Fe, NM: National Park Service, Division of History, Intermountain Cultural Resources Center, 1995, http://www.nps.gov/whsa/learn/historyculture/upload/Dunes-and-Dreams.pdf, accessed April 19, 2015.

[47] Rodgers, "Bombing Range Negotiations Progress," *New Mexico Magazine*, 39.

[48] "Acquire Bombing Range July First," *New Mexico Magazine*, Santa Fe, NM, May 1942, 38.

Interior, Rodgers entered negotiations with the Departments of War and of Justice on the question of state permits to "give all interested parties an opportunity to state their case before taking legal action."[49] Like Governor Dempsey, Lewis Gillis, or the President of the Las Cruces Lion Club, Commissioner Rodgers took action because he was driven by anxiety for the economies of the Otero, Lincoln, Dona Ana, and Socorro counties that were to "suffer considerably in the loss of personal property from their tax rolls, in livestock, and also in improvements."[50] These appeals by concerned citizens mirror the collective apprehension that was produced by what became known as a military "land-grab" in New Mexico.

The Governor's correspondence and the articles in the *New Mexico Magazine* make it obvious that the State of New Mexico, although willing to participate in the war effort, was reluctant to relinquish some of its best economic assets that had so far fueled its fragile economy. The debate centered on the possible repercussions of such economic loss after the War and on asserting the rights of the ranchers established in the area. What comes out of these negotiations is the clearly-expressed fact that the lands would be returned after the War; however, the expropriated ranchers never recovered their land. Concerns did not end with the World War; new issues regarding the range continued to arise. For example, new telegrams were sent in April 1945, to the Governor by the Chairman of Dona Ana County Commissioners and the President of the Las Cruces Lions Club to inform Dempsey of the protest against the closing of Highway 70 because of the Rocket Range as a detriment to their town. Yet, to this day, Highway 70 can still be closed due to testing on the Missile Range, thus adversely affecting the traffic east of Las Cruces.[51] In the 1950s the White Sands Proving Ground extended further east toward the Sacramento Mountains, dispossessing around fifty more ranches. Protest reached the state and federal levels in politics and in court, but the most visible protest came from the individual level.

c. White Sands Ranchers

Years after World War II, part of the ranchers of the Tularosa Basin who experienced the loss of their lands, houses, livelihoods, and lifestyles entered a legal battle against the

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[49] H. R. Rodgers, "Will Compensate Ranchers on Bombing Range, Resources Unlimited, New Mexico Aids National Defense, A Department of Information and Reports of the State Land Office," *New Mexico Magazine,* Santa Fe, NM, June 1942, 29.
[50] Rodgers, "Bombing Range Negotiations Progress," *New Mexico Magazine,* 39.
[51] J. H. McLaughlin, Chairman of the Dona Ana County Commissioners, Western Union telegram to Governor John Dempsey, Hatch, NM, 21 April 1945, Governor John Dempsey Papers, 1936-1958, Santa Fe, NM: New Mexico State Records Center and Archive, Collection 1959-046, Box 13144, Folder 6, World War II Bases New Mexico Military.

Army and the Federal Government. Their voices acknowledged one crucial fact: the area now known as WSMR was not wasteland; it was not empty. Before the birth of a military and then scientific network in New Mexico, before the Army condemned vast distances of land, before there was a missile range dedicated to weapons testing, New Mexican families lived in the desert. A section of the WSMR Museum dedicated to the ranching era in the Tularosa Basin explains to visitors that, for over half a century, the Basin was home to more than a hundred sheep, cattle, and goat ranches. The San Augustin Ranch, for example, formed much of the land that is now military-owned. This ranch, operated by the Cox family since the 1800s, spread over more than 150,000 acres; in 1945 the Army used eminent domain to take over 90% of it, and the family now lives in the remaining land and house just a few miles west of the main post housing area. Most of these ranching families, like the Coxes, inhabited the area from around 1880 to 1942 before their land was claimed by the government or acquitted by the Army. The families lived up to twelve miles (19 kilometers) from any neighbors and sometimes as far as fifty miles (80 kilometers) from a town; like in many other parts of the state, they were secluded and self-sufficient. One WSMR Museum exhibit presents visitors with the findings of the WSMR Ranching Heritage Oral History Project for which 24 members of ranching families were interviewed. The exhibition describes these ranchers' lives using the "romantic" prism that was described by the British novelist D. H. Lawrence, the stereotyped nostalgia often present in the U.S. when referring to the country's agrarian past, and the lure of freedom through agricultural activities that had sustained the recreational homesteading movement.[52] The exhibit stresses isolation, love of the land and the courage of women:

> If they got in the mood to visit, they saddled up their favorite horses and took off. Sometimes, entire families would ride twenty miles [32 kilometers] to attend a dance that started at sundown and ended at breakfast. […] When they were children, the canyons and ridges, rocks and trees became the landmarks of their neighborhood. As adults, they scratched from the very earth the materials—particularly rock and adobe—with which they built their homes. *They lived from the land and marveled in its beauty*. […] The things modern women take for granted—hot and cold running water, washing machines, microwaves, hair dryers—had either not been invented or had not found their way into the remote fastnesses of Deadman's Canyon and Lava

[52] See Part 1, Chapter 2, Artists and the Land of Enchantment and Increased Federal Presence.

> Gap. If families had electricity at all, it usually was generated by a wind charger, stored in car batteries and used to power lights and radios.[53]

The role of women is particularly emphasized in the exhibition to illustrate the difficulties of their way of life in the desert and celebrate their resourcefulness. The women engaged in various activities that were typical of ranching: cooking beans, baking sourdough, making jerky, and frying beef cut from carcasses on the porch during cold weather. They also gave birth at the ranch without any doctor or nurse but just accompanied with a relative because of the isolated situation of their homes. In the 1940s, the ranching lifestyle in the area had not much changed from the 1880s. Most ranch houses were built of adobe. The ranchers typically owned cattle, sheep, horses, and chickens, kept a dairy cow to produce dairy goods on the ranch, and a garden to grow beans, potatoes, peas, root crops, squash, corn, and, sometimes, fruit trees. Some families also raised hogs. The women would can the goods that had not been eaten fresh in glass jars to feed the family until the next harvest. Flour, sugar, and other staples were bought in town. Ground water was only used to water livestock because it contained too many minerals to be drunk by humans; people drank the water they collected from their metal roofs in cisterns. For meat, deer and chicken came first and then sometimes beef when they had a grown calf from a dairy cow. The ranchers actually did not have any electricity before the War.[54] Ranch life was then similar in some points to village life in New Mexico's native communities—Native American or Hispanic. Self-sustenance, seclusion, farming, and livestock activities were the common points. The most evident differences were that the great majority of these ranchers were Anglo-American and that the individual was more central to the organization of the small ranching unit in comparison to the emphasis on community and collectivity in the Hispanic and Native American village system.

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[53] White Sands Missile Range Museum, White Sands Missile Range Ranching Heritage Oral History Project exhibit, visited on October 26, 2013. The Oral History Collection was prepared for White Sands Missile Range by Peter L. Eidenbach, Beth Morgan, and Mark Carter, eds., "Homes on the Range: Oral Recollections of Early Ranch Life on the U.S. Army White Sands Missile Range, New Mexico," United States Department of Defense, Legacy Resource Management Program, Ranching Heritage Oral History Project, Las Cruces, NM: Human Systems Research, Inc., 1994. Italics added by Lucie Genay.

[54] The information on the ranching era does not solely come from the museum exhibit but also from Thomas Widner, et al., "Draft Final Report of the Los Alamos Historical Document Retrieval and Assessment (LAHDRA) Project," Atlanta, GA: Centers for Disease Control and Prevention (CDC), National Center for Environmental Health Division of Environment Hazards and Health Effects, Radiation Studies Branch, June 2009, chapter 10, 42; 43, http://www.lahdra.org/pubs/Final%20LAHDRA%20Report%202010.pdf, accessed April 19, 2015.

The following map, probably made in the early 1940s and donated to the Museum by the Henderson family, illustrates the vast distances between ranching units in the area of Salinas Peak in the upper half of the range. The blue blocks are the lands patented and owned by the ranchers where they built their houses near water springs or wells. The whole ranch unit, containing both the patented land and the land that they leased by paying grazing rights on federal and state lands surrounding them, is represented by a red boundary line with the name of the owner handwritten in red. The red blocks are the state "school" sections: trust land given to New Mexico by Congress under the Ferguson Act of 1898 and the Enabling Act of 1910. Ranchers also paid grazing rights to use these lands, but the payments went to the New Mexico State Land Office to benefit public schools in the state. These are the sections that Governor Dempsey referred to in his letter to Henry Stimson to explain how taking the land requested by the Army would affect the State's institutions.

Fig. 15: Ranching Units in the Area of Salinas Peak. Source: Personal picture by Lucie Genay, WSMR, NM, White Sands Missile Range Museum, October 26, 2013.

The exhibit panel ends with a paragraph on the "supreme sacrifice" that the majority of these ranchers made when they gave up their land during World War II. Insisting on their patriotism, "Many left homes that had been in their families for several generations. […] Not only did they give up their homes and livelihoods in support of the war effort, but many sons and husbands also served in the military during World War II. Rancher Eda Anderson Baird reached the rank of lieutenant in the Army medical corps."[55] The museum exhibit, while providing interesting insights into the ranching era in the Basin, gives a romanticized view of the ranchers' lives in that it emphasizes the patriotic value of their renunciation of the ranching lifestyle.

But not all testimonies recount the event from a patriotic angle. In 1942, when the first range was created, about fifteen ranches were located on the million acres coveted by the Army. The bigger ones included one owned by Tom McDonald and his sons and another one owned by Bill O. Burris. In the 1955 extension, fifty more were targeted among which was John Prather's ranch. Both McDonald and Prather became known for their determined resistence to the government and the Army. They also both appeared under the category "Farm and Ranch Folks" of another oral history program conducted by the New Mexico Farm and Ranch Heritage Museum. This program was launched in the mid-1990s in an effort to "collect and preserve the agricultural heritage of New Mexico."[56] Three interviews were particularly relevant to this dissertation as they concerned ranchers who owned or whose parents owned property in the Tularosa Basin that was taken away by the Army either in 1942 for the establishment of the Alamogordo Bombing Range or later in the mid-1950s when the White Sands Proving Ground was enlarged. These recollections are valuable to get a sense of how these ranchers experienced the loss of their land and what their understanding of the event was: in all three cases, the ranchers were led to believe that they would be able to perpetuate their lifestyle, be it under a leasing contract to the Army or by getting their property back after the War. Some of these men brought to light the plight of the White Sands ranchers through their repeated appearances in the local newspapers, as part of lawsuits, or by taking direct action against the Army on their land.

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[55] Eidenbach, et al., "Homes on the Range: Oral Recollections of Early Ranch Life on the U.S. Army White Sands Missile Range, New Mexico," 1994.
[56] "Farm and Ranch Folks Project," Oral History Program, Las Cruces, NM: New Mexico Farm and Ranch Heritage Museum, New Mexico Department of Cultural Affairs, Research and collections, http://www.nmfarmandranchmuseum.org/oralhistory/browse_by_project.php?project=1, accessed April 25, 2014.

Ernest Aguayo's family has deep roots in the state of New Mexico: his grandfather—a lawyer, schoolteacher, and justice of the peace in Lincoln County—witnessed the Lincoln County War,[57] one of the most epic events in New Mexican history, and befriended Billy the Kid. Aguayo recounted the story of how the Kid came to visit his grandfather, to seek advice, and to play guitar and how his grandfather was responsible for putting a gun in an outhouse for him. This heritage of the "Old West" in the area has often been used to introduce the military reservation as was done in the series of articles announcing the creation the Alamogordo Bombing Range published in the January 1942, *New Mexican Magazine*: "The country of Eugene Manlove Rhodes, of which he wrote so picturesquely and romantically, and of Billy the Kid, which is still 'cow country', soon is to resound again to the sound of crackling gunfire—gunfire of greater volume than Gene Rhodes or the deadly Kid ever dreamed of."[58] Resting on the violent and mythical past of the region was a way for proponents of the military industry in the West to convey the belief in a perfect match between New Mexico and weaponry.

In the case of Aguayo's family, the New Mexican western heritage was mixed with a strong Spanish heritage that is reflected in the Castilian language spoken by Aguayo's father for the joy of all who heard him.[59] He grew up on the Vega Ranch on the Carrizozo Flats below Nogal, NM, before the family moved to the Tortalito Ranch further to the southwest. His father was the first person to take out a permit to lease land for grazing from the Lincoln National Forest, beginning in 1913; he also bought several other homesteads in that area. From an early age, Aguayo helped his family grow crops such as corn and beans. They did not lack food: the garden provided crops for canned goods, the seed corn was used to feed the chickens and horses, the pinto beans[60] were reserved for the family during the winter, the apples were sold or stored in the cellar, and meat was plentiful including beef, pork, chicken, and venison. Once he finished his schooling first in Nogal and then in Carrizozo, Aguayo

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[57] The Lincoln County War occurred in 1878 and lasted until 1881 when the Kid was killed by Sheriff Pat Garret. Rival business factions fought for economic domination of the county using murder, back-and-forth revenge, and gunfight. The conflict began with accusations of cattle rustling and led to a five-day gun battle at the courthouse. The most famous partakers were bankers, merchants, cattlemen, sheriffs, and outlaws including Billy the Kid, Pat Garret, William Brady, John Chisum, Alexander McSween, John Tunstall, James Dolan and Lawrence Murphy.

[58] Rodgers, "Bombing Range Negotiations Progress," *New Mexico Magazine*, 39.

[59] The Aguayo name originated from Spain and refers to a specific river from which three brothers saved the prince of Spain. The river was represented in a symbol for water on their family crest.

[60] This variety of bean is a staple food in the southwestern United States and northwestern Mexico. They are called pinto (painted in Spanish) because of their reddish brown spots. A traditional ingredient in Hispanic and Native American cuisine, they are the fifth most important crop in the state of New Mexico and Mountainair in the Estancia Valley is actually dubbed the Pinto Bean Capital of the U.S.

became a cowboy and worked with his father tending the cattle with his brother until his father retired and sold the ranch. Aguayo later acquired his own land to run his cattle on the east side of the Oscura Mountains; he owned 640 acres of patented land and a grazing lease for 84 cattle and saddle horses. He complemented the ranching activities by working as a lineman and power man for the U.S. Forest Service during the summers, as a forest trail foreman, and with the Southern Pacific Railroad in 1941 maintaining the water service for the steam engine trains.

The Aguayo ranch was one of many ranches taken by the government for the creation of the Alamogordo Bombing Range. He was paid a $1000 land use fee with a promise that he would get the land back but he was given no chance to remove any of his belongings before government use began. He estimated that it took three months from the time he was notified about the taking until he had a chance to meet with the government attorneys. He had every intention of going back to his ranch and starting over; but, according to him, the government was unclear as to what was asked of the ranchers, and he was left with the understanding that he would get his ranch back when the War ended. The government takeover ended Aguayo's dreams of being an independent farmer and rancher. In the postwar economy, he turned to other occupations: he worked as a blacksmith in Mesilla Park, and later for the Empire Zinc exploration division, and, finally, went back to work for Southern Pacific Railroad. He later took an active part in the protest and legal strife that was undertaken by the WSMR Ranchers, but his role in this lawsuit will be addressed in Part 4.[61]

The most emblematic rancher of the White Sands Missile Range who became known for his campaign against the government and for his armed reoccupation of his old ranch was David G. McDonald. The oral history program of the New Mexico Farm and Ranch Heritage Museum interviewed McDonald in 1997 and retraced his family's story in the Tularosa Basin. The family, originally from Ireland, had moved to New Mexico from Texas—like many other ranchers in this part of the state. His great-grandfather Mike McDonald first homesteaded in the Mockingbird Gap in the La Luz area of New Mexico in the late 1870s or '80s. Tom McDonald, his grandfather, became interested in going further south: he eventually owned three ranches in the WSMR area. His father, Dave McDonald, went to work on one of them. All the children of that pre-1942 era either worked on or owned their own ranches. Even their

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[61] Ernest Aguayo, Interview by Beth Morgan, Las Cruces, NM, 14, 19, 25, 26 June and 11 July 2001, "Farm and Ranch Folks Project," Oral History Program, Las Cruces, NM: New Mexico Farm and Ranch Heritage Museum, New Mexico Department of Cultural Affairs, Research and collections, http://www.nmfarmandranchmuseum.org/oralhistory/detail.php?interview=15, accessed March 30, 2014.

children would sometimes stay alone in remote locations looking after cattle when they did not attend school in Oscura, about 56 kilometers away. McDonald recalled that his first saddle as a child had been a longed-for Christmas gift. All ranchers were cowboys themselves, but they also hired some for specific tasks that required more manpower such as roundup and branding; the rest of the time they relied on inter-family help. Later accounts of these lifestyles on the range and their distortion through popular images of the West helped create the cowboy mystique that developed as the cowboy way of life was disappearing.

Four McDonald ranches were taken by the Army to build the bombing range. The family did not know that the Army was interested in the ranches until someone came to evaluate the land, so they had very little time to vacate. The families left equipment behind, believing it would be there when they returned; but things were stolen or allowed to deteriorate, and their cattle was driven to pasture or trucked out for selling. McDonald complained that the New Mexico practice of valuing ranches based on patented land and related grazing leases was not honored by the government: he did not know how compensation was determined but speculated that it may have been arbitrary or that some ranchers were able to use their political influence, bribery, and better legal representation to raise their compensations. The examples of Oxnard Field and Clovis mentioned above would tend to confirm this statement. Dave McDonald and his brother Ross went to court and managed to slightly increase the amount, but their legal battle lasted for several years.

The ranchers entertained the hope of getting their properties back after the War, but the Army renewed the leases until the 1970s to use the land for WSMR. The prices offered for purchase would be based only on the patented land without taking into account the grazing rights, which consisted of a very substantial part of the ranch's value as shown in the map of ranching units above (see Figure 14). Lawsuits followed. The government condemned the ranches of those who refused their offers and the owners still had to leave within the allotted time. McDonald said that they understood that their land was needed during the War, but they were concerned with the loss of their livelihood. The compensations they received could not enable them to reproduce their lifestyle elsewhere. The families were not given any funds for lodging or food during the move. Because cattle prices dropped, selling their animals did not help. He further contended that the ranchers were devastated by the taking of the ranches; and, in addition to the family members they had lost at war, they lost their homes and trust in the Federal Government. His father thought concerns over insufficient compensation would die out with the ranchers but McDonald believed that the taking affected people physically and

emotionally. The seizure of the land affected the quality of his life as well as that of his children and his sister.[62] His nationally famous armed occupation of his ranch within WSMR in the 1980s with his niece will be addressed later in Part 4, but this first approach to his testimony reveals how much the ranchers' perception of their sacrifice clashes with the romanticized and overly patriotic view emphasized at the Museum. McDonald voiced his bitterness at being treated as if his land had been "free land"; he thus became another victim of one western myth while being the representation of another, i.e., the cowboy on the range, who, incidentally, had also taken possession of "free" land.

The last interview concerns another rancher of the Tularosa Basin who became known for standing until the "land-grab" in the 1950s when the range was extended. John Prather and his brother Owen came to New Mexico from Van Zandt County, Texas, in 1883 to seek free profitable land at the very end of the westward migrations. They arrived in Lincoln County, which encompassed much of the Tularosa Basin at the time and attracted solitary and resolute men who dared settle in this inhospitable environment. John settled below the Sacramento Mountains to raise cattle, and Owen developed a sheep ranch. Interviewee Irving Porter was eleven years old when he was taken in by the Prather family in Piñon. Although Owen Prather welcomed Porter into his home, Porter recalled the time spent at John's ranch. He described John Prather's ranch as heaven, "an oasis in the middle of the desert." At seventeen, Porter went to work for John at the ranch breaking horses: "I learned everything about horses from John," he said. The Prather family had first ranched on the Agua Chiquita near Weed in the Lincoln Forest before going further west to the "flats" when the livestock outgrew the area. John Prather started with a homestead on a school section of land and eventually became known as the "Mule King" because, in addition to cattle and horses, he raised mules. The property even included a five-acre orchard for the production of fruit—peaches, apples, and grapes.[63]

In order to enlarge his property, Prather purchased the land from ranchers in the area who homesteaded only one section of land, which was not enough to make a living and led them to giving up their homesteads. At the time of the government land-grab in 1955 to extend the White Sands Proving Ground eastward, Prather was 82 years old and owned eight

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[62] David McDonald, Interview by Jane O'Cain and Beth Morgan, The McDonald residence, NM, 4 June 1997, "Farm and Ranch Folks Project."

[63] Porter also describes how they handled the issue of water since the ranch did not have any naturally occurring water sources. Prather dug a well, installed a tank and a pump, and thanks to the canyon near the house that drained lots of runoff to the ranch, they never had any problems with water.

sections (5,120 acres) of patented land that the Army wanted. It was the largest ranch in the area. He became known, as did David McDonald a few years later, for standing up to the Army, consistently refusing offers, and forcefully occupying his ranch in spite of the eviction notice against him. Porter said Prather was "a thorn in [the Army's] side." He recalled that Prather went as far as offering to let the Army lease his land for $1 per year for 99 years if they would just leave him alone. Prather believed that the other ranchers would have fought back if they had known, as he had, that the Army's rights were not above the law. Like David McDonald, Prather said that the compensation was not enough to purchase land because the amount was insufficient to replace what had been lost and reproduce the same way of life somewhere else.[64]

John Prather's and David McDonald's resistance attracted media coverage and public sympathy to the ranchers' cause but also manifested the disappearance of a lifestyle that was part of the identity of southeastern New Mexico. Once the patriotic enthusiasm at the end of the War died out, New Mexico newspaper cast the stories of these men as warnings to all others that the militarization of the state had directly affected populations and the New Mexican culture of the land. The ranchers' plight is a point of convergence between western mythologies and realities as some of them, such as the Prathers, arrived in Lincoln County looking for lands free for the taking and aspiring to the rugged life of westward migrant farmers only to be later stripped of that land through a mechanism largely influenced by concepts shaped in the westward migration era. As in the selection of the isolated Pajarito Plateau in Los Alamos, there is irony in the ranchers' situation. The irony lays in the fact that the ranchers received the land from the State, which had initially acquired it through violence against the region's ancestral inhabitants, and developed it, readily observing the open range myths; and, then, the Federal Government took the land as its own from them, just as easily.

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[64] Irving Porter, Interview by Donna M. Wojcik, The Porter residence, Piñon, NM, 9 October 2009, "Farm and Ranch Folks Project," Oral History Program, Las Cruces, NM: New Mexico Farm and Ranch Heritage Museum, New Mexico Department of Cultural Affairs, Research and collections, http://www.nmfarmandranchmuseum.org/oralhistory/detail.php?interview=226%27, accessed April 1, 2014.

CHAPTER 2: THE MANIFEST DESTINY OF ATOMIC SCIENCE

1. Land condemnation at Los Alamos

The condemnation proceedings at Los Alamos followed the tracks of military settlements anywhere else in New Mexico, but the significance of the secret project meant that acquiring the land would have to be expeditious and without any interferences. The displacement of inhabitants on the plateau to make way for the first scientists revealed, even more strikingly than in the Tularosa Basin or on the military base sites, the hierarchy among evicted people. Some were able to negotiate and others were hastily and forcibly removed in the name of national defense. As mentioned above, physicist John Manley called this move "a new civilization colonizing this Pajarito Plateau."[1] His meaning of the word "colonizing" is to add a civilization of cosmopolite top-scientists of mixed nationalities in the list of peoples who had come to conquer the rough conditions of mountainous northern New Mexico after the Keres people, the Spanish, Mexican, and Anglo-American settlers. The people on the plateau were also included in the colonization process.

Approximately 54,000 acres of land were deemed necessary for the establishment of the laboratory. One of the main reasons for the selection of the Los Alamos site was the fact that a great part of the land already belonged to the Federal Government in the form of the Santa Fe National Forest, which was administered by the U.S. Forest Service as timberland. However, this land was also linked to the local population who held grazing permits to it. A transfer was made to surrounding grounds controlled by the Baca Land Company that offered the rancher's equivalent to sharecropping. Out of the 54,000, approximately 8,900 were federally owned, and 3,600 were private properties. The larger property was the LARS.

a. Condemnation of the Ranch School

After the first visit of the school by Groves, Oppenheimer, and Dudley in November, the Army started posting guards and sending more people to assess the locale. The schoolboys dubbed this flow of military people "the Big Invasion."[2] Bernie White, one of the invaders, was the appraiser for the Los Alamos site. His role, as a member of the Land Acquisition section within the Army Corps of Engineers, was to visit the property and report all details on

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[1] Manley, "A New Laboratory is Born," in *Reminiscences of Los Alamos*, 32.
[2] David Joshua Anderson, "Los Alamos Ranch and the Manhattan Project," *New Mexico History.org*, Santa Fe, NM: The Office of the State Historian, Albert J. Connell, Director of Los Alamos Ranch School, Correspondence to Jerome Rich, 16 March 1943, http://newmexicohistory.org/people/los-alamos-ranch-and-the-manhattan-project#_edn19, accessed April 10, 2014.

the nature of the site.[3] General Groves emphasized in his version of the condemnation proceedings that the headmasters were more than happy to cede the land to the Army due to a staff shortage: "I was most relieved to find that they were anxious to get rid of the school, for they had been experiencing great difficulty in obtaining suitable instructors since America had entered the War, and were happy indeed to sell out to us and close down for the duration—and, as it turned out, forever."[4] Actually, the school was in financial difficulty, and A. J. Connell, the school director, had the idea that the Army would take over the school for the duration; then, he would be able to recover it after the War. So he was indeed prepared to negotiate a sale but only until the end of the War; that he was "anxious to get rid" of it challenges credulity. The government would have to go through condemnation proceedings as he could not sell it outright: the trustees owned the school, and he did not have the authority to sell.[5] Connell refused all the offers from Army real estate men, engineers, scientists, and inspectors until he received the letter by War Secretary Henry Stimson on December 1, 1942, that read:

> You are advised that it has been determined necessary to the interest of the United States in the prosecution of the War that the property of the Los Alamos Ranch School be acquired for military purposes. Therefore, pursuant to existing law, a condemnation proceeding will be instituted in the United States District Court for the District of New Mexico to acquire all of the school's lands and buildings, together with all personal property owned by the school and used in connection with its operation. Although the acquisition of this property is of the utmost importance in the prosecution of the war, it has been determined that it will not be necessary for you to surrender complete possession of the premises until February 8, 1943. It is felt that this procedure will enable you to complete the first term of the regular school year without interruption.[6]

A week later, the faculty, staff, and students were told they had to leave because the government needed their property. One student understood well what was happening to his school: Sterling Colgate, a senior, had recognized Oppenheimer and Lawrence when they came to visit the school at the end of November. He recalled, "These two characters showed up, Mr. Smith and Mr. Jones, one wearing a porkpie hat and the other a normal hat, and these two guys went around as if they owned the place." While still attending classes, students saw

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[3] Hales, *Atomic Spaces*, 49.
[4] Groves, *Now It Can Be Told*, 67.
[5] Wirth, et al., *The Ranch School Years*, 156-157.
[6] Henry L. Stimson, Secretary of War, "Los Alamos Ranch School Seizure Letter," December 1, 1942.

the trucks and bulldozer begin their work on the "demolition range," as the Los Alamos site was referred to at the beginning for security reasons. Colgate commented that the Army was putting "megabucks" into "what seemed […] the worst place in the world to have a laboratory because there was no railroad and no water or any of those things that you normally need for a laboratory."[7] There last four seniors were quickly graduated and the other students were relocated. The Federal Government also filed the petition of condemnation under the 1942 Second War Powers Act in the spring of 1943.[8] The price negotiations occurred that summer. In the end, the direct-purchase contract between the school and the Army was of $350,000, a middle ground between the school's asking price of $500,000 and the government's first offer of $275,000.[9] The school buildings and the campus grounds became Area A, the center of the Laboratory.

Fermor Church, a math and science teacher, tried to reopen a school bearing the same name in Taos in 1944 but failed because recruiting students was difficult during the War. His school closed after a year, and he became an environmental activist with some Los Alamos scientists and the founder of New Mexico Citizens for Clean Air and Water. He and his wife, Peggy Pond Church, had three sons who, ironically, all ended up working in the field of nuclear energy:

> While they didn't agree with her views of nuclear weapons, Peggy's sons did share the family's sense of loss at being evicted. Today, the Churches still lament the loss of the school, still consider themselves victims of the war effort, still complain about family furnishings and collections never returned, and wonder what life might have been like had Oppenheimer never seen their land.[10]

The owners of the Anchor Ranch, the second largest property on the plateau, also challenged the government offer and settled for $25,000. The ranch became a test range for the gun program. Edwin M. McMillan recalled the state of it when he and his team came to

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[7] Kai Bird and Martin Sherwin, "A Los Alamos Beginning," in Cynthia C. Kelly, and the Atomic Age Foundation, eds., *Remembering the Manhattan Project: Perspectives on the Making of the Atomic Bomb and Its Legacy*, Hackensack, NJ: World Scientific, 2004, 55.

[8] Edith Warner, *In the Shadow of Los Alamos: Selected Writings of Edith Warner*, Ed. Patrick Burns, Albuquerque, NM: University of New Mexico Press, 2001, 20.
The two War Powers Acts in 1941 and 1942 gave immense power to the executive branch to execute World War II. The first act authorized the President to make changes in government organizations and agencies to better serve the war effort. The second act authorized the acquisition of land through condemnation or other forms for military and naval purposes.

[9] Wirth, et al., *The Ranch School Years*, 158.

[10] Bartimus, *Trinity's Children,* 79; 89.

assess the place: "the owner of the ranch was moved out and he'd left everything behind. It was a complete ranch with house, barn, equipment, everything including a flat area, which would make a good test range, next to a small canyon so the control building could be down in the canyon with the gun on the flat above."[11] This comment reveals the rapidity with which landowners had to vacate their houses to make room for the scientific experiments. Of all the evicted people, those who had the least time to organize their departure were the small landowners: the homesteaders, most of them Hispanic locals. Daniel Lang, reporter for *The New Yorker*, commented on "the first settlers of this atomic colony" in 1948; he wrote, "These men were furtively invading Los Alamos to see what could be done with a mesa. The *only* obstacle to their taking over was A.J. Connell, operator of the Los Alamos Ranch School."[12] The homesteaders were completely obliterated from his account of the creation of an "atomic colony."

b. Taking the homesteaders' land easily

Aside from the Ranch School, the Army Corps of Engineers looked upon the land as unoccupied grazing land that they could acquire at little expense. When Marcos Gomez, a forty-year-old Hispanic homesteader on the Pajarito Plateau, saw the first government surveyor on his family ranch he said "I think the government's coming." When his father, Donaciano, replied that these government officials could not come here he said, "Yes, they can. The government can throw down our mountains here if they want to."[13] The homesteaders received very low compensations for their land and their grazing rights. Almost all of them signed quitclaim deeds[14] and accepted compensations. As for those who tried to object the amount, their claims were considered as inconsequential by the Manhattan Engineering District. Three contesters are listed in the District's history: Elfego Gomez, Ernesto "Montoyo," and Adolpho "Montoyo"; but, as historian Peter Hales explains, the District's Real Estate Branch had trouble spelling these small owners' names and addresses. The name of "Montoya" misspelled "Montoyo" in the registers is a telling example of how seriously their claims were regarded by the District. While the two Anglo properties were

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[11] McMillan, "Early Days at Los Alamos," in *Reminiscences of Los Alamos, 1943-1945*, 17-18.
[12] Daniel Lang, "A Reporter in New Mexico," *The New Yorker*, New York, NY, 17 April 1948, 68, Ralph Carlisle Smith Papers on Los Alamos 1924-1957, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS149BC, Box 1, Folder 24. Italics added by Lucie Genay.
[13] Sagel, "Los Alamos: He Lived on the Hill Before It Meant 'The Bomb,'" *Journal North*.
[14] A quitclaim deed is an instrument which transfers all of the right, title, and interest that the conveyor has in a piece of property, but with no warranty or assurances that the conveyor has good and legal title; risk of liens or encumbrances pass to the transferee. Definition from *Webster's New World Law Dictionary*, Hoboken, NJ: Wiley Publishing, Inc., 2010.

officially acquired after long negotiations, the families who, for some, had been living in the region for centuries were the easiest to uproot from their land because of cultural and language barriers. Truly, "the small landowners held more than two-thirds of the privately owned land (and probably a similar proportion of the grazing rights); but they received less that eighth of the money."[15] While the school was paid $225 per acre including the buildings and Anchor Ranch received $43 per acre just for the land, the homesteaders received between $7 and $15 per acre with all improvements.[16]

More than fifty years later, the families and descendants of these early homesteaders entered a legal battle to claim their right to justice and compensation. In the course of this campaign Executive Director of the Pajarito Plateau Homesteaders Association, Joe Gutierrez, affirmed that the government's actions in 1942-1943 were "unbridled." He said, "Due process was sacrificed for expediency and families were forced at gun point to leave their homes."[17] Furthermore, the owners of the school and Anchor Ranch were given time to evacuate—two months according to Stimson's letter—but the homesteaders had to leave immediately, sometimes leaving everything behind. The case of the Gomez family is illustrative of the eviction proceedings followed by the Army:

> The Gomez family was at the ranch when the two men from the Army Corps of Engineers drove up in a jeep. These men carried rifles and approached the family members, one of whom was in the field, planting. These government representatives told the family they would have to gather the possessions they could carry and leave by the next day.

If the family's address was known, they should have received a notice, not of the condemnation proceedings but of the immediate taking of their land by the War Department. In theory, the homesteaders should then have been able to negotiate the compensation amounts; but, instead, "a Declaration of Taking was filed in lieu of the condemnation, an amount was deposited in court equal to the estimated value of the homesteaders' property, and title to that property immediately passed to the government." Marcos Gomez testified in 1998

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[15] Hales, *Atomic Spaces*, 59.
[16] Diana Heil, "Justice Draws Near For Heirs Of Land Taken By U.S. Government," *The Santa Fe New Mexican*, Santa Fe, NM, 12 October 2004, B1, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Los Alamos National Laboratories—Pajarito Plateau Hom 1.
[17] Chuck Moutain, "Los Alamos Fire May Bring Heat and Justice to Original Latino Families," *Imagen Magazine*, Albuquerque, NM, September 2000, 26, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Los Alamos, NM—Health Hazards.

saying, "What I remember is that they came and they decimated everything… buildings, *corrales*[18], and homes. And from there they had us under guard. … They took us to where the school is."[19] With the land, the Gomez family, like the others, lost their livestock—several hundred animals—which, some homesteaders saw, were shot by the Military Police Corps. Donaciano Gomez's compensation check was sent to a fictitious address, and there is no record of him ever receiving it. Many homesteaders were listed under "address unknown." A wide gap opened between the estimated value of these properties and the actual compensations. Enrique Montoya's property, for example, was estimated at $17,500, but the Army offered compensation of $425. In the end, he obtained $1,250; however, because his address was listed as unknown, he was notified through a newspaper publication.[20]

Most of these families went to live in the Española valley, and none of them were able to reproduce the self-sufficient way of life that they had led on the plateau. Instead, they went to work for the Laboratory as maintenance people. From living off the land they became the blue-collar workers of the atomic bomb. Of the many families who made this transition from agrarian and pastoral occupations to paid work, thus fully entering the cash economy that had been limited so far in the region, most saw the change as an improvement of their living standards, but others clung to the nostalgia of this previous life close to the land. Marcos Gomez and his wife, Maria, moved to Alcade where Marcos became a laborer and foreman for one dollar a day at Los Alamos, four miles (6.4 kilometers) away from his "El Rancho." In 1975 Don Marcos and his wife were granted the right to visit the site of their old ranch accompanied by security guards. This area, Two Mile Mesa, became a testing ground for detonators in high explosives research. The Gomez family was satisfied to see that the outdoor stone bread oven, pigpen, corrals, and chicken house also made of stone remained as markers of the homestead. Their reaction was highly emotional: "Both of us cried. We spent some of our best years there."[21]

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[18] *Corrales* is the Spanish word for an animal pen.
[19] Malcolm Ebright, "Hispanic Homesteaders on the Pajarito Plateau: An Unconstitutional Taking of Property at Los Alamos, 1942-1945," *La Jicarita News*, Chamisal, NM: Rio Pueblo/Rio Embudo Watershed Protection Coalition, May 2007, 4, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Los Alamos, NM—Impact of Manhattan Project on Area Communities, Homesteaders on Pajarito Plateau, 1942.
[20] *Ibid.*, 5.
[21] Sagel, "Los Alamos: He Lived on the Hill Before It Meant 'The Bomb'" *Journal North.*

Owners of lands evacuated in what is now Los Alamos in 1942	
OWNER	ACREAGE
Jose & Fidel Serna	62.25
Frederico Gonzales	75.50
Noberto Roybal	125.00
Estanislado & Cirilo Gonzales	152.50
O.O. Grant	90.00
Ernesto Montoya	30.00
Adolfo Montoya	30.00
Elfego Gomez	120.00
Francisco Gonzales	22.50
LARS	790.00
Ramon Duran, ET Al	160.00
Manuel Lijan & Elfego Gomez	150.00
Martin Lujan	160.00
Enriquez Montoya	62.50
Mrs. Sanaida Archuleta	34.07
Fermin L. Vigil	60.31
Ramon Duran, ET Al	60.31
A.M. Ross, Anchor Ranch	322.16
Donacio Gomez	160.00
Jose Elfego & Jose Patricio Montoya	160.00
Walter V. Grottenhaler	60.90
Mrs. Francisquita Romero	160.00
Victor Romero	15.00
Montoya Bros.	90.00
Ramon R. Roybal	107.50

Fig. 16: Owners of lands evacuated in what is now Los Alamos in 1942. Source: Chuck Moutain, "Los Alamos Fire May Bring Heat and Justice to Original Latino Families," *Imagen*, September 2000, 26, Center for Southwest Research, University Libraries, University of New Mexico Vertical Files, Los Alamos, NM—Impact of Manhattan Project on Area Communities, Homesteaders on Pajarito Plateau, 1942.

c. Sacrifices for the "arsenal of democracy"

Condemnation of land in the prosecution of World War II happened in many places throughout the United States; high numbers of private and public buildings or lands were put under control of the War Department and the Army in the four years of the War. These proceedings were part of the collective war effort and of Roosevelt's "arsenal of democracy."[22] In this concept, the individual was meant to vanish in the collectivity for the sake of the fight against "evil," i.e., the axis, and as an expression of patriotism that was indispensible for victory. General Groves later wrote in his autobiography that he was

[22] The expression comes from one of President Franklin D. Roosevelt's most famous speeches, "The Great Arsenal of Democracy," delivered on the radio on December 29, 1940. He declared, "I want to make it clear that it is the purpose of the nation to build now with all possible speed every machine, every arsenal, every factory that we need to manufacture our defense material. […] We must be the great arsenal of democracy. For us this is an emergency as serious as war itself. We must apply ourselves to our task with the same resolution, the same sense of urgency, the same spirit of patriotism and sacrifice as we would show were we at war." Building an atomic bomb was part of this arsenal. To read or listen to the whole speech: Franklin D. Roosevelt, "The Great Arsenal of Democracy," Speech delivered 29 December 1940, *American Rhetoric*, American Rhetoric, 2001-2015, http://www.americanrhetoric.com/speeches/fdrarsenalofdemocracy.html, accessed February 11, 2015.

satisfied with the reaction of the local population to their project. He noted the population's and the state government's motivation in participating in the war effort because a New Mexico National Guard regiment had been captured in the Philippines. He commented on the patriotism of New Mexicans, writing "The support we received was superb."[23] And New Mexico showed great patriotic pride at the outbreak of the news that the bomb had been made at Los Alamos. Even some of the smallest participants in the Project expressed this sense of gratification when they realized their contribution to victory against Japan. Although most landowners on the plateau patriotically accepted the sacrifice that the government asked from them, they also hoped to recover their land after the War because, as explained in Part 1, Chapter 3, this land was their way of life as much as their livelihood. Connell was heard by a Forest Service officer saying, "he hoped eventually to acquire the lands that the War Department had taken over from him"[24] and the Forest Service shared that hope. The Service was even able to retrieve some land that formerly belonged to homesteaders.[25] Others refused to give up their land willingly because they doubted the postwar outcome:

> Ted Mather's wife sat on the front porch of their homestead with a shotgun, indicating how they felt about the taking. Some Hispanic landowners in Los Alamos considered refusing to sign quitclaim deed because they believed that the government was going to take the land whether or not they signed. They hoped that not signing would give them better legal grounds for reclaiming land after the war.[26]

Some of these displaced landowners saw their family land being transformed into a testing ground for explosives or into the town's golf course. The hope to return did not die out and reappeared in the class action lawsuit the families and heirs of the Hispanic homesteaders filed in the late 1990s.[27]

The portion of a sacred Pueblo burial ground was cut off, and no funds were allocated for either for purchase or removal of graves and ceremonial objects; instead, the area was designated as a game protection area by the U.S. Forest Service.[28] When the land was condemned in the urgency of war and the atomic arms race, no reports and no studies were

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[23] Groves, *Now It Can Be Told*, 65.
[24] Wirth, et al., *The Ranch School Years*, 159-160.
[25] Heil, "Justice draws near for heirs of land taken by U.S. government," *The New Mexican*. This issue will be further discussed in Part 4 when addressing the conflict between the Forest Service, the Pajarito Plateau Homesteaders, and the San Ildefonso Pueblo.
[26] Wirth, et al., *The Ranch School Years*, 196.
[27] See Part 4, Chapter 3.
[28] Hales, *Atomic Spaces*, 17.

undertaken to evaluate what might be the impact of a weapons' laboratory and development of an urban environment on these areas, be it the game refuge, sacred Pueblo burial grounds, or, the close-by Bandelier National Monument that sheltered invaluable archeological treasures and later served as a recreational park for the scientists of the Project. As soon as November 23, 1942, the first scientists—Oppenheimer, Lawrence, McMillan, and Compton—came to make a thorough study of the site and envision how the laboratory buildings and the housing units should be organized. Following this visit Oppenheimer went on a tour of the country's universities to recruit scientific personnel. The first group arrived at Los Alamos in March 1943, and on April 1st of that year, Los Alamos had officially become a military establishment under the supervision of Oppenheimer on the civilian side, Colonel John M. Harman on the military side, and the University of California as a War Department contractor.[29] The hurriedly-built community of a few hundred grew to more than six thousand by the end of the War and eventually thrived because it combined, from its very beginning, two important factors for success in a difficult isolated environment: technology and government capital.[30]

2. The scientist pioneers

a. The modern West

At the beginning of Project Y, several scientists and observers such as Sterling Colgate, the LARS student who had recognized the scientists, commented on the idea that the western setting was the least expectable place for such a "futuristic" enterprise and that the western cultures and environment were completely at odds with the purpose of the Army's presence. The prevalence of western mythology in the American mindset has long prevented any association of the ideas of modernity with the West. Richard White wrote that this "idea of a modern West" seemed to be an "oxymoron" to many people because "the 'real' West can't be modern."[31] In New Mexico, the contrast is amplified because the state is a concentrate of western mythology that derives from its landscapes, its native populations, and its historical landmarks. The names that made the international fame of the West are still used to advertize a unique western experience and attract tourists. New Mexico was the stage of Kit Carson's (1809-1868) campaign against the Navajo tribe. His burial place in Taos, in the north, was the former crossroads of the fur trade that he had used as a base camp as a young trapper and

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[29] Jones, *Manhattan, the Army, and the Atomic Bomb*, 86.
[30] Chambers, "Technically Sweet," 1.
[31] White, *"It's Your Misfortune and None of My Own,"* 537.

where he bought a house in 1843. This house has now become the Kit Carson Home and Museum. Another great western figure, the outlaw Billy the Kid (1859-1881), is also buried in New Mexico at Fort Sumner as is the equally well-known Lincoln County Sheriff Pat Garrett (1850-1908) who arrested and shot the Kid. These frontiersmen travelled on one of the most famous migration trails to reach western lands, the Santa Fe Trail. Therefore even the name Santa Fe summons pictures that involve tumbleweeds being blown through the streets, colorful Indian rugs, and cowboy boots.[32] New Mexico is the home of western legends, and the tourist industry then and now has always sought to capitalize on this heritage to attract visitors. For instance the New Mexico Tourism Department boasts the state has 400 ghost towns of the late 1800s—such places as Madrid, Cerrilos, Colfax, and Hillsboro.[33]

This concentration of markers of the western myths accentuated the propensity of participants in the atomic project to view New Mexico and their adventure going west through conceptions inspired by the Frontier mythical potency, the Manifest Destiny ideology, and the growing success of the western narrative genre in popular culture. General Groves, for instance, was fascinated with the Western mystique because he had spent most of his life on army posts, dating back to the American-Indian Wars with his father who was an army chaplain. He met men who had taken part in the final chapters of the conquest of the West and who had closed the Frontier in the 1890s. At loss for a driving purpose, Groves saw in the dawn of the atomic age the opportunity to expand on the "win the West" incentive and find a new frontier to the confines of science.[34] Groves reportedly told Colonel J. C. Marchall that the Los Alamos scientists "will like anything you build for them. Put up some barracks. They will think they are pioneers out there in the Far West."[35] Many other Americans, Easterners and Westerners alike, have been induced to look for ways to regenerate the Frontier in the pursuit of their collective and individual aspirations. According to Richard Slotkin, regeneration is a major mechanism of American society where settlers sought "to regenerate their fortunes, their spirits, and the power of their church and nation; but the means to that

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[32] "Authentic Albuquerque: Western Legends," *Albuquerque Convention and Visitors Bureau*, Albuquerque, NM: Albuquerque Convention and Visitors Bureau, 2015, http://www.visitalbuquerque.org/albuquerque/history/western/, accessed April 30, 2014.
[33] "Ghost Towns in New Mexico," *New Mexico True*, Santa Fe, NM: New Mexico Tourism Department, http://www.newmexico.org/nm-adventures-ghost-towns/, accessed April 30, 2014.
[34] Hunner, *J. Robert Oppenheimer*, 79.
[35] Phyllis Fisher, *Los Alamos Experience*, Tokyo: Japan Publications, 1985, 59.

regeneration ultimately became the means of violence, and the myth of regeneration through violence became the structuring metaphor of the American experience."[36]

Imagination and myth-making are two of the most powerful tools that helped create an American experience and cohesion between people of various backgrounds. Unity is created through shared experiences but also through adherence to the myths that collective experience produce. In turn, the uniting effect of these myths helps create a collective identity that can be extended even to those who did not partake in the nation's great experiences but believe its myths. The western myths owe their existence to the will of individuals to show their understanding of a world they feared and could not control. This perception of the unknown conditioned other visions to the point of altering the reality of the West and concealing it behind legends and stories. Slotkin defines a myth as the description of "a *process*, credible to its audience, by which knowledge is transformed into power; it provides a scenario or prescription for action, defining and limiting the possibilities for human response to the universe."[37] This definition means that myths have the ability to dictate behavior and relations because myth-influenced people will model their perception, behavior, and relations to the sense of otherness they imagine. This effect is observable in the attitudes of the scientists and their families during the wartime years of Los Alamos.

b. The scientists' Manifest Destiny

This section analyzes Richard White's second "familiar channel" in his argument that post-World War II changes were "shaped by the western past."[38] The western past was strongly present in the military actions and in the decision-making process that led to the selection of the site, but this past also shaped the mindset of the atomic pioneers who travelled to the Pajarito Plateau in 1943-1945. When the first scientists arrived in the Jemez Mountains, those who thought they knew about New Mexico probably had learned their information from tourist brochures that praised the healing qualities of the climate and the authenticity of its "Old West" experience. Or these people remembered the formatted images from the western narrative genre. In their narratives of the wartime years, many Hill dwellers, as Los Alamos' residents were typically called, made the analogy between their experience in northern New Mexico and tales of life on the Frontier. Ruth Marshak expresses the typical sentiment when

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[36] Richard Slotkin, *Regeneration through Violence: The Mythology of the American Frontier, 1600-1860*, Norman, OK: University of Oklahoma Press, 2000, 5.
[37] *Ibid*., 7.
[38] See Part 2, Chapter 1, The militarization of New Mexico.

she writes "I felt akin to the pioneer women accompanying their husbands across the uncharted plains westward, alert to danger, resigned to the fact that they journeyed, for weal of for woe, into the Unknown."[39]

While previous visitors in the region—artists, health-seekers, and tourists—were attracted by the prospects of a life away from the unhealthy industrial cities of the East, scientists and their families were ordered to go northern New Mexico. The daunting idea of vanishing in a desert army camp for an indeterminate period of time and New Mexico's reputation at the time transpires in their memoirs. In their accounts, the pioneer scientists' perceptions of their experiences are heavily influenced by "Wild West" and Manifest Destiny myths because they knew little about the area before arriving there. While looking at maps to locate Los Alamos in the Jemez Mountains, John Manley could not find it because, following Oppenheimer's oral instructions, he was looking for place he thought was called "Hamos." His phonetic spelling of the Spanish name *Jemez* shows how foreign the area must have seemed to some of them.[40] While scientists had difficulty locating New Mexico's mountain ranges, the chore was even more violent for the incoming Army personnel who, for some of them were so bewildered that they "figured they had somehow landed in North Africa where the War was raging at the time."[41] Even the scientists' Sunday pastimes reflect this influence. One of their most popular hobbies, inspired by the Old West romantic images, was mining; they started with exploration and then began studying mining reports and geological maps before hiking to old mines hoping to find gold or any other precious materials.[42]

Meanwhile, other early Los Alamos residents showed the strangeness of their presence in the desert and their ignorance of the arid environment through their attempts to transfer features from home on the mesa. Scientists' wives tried for example to master the Plateau's

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[39] Ruth Marshak, "Secret City," in Charlotte Serber and Jane Wilson, eds., *Standing by and Making Do: Women of Wartime Los Alamos*, Los Alamos, NM: Los Alamos Historical Society, 1988, 2. Ruth Marshak was the wife of Robert Marshak, Deputy Group Leader of the Theoretical Physics Division.
[40] Manley, "A New Laboratory is Born," in *Reminiscences of Los Alamos*, 29.
[41] Fern Lyon, "The Atomic Age: Research Labs Keep New Mexico in the Forefront of Technology," *New Mexico Magazine*, Santa Fe, NM, October 1987, 60.
[42] Jean Bacher, "Fresh Air and Alcohol," in Charlotte Serber and Jane Wilson, eds., *Standing by and Making Do: Women of Wartime Los Alamos*, Los Alamos, NM: Los Alamos Historical Society, 1988, 109-110. Jean Bacher was the wife of physicist Robert Bacher who was working at the Massachusetts Institute of Technology (MIT) Radiation Laboratory when he was recruited on the Project. Bacher writes, "From the passion of exploration it was only a step to the mining mania. Mining offered not only exercise but also the spirit of romance of the Old West. It led from perusal of old mining reports to the study of maps and geological tracts, then to a day's drive to a take-off spot and sizeable hike to the old mines sites, the chance to pick over old dumps and crawl through old shafts, a pleasant picnic, and the trek home again loaded with specimens to swap or display." This past-time is still popular among tourists in Western states today.

climate and the soil's bareness: they tried to reproduce the gardens they had at home. They labored hard every year and watered heavily in their attempts to grow some fruit or vegetable next to their house in the dry dirt.[43] The water supply remained a headache for the administration officers at the site throughout the War because, contrary to the preceding inhabitants on the mesa, this population was water-greedy. It is only thanks to the immense technological means the site officials had at their disposal that they managed to maintain this community that was so much at odds with its environment's scarce resources.

Early pioneers' mindsets and images of the West as the Frontier of civilization conditioned the way they interacted with the non-English-speaking locals who were hired at Los Alamos; the newcomers were predisposed to consider the locals with inquisitiveness and paternalism. The Project hired profusely from nearby communities to remedy the labor shortage and to comply with secrecy and security rules: construction workers, janitors, custodians, cooks, clerks and housekeepers from Española, Chimayó, Bernalillo, Las Vegas, NM, and from the nearby Indian pueblos of San Ildefonso, Cochiti, Tesuque, and Santa Clara. At first, the community was meant to hold no more than 300 people, but there were 6,000 by the end of the War. This overcrowding of the Hill made it necessary to hire people who would not have to live there. Every time a house was vacated, a team of Hispanics would come to empty and clean it before the next family arrived.[44]

The encounter between individuals from the scientific and from the local communities aroused a curiosity on both sides that was favorable to exchanges but the role differences also fueled stereotyping between natives and settlers. Local workers had an inferior status to Project scientists, and their inferiority combined with the preconceptions some scientists had about them made them prone to caricatures drawn from popular literature about the southwest. Charlie Masters, a teacher at the Los Alamos school, recalled a skit staged at the British Mission party in which Otto Frisch played the part of an Indian maid wrapped in a rug. The "maid" was portrayed as an indolent slow-working employee who cleaned dishes on the

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[43] Kathleen Mark, "A Roof over our Heads," in Charlotte Serber and Jane Wilson, eds., *Standing by and Making Do: Women of Wartime Los Alamos*, Los Alamos, NM: Los Alamos Historical Society, 1988, 36. Kathleen Mark was the wife of physicist and mathematician J. Carson Mark who worked at the Montreal laboratory of the National Research Council of Canada before coming to Los Alamos as part of the British contingent. He then headed the Theoretical Division after 1947 (when the hydrogen bomb was developed). Mark writes, "Nowhere on the ground was there any sustained greenness. Whether out of nostalgia or just a dogged will to succeed, some people tried year after year to create gardens. They first carried up soil from the floor of some canyon and injected it into the yellow or gray dust beside their houses. Then by dint of much watering they sometimes achieved rows of green seedlings and occasionally knew the triumph of actually eating the fruit or, in this case, the vegetables of their labor."

[44] *Ibid*., 39.

window curtains and drank alcohol as her reward. This is one example of the simplistic images that some Los Alamos dwellers fostered of their Indian maids.[45] Toni Michnovicz Gibson and Jon Michnovicz, daughter and son of John Mike Michnovicz who was employed in the Los Alamos photo lab and kept an extensive collection of wartime photographs of the community, added this caption to the following picture of Frisch at the British Mission: "This exaggeration took to the point of hilarity the comparison between regimented routines of the New England, Southern, or Midwestern transplants and the ageless, unhurried rhythms of the Indian natives."[46] The point of the caricature, therefore, was to underscore the discrepancy between the native and imported cultures and this discrepancy largely stemmed from the preconceptions the Hill population had about Native Americans. It can be pointed out that the "maid" is wearing a *concha* belt[47] around his neck, thus displaying a jumbled use of signifiers.

Fig. 17: Otto Frisch dressed as a Pueblo housekeeper at the British Mission Party, 1945. Source: Toni M. Gibson and Jon Michnovics, Los *Alamos 1944-1947,* Images of America, Charleston, SC: Arcadia Publishing, 2005, 103.

Eleanor Jette recalled how shocked she was at the poverty in the Pueblo villages and remarked on the economic gap between the two groups that clearly stresses the type of relation between them: paternalism and sometimes even compassion on the one side and contentment to have a job on the other. She writes, "There was abundant evidence of the poverty that oppressed the pueblos for centuries. I realized that even the meager wages the

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[45] Charlie Masters, "Going Native," in Charlotte Serber and Jane Wilson, eds., *Standing by and Making Do: Women of Wartime Los Alamos*, Los Alamos, NM: Los Alamos Historical Society, 1988, 122.
[46] Toni M. Gibson and Jon Michnovics, Los *Alamos 1944-1947,* Images of America, Charleston, SC: Arcadia Publishing, 2005, 103.
[47] *Conchas*, meaning "shell" in Spanish, are oval pieces of jewelry usually in silver and turquoise attached to braided leather to form a belt. It has become a well-known item of Navajo jewelry.

maids received were riches to most of them."[48] Maids were paid $3 a day, $1.5 for each half day, and used the money to improve their homes or to buy food at the Los Alamos commissary.[49] But the most striking comments about the Indian population concern their value in terms of entertainment: they were "picturesque."

c. "Picturesque" in the Frontier tales of Los Alamos pioneers

To Los Alamos dwellers, especially to the scientists' wives, local workers brought a kind of exoticism that brightened their "expatriate" experience. Ruth Marshak expresses this idea when she wrote, "they [the native New Mexicans] gave a remarkable flair to the place." She also notes the incongruity of "the oldest peoples of America, conservative, unchanged, barely touched by our industrial civilization" participating in the birth of the atomic age: "The Indians and Spanish-Americans of New Mexico were the most unlikely of all peoples to be ushers to the atomic epoch."[50] Similar to Sterling Colgate's, her comment reflects Richard White's analysis of the modern West as an oxymoron. Neither the region nor its people could be modern. The word "picturesque" appears time and again in the narratives of early Los Alamosans such as Elsie McMillan who describes driving on the road to the site "past Black Mesa, which seemed to me like a wonderful sentinel, guarding the Indian pueblos so near. The chamiso and the tumbleweeds going along made this wonderful country even more *picturesque*."[51] Like her, other Hill dwellers rejoiced in the attractive location of the laboratory and used the same adjective to express the charming setting that resembled a painting. Emilio Segré, for instance, chose a small isolated log cabin as his personal, secondary laboratory to measure spontaneous fission. The cabin had belonged to a ranger in a valley a few miles away and was "one of the most *picturesque* settings one could dream of."[52]

Phyllis Fisher, wife of scientist Leon Fisher, describes her first encounter with her house help called Apolonia, "a short, middle-aged, stooped Indian woman from a nearby pueblo"

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[48] Eleanor Jette, *Inside Box 1663*, Los Alamos, NM: Los Alamos Historical Society, 1977, 42. Eleanor Jette was the wife of Eric Jette, Professor of Metallurgy at Columbia University's School of Mines who came to work at the metallurgy lab at Los Alamos to study plutonium. He became Division Leader after the war.
[49] Bernice Brode, *Tales of Los Alamos: Life on the Mesa, 1943-1945*, Ed. Barbara G. Storms, Los Alamos, NM: Los Alamos Historical Society, 1997, 52. Berenice Brode was the wife of Robert Brode who came to Los Alamos from the Applied Physics Laboratory at Johns Hopkins University and headed the Fusing Group.
[50] Marshak, "Secret City," in *Standing by and Making Do*, 3.
[51] Elsie McMillan, "Outside the inner fence," in Lawrence Badash, Joseph O. Hirschfelder, and Herbert P. Broida, eds., *Reminiscences of Los Alamos, 1943-1945*, Dordrecht, Holland: D. Reidel Publishing Company, 1980, 41. Italics added by Lucie Genay. Elsie McMillan was the wife of Edwin McMillan who came to Los Alamos after working at the Berkeley Radiation Laboratory under Ernest O. Lawrence.
[52] Richard Rhodes, *The Making of the Atomic Bomb*, New York, NY: Simon & Schuster, 1986, 540. Italics added by Lucie Genay.

who arrived "rolled up in a bright red blanket and all smiles" and called her "Meesie Feeshah." Her thought on the colorful appearance was that, whether she was a competent worker or not, she would "be worth her wages in entertainment value alone. She is sweet and *picturesque*, and I do love to watch her. If she does nothing more than stand around, I'll find my housework less boring."[53] In a letter to her parents, Fisher also writes of her surprise at discovering that a Pueblo was "clean" and "attractive."[54] The men were not depicted in such detail as they were more taciturn and wore work clothes that were less colorful. Their unusualness came from the way they wore their hair. Berenice Brode uses the same term, "very *picturesque*,"[55] to describe the Indian workers commuting to the Hill, and she emphasizes the entertainment dimension of Indian dances: "whatever else they meant to the Indians, [they] provided good fun and a show for everyone. Our people at Los Alamos provided a good and enthusiastic audience and the Indians liked it."[56]

One can deduce that this constant reference to picture-like charm is evidence of the extent to which scientists and their wives associated encounters and experiences with the iconography of the Old or the Wild West they had seen in tourist brochures, literary works, and in the myriad of epic Western movies released between 1920 and 1940.[57] General Groves called the Los Alamos scientists "prima-donnas" and wanted to keep their morale high, so the picturesque setting and the native entertainment were very useful for that purpose.[58] The symbol of the noble Indian warrior and the belief that Indian adaptability to change was inexhaustible produced descriptions such as the following by Charlie Masters:

> They [the Indians] had a ponderous, undisturbed quality which made us remember that their kind had endured through tribal wars, drought and famine, Spaniards and slavery, Yankees and machines, and that assuredly they would have no trouble surviving the atom-smashers. Unhurriedly and with the minimum of adaptation, they altered the manner of their living temporarily to serve the Hill as maids and waitresses, as

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[53] Fisher, *Los Alamos Experience*, 44. Italics added by Lucie Genay.
[54] Hales, *Atomic Spaces*, 207.
[55] Berenice Brode, "Tales of Los Alamos," in Lawrence Badash, Joseph O. Hirschfelder, and Herbert P. Broida, eds., *Reminiscences of Los Alamos, 1943-1945*, Dordrecht, Holland: D. Reidel Publishing Company, 1980, 157. Italics added by Lucie Genay.
[56] *Ibid*., 154.
[57] The epic Western genre was introduced by James Cruze in 1923 (*The Covered Wagon*) and then by John Ford (*The Iron Horse*) in 1924. Ford chose John Wayne, the actor whose name became associated with the genre, to star in *Stagecoach* in 1939.
[58] Manley, "A New Laboratory is Born," in *Reminiscences of Los Alamos*, 26.

> janitors, firemen, and cooks. But no matter what the nature of their work, their native dignity remained unimpaired.[59]

Likewise, Berenice Brode mentions their "serene dignity," which made them seem "more like guests than servants."[60]

3. Relations and cultural influences

a. The primitivism frenzy

The fascination of Hill dwellers developed for Indian Puebloans made them eager to possess tokens of their cultural discovery. This was the start of a collector's mania. Whether it was by exchange of gifts, a simple touristic transaction, or sometimes through theft and violation of local archeological sites, many Hill dwellers acquired rugs and pottery. An unprecedented demand for such items put a strain on the potters of Santa Clara and San Ildefonso who had to produce their craft in massive quantities to keep up with the growing number of orders from Los Alamos. Charlie Masters called this appetite for regional objects to lay on their fireplaces at home the "going-native process." This form of artistic primitivism was their antidote to the stress of life on the Hill. As part of this process, people sought to revive their common heritage of the West and did so by organizing folk-dancing groups and the Old Timers Square Dance Club that held events mixing people from the pueblos and other groups on the Hill. The people from Los Alamos would go to San Ildefonso to watch Indian dances, and, in turn, they would invite Indians to join their dances. "It was the Yankee invasion all over again," wrote Charlie Masters. They brought wieners, buns, Coca Cola®, record players, electric cords, generators, and guitar and violin players in case a generator didn't work. They shouted instructions to each other in front of their Indian hosts who observed them "silently and sympathetically."[61]

Berenice Brode argues that their influence on the surrounding communities was positive, contrary to others in Santa Fe who accused them of disrupting their traditional life-ways. She learned from her Indian acquaintances that they liked the people on the Hill on the grounds that the relationship was primarily work based. She comments, "It was the first time they had known any group of Anglos who were not primarily interested in their welfare or

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[59] Masters, "Going Native," in *Standing by and Making Do*, 122.
[60] Brode, *Tales of Los Alamos*, 52.
[61] Masters, "Going Native," in *Standing by and Making Do*, 124; 128-9.

curious about their cultural patterns."[62] And that was why the scientists and their families were welcomed as guests rather than as ordinary tourists to their dances. She believed the relations to be the same for those who wove ties with Spanish families. Yet, the presence of Los Alamos visitors did induce some modifications in the rhythm of pueblo life. Following the increased production of pots, the Indians were pushed to organize more dances to meet the demand of eager scientist families who came to relax on weekends. As a result Puebloans also added festivities on Sundays.[63] Hill dwellers suspected that the Indians were inventing new, nontraditional dances for them, knowing that they wouldn't notice the difference. Brode argued that the Pueblos suffered from pressure to remain rigorously traditional for the benefit of tourists and other curious people; but, in their craving for entertaining dances and crafty souvenirs, they participated in the intensification of these pressures.[64]

Brode also countered the attacks of local anthropologists by claiming that the influence was reciprocal. As people in Los Alamos acquired Indian artifacts to decorate their homes, Indians used their wages to buy comfort additions to their homes (e.g., furniture, a bathroom, a new floor). Brode writes, "We just enjoyed the Indians and what they had to offer, just as they enjoyed our Hill life and drinking Cokes in our PX." When she visited the pueblos again in 1948, she noticed the modernization that had taken place. She thought it did not have much to do with Los Alamos but more with the fact that the local residents all earned wages. By that time in fact, they were economically bonded to the Hill. She described the Hill's influence on Santa Fe in the same lines; the new residents got local businesses going and that impetus, despite shortages often caused by their sometimes overwhelming presence, helped the town prosper. Still using western stereotypes, she explains that they had "livened up" this "ancient sleepy town" and doubts "whether [their] presence affected the *picturesque* atmosphere well established in Santa Fe."[65]

A different perspective that can be put alongside Berenice Brode's is that of Phyllis Fisher who describes her gradual adaptation and infatuation with the character of the region. Her husband, Leon Fisher, was an instructor at the University of New Mexico in the Department of Physics and Astronomy for a few months before being recruited by the Manhattan Project. In her book, Fisher refers to her new environment as "almost foreign land." After moving to the Hill and upon making the discovery that the outside world was

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[62] Brode, "Tales of Los Alamos," in *Reminiscences of Los Alamos*, 153.
[63] Fisher, *Los Alamos Experience*, 89.
[64] Brode, "Tales of Los Alamos," in *Reminiscences of Los Alamos*, 154.
[65] Brode, *Tales of Los Alamos*, 84; 138.

culturally rich and worth exploring, she became interested in the art, the philosophy, and traditions of local people. She later pointed out in retrospect that, "while enjoying their entry into our world," the transplants never thought of how their entrance was perceived. For so many, she writes, "it never occurred to us that we were intruders into their world, or that we behaved toward them in a condescending manner. In fact, it was a while before we knew these gracious people as individuals and as friends and not as curiosities." To exemplify this thought, she recalls the day they hiked on Black Mesa, which is sacred to the Pueblo peoples as the mesa conceals sacred natural resources. The hikers became aware of the intrusion once they had reached the summit and saw evidence of a shrine. Fisher wrote a letter about this intruding expedition in which she wondered at their inconsiderate behavior. Although she came to question their behavior toward Native Americans, she concurred with Bernice Brode in saying that the cultural influence between the two groups was mutual. While the Anglo population purchased pottery, learned how to make frybread, displayed Navajo blankets in their homes, and wore Indian jewelry, the native population bought sets of dishes from their Montgomery Ward catalogues, made peanut butter sandwiches, put linoleum on their floors, and wore jeans.[66]

Fig. 18: Black Mesa. Source: "Black Mesa, NM," *Summitpost.org*, SummitPost.org, 2006-2015, http://www.summitpost.org/black-mesa-nm/540030, accessed February 13, 2015.

[66] Fisher, *Los Alamos Experience*, 36; 87; 89.

A visual testimony of these inter-cultural relations was gathered by Toni Michnovicz Gibson and Jon Michnovicz. Among the photographs of the site, buildings, people, and surrounding wilderness, a few pictures feature local people and participants in the Project. Maids, clerks, cooks, and mechanics are seen hopping on one of the military buses that helped them commute to the Hill every day.[67] Cleto Tafoya, a former Governor of Santa Clara Pueblo who was hired as a cook, is shown pouring soup at the East Cafeteria. Residents called him "chief" because his name could not be pronounced or remembered.

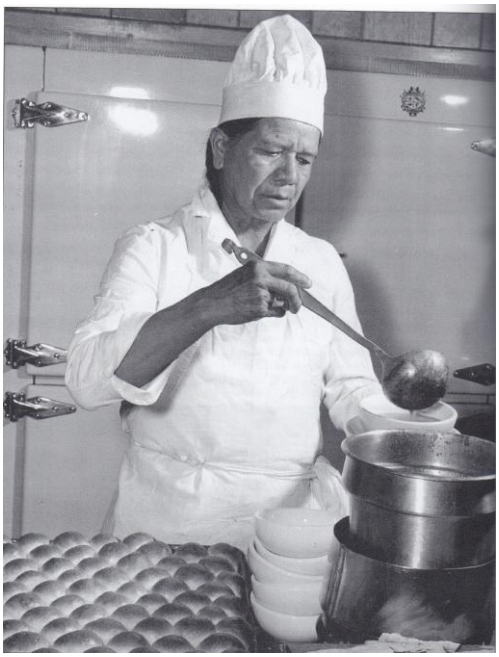

Fig. 19: Cleto Tafoya, former Governor of Santa Clara Pueblo pouring soup at the cafeteria. Source: Toni M. Gibson and Jon Michnovics, Los *Alamos 1944-1947*, Images of America, Charleston, SC: Arcadia Publishing, 2005, 36.

A series of pictures taken during visiting trips and dances in the pueblos and others taken during events organized by the Old Timers Square Dance Club portrays inhabitants of Santa Clara and San Ildefonso—including the famous potter of San Ildefonso Maria Montoya Martinez[68] and her son Popovi Da—dancers performing various traditional dances such as the *Los Matachines* dance and Dance of the Braided Belts, musicians and singers Charlie

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[67] Michnovicz, et al., *Los Alamos 1944-1947*, 17.

[68] Renowned for her black-on-black pottery, Maria Montoya Martinez (ca. 1887-1980) of San Ildefonso Pueblo learned how to make pots from clay with her aunt as a child. She was contacted by Dr. Edgar Hewett, New Mexico archaeologist and Director of the Laboratory of Anthropology in Santa Fe, in 1908, because he had excavated seventeenth-century pottery shards reflecting various pre-historic techniques and asked her to replicate them. Through her experiments and innovative techniques, Maria rediscovered the art of making black pottery. She first associated with her husband Julian, with whom she studied the pottery in display at the Museum of New Mexico in Santa Fe where Julian was a janitor. Then she associated with her sons, Popovi Da and Adam. Even though she became very famous, she spent her whole life in her Pueblo home. She was invited to the White House and received honorary doctorates from the University of Colorado and the New Mexico State University.

Montoya and Miguel Martinez playing drums, and Old Timers member Mrs. Reide square dancing with her Pueblo Indian host.[69]

Fig. 20: Mrs John Reide square dancing with her Pueblo Indian host.

Fig. 21: Enrico Fermi introduced to potter Maria Montoya Martinez.

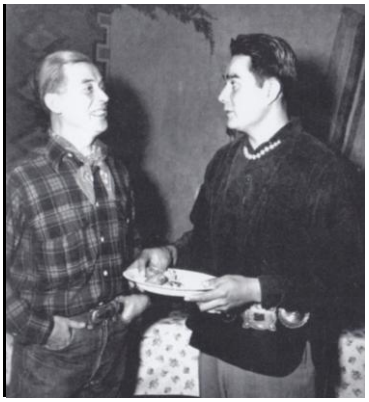

Fig. 22: Popovi Da, Maria Martinez's son, talking to Charlie Robinson, president of the square dance club.

Source: Toni M. Gibson and Jon Michnovics, Los *Alamos 1944-1947,* Images of America, Charleston, SC: Arcadia Publishing, 2005, 90; 85.

In 1995, Katrina Mason published *Children of Los Alamos*, a book in which she collected the reminiscences of men and women who lived in Los Alamos as children and who shared with her their childhood memories of their relationships with the Indian or Hispanic employees on the Hill. Many recalled with affection their Indian caregivers and housekeepers who gave them Tewa names.[70] They remembered the fieldtrips they went on as schoolchildren to see the potter Maria Montoya Martinez. One of the interviewees, Martha Bacher Eaton, linked her appreciation of spirituality to her relations with the Indians. She said, "I don't think that I would have been this kind of a spiritual person if I hadn't run into the Indians. […] There wasn't any way to talk to them, so I had to relate to them on a different kind of dimension—which was possible to do."[71] It was the silence of Puebloans with outsiders but also with each other that inspired her. Another interviewee, Joan Bainbridge Safford, recalled when Popovi Da Martinez, Maria's son, came to his school to perform a buffalo dance and his sister's amazed reaction at his appearance. The dances and the food are some of the children's most vivid memories. Stafford recalled, "That's vivid to me, the dancing, the sound of the chanting, this black bread—kind of like ash. The other thing that made an impression is this kind of powder they put on faces and bodies for some

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[69] Michnovicz, et al., *Los Alamos 1944-1947*, 81-94.
[70] Katrina R. Mason, *Children of Los Alamos: An Oral History of the Town Where the Atomic Age Began*, Twayne's Oral History Series (Book 19), New York, NY: Twayne Publishers, 1995, xi.
[71] Interview of Martha Bacher Eaton in Mason, *Children of Los Alamos*, 54.

dances."[72] One can note the tendency of Anglos to always interpret Indian attitudes positively and with admiration or even idealization.

As others before them, some deeply fell in love with New Mexico and came back to settle there. Jim and David Bradbury, sons of Norris Bradbury, second director of LANL, both came back to work in New Mexico—the former as a physicist and the latter for the New Mexico State Land Office in Santa Fe and then at the environmental restoration at LANL. Jim was friends with a local Hispanic, Secundino Sandoval, and explained that he envied the sense of belonging and the ties to the land that he saw in the extended Spanish-American families. Once he came back, he found that he had been missing these things. He said, "The sense of connection to the land. The space, the confluence of these cultures... The things that stand out in my mind are these relationships with the Indians. They were much more than maids. They were surrogate parents in our case."[73] He reconnected with Isabel Atencio, the Bradburys' housekeeper. His brother David also remained close to Isabel and visited her yearly at San Ildefonso where he brought his first child. He found "Isabel was curing some older person there in the house. You do not go into the house at this time. It's sacred business. […] But they said that it was fine for the child to visit because a child is pure. […] To me that's beautiful because they have their integrity."[74] These oral histories are valuable to get a sense of how people from two different worlds came together in exceptional circumstances and interacted with each other. The early relationships and attitudes can also help explain on what grounds social relations were set in the town of Los Alamos and at the Laboratories.

Finally, one last relation must be recounted here. Edith Warner is remembered for the role she played in providing for the well being of the Project's top scientists. In the spring of 1943, Oppenheimer began visiting her house at Otowi Bridge on a weekly basis. He had stopped there many times since 1937, but now it became a way for him and a select few to have relaxing dinner parties away from the frenzied work atmosphere on the Hill. Only "the cream of the crop," so to speak, could enjoy these dinners; thus, going there regularly showed status. In the simplicity of the house and its owner's way of life, the scientists found a counterbalance to the omnipresent and omnipotent technology they were working with daily in their laboratories. Edith Warner considered her war job was to feed the hungry scientists; however, although she grew close to Niels Bohr, she never stayed to talk with them before or

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[72] Interview of Joan Bainbridge Safford in Mason, *Children of Los Alamos,* 51.
[73] Interview of Jim Bradbury in Mason, *Children of Los Alamos,* 121.
[74] Interview of David Bradbury in Mason, *Children of Los Alamos,* 157.

after dinner.[75] From time to time, Mrs. Warner and her Indian companion Tilano would attend the parties where scientists and Native Americans socialized. In 1946, she learned of a plan for a new bridge at Otowi that would force her to leave; her friends built a new house for her at San Ildefonso. Her friend and writer, Peggy Pond Church, writes about her relations with her Indian friends, and her comment clashes manifestly with the attitudes mentioned above: "She resisted the temptation that many white people feel to idealize the Indians, the effort to find in this ancient culture all that seems lacking in our own."[76] In that way, Mrs. Warner was the opposite of the pioneering scientists and their families who perceived Indian employees at Los Alamos as perfect as if immortalized in a painting. Whatever their job, however well they did it, the picturesque nature of their appearance satisfied the curiosity of their new neighbors.

After the War, as Los Alamos continued to grow, the fascination of its inhabitants for the idyllic cultures surrounding them did not subside. Words were even borrowed from the pueblo culture to be incorporated into the Los Alamos scientific culture. *Kivas*, for instance, came to designate the laboratories in Pajarito Canyon where scientists conducted criticality research[77] or where they "tickled the dragon's tale" by moving blocks of fissile material close enough together to start a chain reaction, allow neutrino counts, and then separate them before their explosion. Later, the choice of names for Los Alamos streets also reflected the population's infatuation with the surrounding pueblos: San Ildefonso Lane, Tewa and Santa Clara Place or Navajo and San Juan Place. Taking the cultural uncanny to its extreme, during Operation Redwingat at the Bikini and Eniwetok atolls in the summer of 1956, the seventeen nuclear and thermonuclear explosions were each named after a Native American people including four tribes living in New Mexico—the Zuni, Apache, Navajo, and Tewa. The Tewa device detonated on a barge produced radioactive fallout that contaminated Bikini, Enewetok, and over 2,000 square miles (3,200 square kilometers) of ocean.[78]

b. The local perspectives

Dorothy Hillhouse was teaching elementary school in Santa Fe when Oppenheimer went to recruit her in the spring of 1943. She reminisced about one of her students, a little girl whose father had been with the Ranch School and who had spent her life on the mesa. Once, in class, they talked about the Lincoln Highway in the southeastern part of the state. Mrs.

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[75] Warner, *In the Shadow of Los Alamos*, 40.
[76] Church, *The House at Otowi Bridge*, 107.
[77] This was after Harry Daghlian's accident in 1946.
[78] Masco, *The Nuclear Borderlands*, 123.

Hillhouse assumed that the girl knew about it, that her world went beyond northern New Mexico and that she had a visual sense of it; however, the child had none whatsoever. The teacher asked, "Tell me about all the places you've been," and the girl replied she had been to Española and Santa Fe, and she thought she might go to Albuquerque in the future. Hillhouse commented, "Here was this little girl who had a concept of the Ranch School, Española, and Santa Fe, attempting to go across the Lincoln Highway with these children from around the world."[79] The fact that the teacher assumed that this little girl knew more about the world than she did, demonstrates the type of assumptions that the special community of Los Alamos could make and the shock of their arrival as it broke the isolation some of the locals had been in.

Thanks to memoirs, autobiographies, pictures, and the work of historians such as Katrina Mason, we have acquired a rich knowledge of the early scientific pioneers' perspective and view of the world and people surrounding them at Los Alamos. Oral history projects such as "Voices of the Manhattan Project," a joint project by the Atomic Heritage Foundation and the Los Alamos Historical Society, contribute to the creation of a public and well-supplied archive of recollections of Manhattan Project veterans and their families.[80] These accounts of scientists and especially those of their wives enable us to have a clearer understanding of what their feelings were toward Pueblo Indians or Hispanic local residents. Only rarely do published accounts by these local residents provide an indication of what *their* feelings were toward the newcomers and toward Los Alamos. Katrina Mason did write about the recollections of two local children: Severo Gonzales, whose family had homesteaded on the Pajarito Plateau from the earliest days, and Dimas Chavez from Torreon, a village behind the Sandia Mountains.

Gonzales graduated from Los Alamos High School in 1948. After working for the LARS, his father, Bences Gonzales,[81] turned to work at the commissary in Los Alamos; this job allowed them to stay on the mesa even after they had to give up their land to the Army. Severo shared his impression of the people who came in the early times of the Manhattan Project with humor:

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[79] Mason, *Children of Los Alamos*, 48.
[80] Atomic Heritage Foundation and Los Alamos Historical Society, "Voices of the Manhattan Project," Washington, DC: Atomic Heritage Foundation, Los Alamos, NM: Los Alamos Historical Society, 2012, http://www.manhattanprojectvoices.org/, accessed May 2, 2014.
[81] See Part 1, Chapter 3, The Los Alamos Ranch School for the history of the Gonzales family on the Pajarito Plateau.

> [they thought] they were going [to a place] where everything was wild, [where] you might be shot with a bow and arrow by an Indian. [...] We were poor but we always had everything we wanted. A lot of the students [when] they were graduating, they'd give us their tennis rackets, balls, skates, hockey clubs, pucks... [...] Boys that were going back East, they had money—real nice jackets these boys would give us. […] If Los Alamos wasn't what Los Alamos is, this whole valley would be about a fourth of what it is. Santa Fe would be half of what it is. It would be selfish to say I wish I was still homesteading.[82]

Dimas Chavez recounted how his father, a farmer and rancher in Torreon, had to go look for a job as a laborer in Santa Fe after most of the crops had withered in the early 1940s drought. His father had an eighth-grade education and his mother a sixth-grade education. They had five children. His father found work and the family moved to Los Alamos in August 1943. His father first worked as a heavy-duty operator and then was involved in the water and sewage treatment of Los Alamos. Dimas Chavez did not speak English when he arrived there; he remembered, "For some reason in the early years, there were few Spanish-speaking students or residents. There were numerous Spanish-speaking personnel who worked there, but they all commuted from down in the Rio Grande valley."[83] But his mother made a deal with the scientists' wives that she would teach them how to cook New Mexican dishes if they would teach her son English. After graduating in 1955 and leaving to Colorado to be a telegrapher, Chavez returned to Los Alamos, took a job at Metzger's gas station, and then became a truck driver for the Lab. He explained being traumatized by the hardships of going to school with smart children because he had to work twice as hard to keep up; he became afraid of this academia atmosphere and did not go to college until 1956. Finally, in 1972, he went back to work at the Lab.[84]

At the same time Katrina Mason published these testimonies, other interviews were being conducted in the Española valley by members of the University of New Mexico Oral History Project, "Impact Los Alamos." Most of the interviewees started working at Los Alamos after the War—after the Zia Company became the Lab's principal subcontractor in

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[82] Interview of Severo Gonzales in Mason, *Children of Los Alamos*, 58-59.
[83] Interview of Dimas Chavez in Mason, *Children of Los Alamos*, 165.
[84] Dimas Chavez, Interview by Cindy Kelly, Washington, DC, 13 February 2013, Atomic Heritage Foundation and Los Alamos Historical Society, "Voices of the Manhattan Project," Washington, DC: Atomic Heritage Foundation, Los Alamos, NM: Los Alamos Historical Society, 2012, http://www.manhattanprojectvoices.org/oral-histories/dimas-chavezs-interview, accessed May 2, 2014.

1946. The few people who remembered the wartime years, whether they were workers hired by the Laboratory or children whose parents worked for the Project, talked about Los Alamos in a comparative perspective; there was a "before Los Alamos" and an "after Los Alamos." Contrary to scientist immigrants of the Project who recalled the novelty of the people and environment surrounding them, locals' memories do not focus on the people but on how drastically their life was changed. Similar to the Indian maids who simply showed their satisfaction to have a job close to their pueblo village, other local employees saw the Lab's presence as an economic opportunity.

One of the recurrently mentioned changes was that New Mexicans no longer had to find work in other states but could stay at home with their families. This was a major difference compared to the regular work migration family members had to go on in order to supplement their meager incomes from the land. The children could see their parents every day. Bernadette V. Cordova, for instance, was a child when her father began working in Los Alamos during the War, and the images she recalled was him taking "the G.I. bus to the Hill" and the chocolate bar that she would get once a week on Fridays.[85] Jose Benito Montoya recalled his father was a carpenter on the Hill and boarded there but could come back home on Sundays. Jose was accustomed to him being away because he had worked in Colorado before the Manhattan Project; but they began leading a better life after the arrival of the Lab. Instead of making their pants and shirts, they could go to the store and buy clothing.[86] Old-timers remember indeed how the Army trucks would travel a fifty-mile (80 kilometers) route through Chimayó, Española, San Ildefonso, Santa Clara, and Tesuque to pick up blue-collar workers on the plazas of Pueblo and Hispanic villages in the early morning and take them back after a ten-hour workday. Not having to pay for rent or transportation was another advantage of living so close to the Project. Joe G. Montoya lived in the barracks when he started working in Los Alamos in the summer of 1944; but, in 1945-46, he started commuting with his friends from the valley, drinking beer on the way down.[87]

Some focused on the wages they brought home as they were considerably higher than the standards of the region. The increase made a huge difference according to Richard Cook who was at the head of the Bond mercantile company, the largest employer in Española at the time. He supplied Los Alamos contractors with lumber, plywood, sand, and gravel for all their

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[85] Bernadette V. Cordova, Interview by Peggy Coyne, Española, El Wache, NM, 29 February 1996, "Impact Los Alamos Project."
[86] Jose Benito Montoya, Interview by Steve Fox, Pojoaque, NM, 8 August 1994, "Impact Los Alamos Project."
[87] Joe G. Montoya, Interview by Carlos Vásquez, Cundiyo, NM, 29 July 1994, "Impact Los Alamos Project."

construction work; before them, there was no market for this kind of business in the area. Many observers in the valley concurred to say the economic spin-off for local businesses was impressive. Los Alamos was a financial goldmine for them. Cook saw the effects of the Los Alamos payroll in the valley from his position because now people could buy better houses and insure a better education for their children who then would not have to go away to find jobs. Like Severo Gonzales, Cook said, "If it weren't for Los Alamos and the payrolls providing the economic base that is what keeps everybody glued together, I don't know what we would have done… We would probably be a sleepy little town like we were number of years ago." The use of the term "sleepy little town" is interesting as it shows that some Westerners also integrated some of the popular images and signifiers of the mythical West. When talking about the first people living on the Hill, Cook admits the newcomers seemed to feel superior because "they were very proud to be Ph.D.s and would look down on people of the valley, considering them a little bit inferior but they were a very small minority. And even if they tried to impress valley people, in most cases, their practical knowledge wasn't as good as their book learning, so I think most people ignored it."[88]

Delfido Fernandez's opinion aligns with Cook's. He insisted on the fact that the communities around Los Alamos, Chimayó, Taos, Española, Santa Fe all benefited from their proximity with the Lab. He observed that people's happiness came from the fact that they did not have to go away from home to work in the fields or in the mines. If some discrimination always existed, it was because *Hispanos* were the minority on the Hill. Fernandez commented "it was natural Anglos were leaders: that was the way it always was. Anglos thought they were superior."[89] The first generation of workers had experienced the hardships of an agrarian and farming economy, the necessary separations to find a way to supplement their small income, and the general poverty in the villages of northern New Mexico. Then, they also experienced the arrival of the Lab, which brought them back to their homes, gave them a way out of the backbreaking days of subsistence farming on a worn-out land, and helped them purchase new comforts for their houses or cars for easy transportation. In their descriptions, Los Alamos was the savior of their valley and a godsend change in their lives because their lives became more stable and more secure. This knowledge was passed on to their children.

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[88] Richard Cook, Interview by Steve Fox, Española, NM, 8 August 1995, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CD 31.
[89] Delfido Fernandez, Interview by Troy Fernandez, Chimayó, NM, 27 February 1994, "Impact Los Alamos Project."

Even those who were too young to recollect memories of their fathers leaving to the mines in Arizona know that, were it not for Los Alamos, they would have had to leave too. Senni A. Gallegos talked of this heritage. As child, she did not have a friend whose parents did not work up in Los Alamos, mostly in the janitorial service or cleaning people's houses. She asserted,

> If Los Alamos hadn't been there, who knows what would have happened to us? We would probably have to move. Everybody working there were very fortunate that they were able to remain in the state. We could have made gardens and be self-sufficient by selling our produce, but I think that people thought that was too difficult, too hard, like slaving yourself to death. One of my neighbors couldn't get a job up here, so he had to go away in California. Before a lot of people did that: leaving their wives behind. And when Los Alamos came here, that's when people stabilized.[90]

On the other hand, interviewee Genaro Martinez recalls with bitterness his days as a blue-collar worker at Los Alamos. In a stratified community where social classes were based on the education level of each person, his not having any diplomas soon became an issue. Martinez started working at Los Alamos in 1942, when he was fifteen, as a laborer and truck driver transporting coal and wood, for about fifty cents an hour. His desire was to be hired as a carpenter since he had acquired the skills while building houses with his father, but he could not secure this job. He remembered, "I didn't get a good job or a good salary because I didn't have the education. I saw people from all over the U.S., they were not educated but they were Anglos and they would get the jobs. […] I worked as a janitor for 25 years. I couldn't move up without that high school diploma. We were the lowest pay."[91] He organized a union in 1958 to defend their pay rights and denounce the treatment they had from some of their supervisors.

Unfortunately, no records exist of the experience of Pueblo Indian maids and workers of the Lab's early years. While Hispanic workers are well represented in the series of interviews upon which this research is based, Pueblo Indian workers are conspicuously absent. In his introductory speech at the "Impact Los Alamos Symposia for the Community" in Albuquerque, Carlos Vásquez, Director of the University of New Mexico's Oral History

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[90] Sennu A. Gallegos, Interview by Carlos Vásquez, LANL, NM, 3 March 1991, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 45-46.
[91] Genaro Martinez, Interview by Peter Malgren, Chimayó, NM, 16 November 1995, "Impact Los Alamos Project."

Program and principal investigator of the "Impact Los Alamos Project,.," explained that the two weak points in their research were the representation of women and of Native Americans.[92] In an ensuing article presenting the project in the *New Mexico Historical Review*, he further accounted for the absence of Native American interviewees: "Unfortunately, local Pueblo Indians were extremely reticent to be interviewed. In recent years, the Department of Energy and other government agencies conducted numerous interview projects among the Pueblos. Perhaps, the Pueblos identified our work with those efforts."[93] The Project team had in fact observed that people were nervous to talk about Los Alamos.

During my own fieldwork in the fall of 2012 and 2013, I made the same observation that Los Alamos was a very sensitive topic. Among the people I met, Darryl Martinez, a resident of San Ildefonso Pueblo, talked about his grandmother, Philipita Torres, who worked as a maid in Los Alamos in the 1940s. Smiling, he mentioned at the start of the conversation that his grandmother had told him that the Army trucks would come pick her up on the plaza next to the large tree, that she enjoyed working there, and that the people she cleaned the house for treated her nicely. She would invite them to watch the pueblo dances. She worked there until the end of her professional life. When Darryl Martinez went on to talk about Los Alamos in the 2010s, he insisted on the fact that it was no longer the same as at its beginning because fewer people could work there. Now it had become more difficult to get a job. According to him, the members of later generations no longer worked for the families or the contractors but applied for positions at LANL; however, these jobs were now scarce and required more qualifications that were more difficult to obtain. His uncle, for instance, worked in the Tribal Relations Department at the mail office where he oversaw the relations between the Lab and the surrounding tribes. According to Mr. Martinez, most people in his community would agree that the Lab has benefited in terms of employment, but that employment was much easier in the early years.[94]

Local communities were the almost exclusive and privileged beneficiaries of an abundant employment source when the Project started; but, once the secret town opened its

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[92] Carlos Vásquez, University of New Mexico Conference Center, Albuquerque, 7 March 1996, "Impact Los Alamos Project," Center for Southwest Research, University Libraries, University of New Mexico, MSS 821 Box 2 CD50.
[93] Carlos Vásquez "Impact Los Alamos: Traditional New Mexico in a High Tech World, Overview of Project and Symposia," *New Mexico Historical Review*, Vol. 72, January 1997, 7.
[94] Darryl Martinez, Interview by Lucie Genay, Governor's office of San Ildefonso Pueblo, NM, 17 September 2013.

gates to the rest of the world, the abundance was replaced by increasing competition. This evolution, pointed out by Darryl Martinez, also reveals wistfulness for the blessed time of job profusion that is reflected in the interviews of old-timers from the Española valley mentioned above. The other aspect of the wartime years that should be underscored here is the nature of the positions that were unofficially reserved for locals. They were a category of maintenance, low-skill, and sometimes menial jobs that the poverty-stricken population, eager to find a way to remain with their families, was grateful to have access to. As a result, persons of importance in their communities, such as former Governor of Santa Clara Pueblo Cleto Tafoya, were seen pouring soup at the Los Alamos cafeteria (see Figure 18).[95]

The sense of inferiority, as expressed by Richard Cook and Genaro Martinez (and others who will be mentioned in further chapters), stemmed from the early separation between the type of jobs reserved for locals and those reserved for highly-educated outsiders. From the early days of the Manhattan Project local workers, be they Hispanic, Native American, or sometimes Anglo, acquired an inferior status and were considered as inferior by Project scientists because the principal criteria separating social classes in the peculiar scientific community were the level of education and the number of degrees or even Nobel Prizes. At school, children had different opportunities depending on their scientist fathers' clearance levels. One of Katrina Mason's interviewees, Nella Fermi Weiner, recalled that

> High school was a mixed bag. [Los Alamos] was a very stratified society. [...] There was a real educational gap. [...] There were the kids of the physicists [and the other kids]. We were not necessarily more intelligent but we certainly had more opportunities than these other kids. We put it down on our intelligence, but looking back I'm inclined to say we really had better chances... not only have gone to better schools but also having parents who were, to say the least, literate.[96]

As the Laboratory grew and the scientific conquest of the rest of the region was launched, the same relational and work patterns were repeated in the new facilities. As new generations of New Mexicans more highly-educated than their parents aspired to better positions at the Laboratories, they faced the difficulty of challenging this established order.

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[95] See Figure 18.
[96] Interview of Nella Fermi Weiner in Mason, *Children of Los Alamos*, 78.

CHAPTER 3: TRINITY AND THE WAR'S END

1. The Trinity test viewed from a local angle

a. Background

The installation of military bases and the acquiring of vast portions of land in New Mexico in the early stage of World War II became major assets to the Manhattan Engineering District after the Laboratory was established at Los Alamos. First, the Army could rely on readily available military help if necessary for security, protection, or transportation. The true value of the new militarized landscape, however, was revealed once it was made clear that the plutonium device would have to be field-tested before considering its use in warfare. The uranium device was never tested prior to Hiroshima. The difference lay in the nature of the two materials and in the complexity of the detonation system. Until the summer of 1944, the Los Alamos scientists focused their research on a design for the fission bomb that resembled a gun-type device. This design was straightforward and reliable; it would be used for the uranium bomb, Little Boy, detonated at Hiroshima: a piece of subcritical metal—fissile uranium—would be fired conventionally into another subcritical mass to create the explosion and a chain reaction. The gun-type design was initially also preferred to the creation of a plutonium bomb that was dropped on Nagasaki. The quantities of uranium necessary to build an atomic weapon were astronomical, and supplies were limited. However, because plutonium is a man-made material, it seemed more advantageous to design a weapon using the most abundant material.

The research on a gun-type plutonium weapon was called the Thin Man Program and started at the beginning of 1944 when the material became available for research. In the spring of the same year, the scientists discovered that the plutonium produced in reactors had a higher spontaneous neutron-release rate that would inevitably result in pre-detonation. Thin Man was consequently abandoned on July 17. The Laboratory scientists then began research on the implosion method which would be much less certain: a fissile mass would be placed at the center of the device and surrounded by high conventional explosives which, by compressing the core with shockwaves when they detonated inward, would achieve criticality and explode. This technique, if successful, offered prospects of building an atomic arsenal much faster than solely using uranium, but it was riskier and more obscure. After months of "trickling the dragon's tail"—as the experiments on criticality were nicknamed—the necessity for an ultimate experiment became evident. While scientists were confident enough that the

gun-type fission weapon would work and did not need any field-test, the plutonium implosion device would have to be tested. The early plans for the test began when the gun technique was still under consideration in March 1944, when the Ordnance Engineering Division formed a group led by Harvard physicist Kenneth T. Bainbridge to prepare a field test. The group shifted to the Explosives Division when implosion became the focus of the Lab's efforts in mid-1944.[1] But the real test planning did not occur before late-1944 and early-1945 as too many uncertainties remained in detonation research. The group focused on instruments, on solutions if the plutonium sphere failed to explode and spread—the huge cylinder dubbed jumbo was designed to that end—and on choosing a site location.

This was the moment when the recent militarization of the American West and the condemnations of land turned out to be so convenient. While looking for an adequate location, General Groves imposed just one selection criterion in accordance with his previous concerns about the West and the problems he might encounter with Secretary of the Interior Harold L. Ickes, who had jurisdiction over the Bureau of Indian Affairs.[2] Throughout the testing operations, Groves was particularly attentive to possible legal outcome such as being sued for damages on civilian structures, and the dealings with the local ranching population followed his line of thought.[3] Kenneth Bainbridge, Trinity Test Director, was in charge of choosing a site; he looked for a place with a flat terrain and good rail transportation available, at a reasonable distance from Los Alamos that would enable workers and supplies to travel relatively easily, as distant from any human presence as possible for secrecy and security reasons and to make sure people could be evacuated rapidly, and to reduce the number of witnesses—to the light, sound, or shock wave—to a minimum.

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[1] Barton C. Hacker, *The Dragon's Tail: Radiation Safety in the Manhattan Project, 1942-1946*, Berkeley, CA: University of California Press, 1987, 74.

[2] Groves, *Now It Can Be Told*, 289. John Collier, Commissioner of Indian Affairs appointed by President Franklin D. Roosevelt in 1933, was also an obstacle. His vision became known as the "Indian New Deal" in a 1934 article in the *Literary Digest*. That same year, Collier supported the Indian Reorganization Act which allowed tribal self-government and consolidated individual land allotments back into tribal hands—a reversal of the 1887 Dawes Act. Collier's first encounter with Native Americans had occurred in Taos in 1920 where he found a way of life he called the "Red Atlantis," that combined individual and collective needs and maintained traditional values. Collier was aware of the importance of land in Indian culture; he writes in his annual report, "So intimately is all of Indian life tied up with the land and its utilization that to think of Indians is to think of land. The two are inseparable. Upon the land and its intelligent use depends the main future of the American Indian." United States Department of the Interior, "Annual Report of the Secretary of the Interior for the Fiscal Year Ended June 30, 1938," Washington, DC: United States Government Printing Office, 1905, 210, https://archive.org/details/annualreportofse8231unit, accessed May 15, 2014.

[3] Hacker, *The Dragon's Tail*, 85.

David Hawkins, philosopher of science and assistant to Oppenheimer who became the official Manhattan Project historian, believed he was the first to suggest the region of *El Jornada del Muerto* for the test. He was born in El Paso, Texas, but grew up at La Luz near Alamogordo where he would wander "all over the Tularosa Basin, one way or another, looking for minerals, looking for excitement, looking for rattlesnakes, looking for adventure of the desert kind," as he remembered in an interview in 1995.[4] Hawkins and Oppenheimer met at the University of California, Berkeley, and their common interest in leftist politics; New Mexico drew them closer. When the Army was looking for a test site, Hawkins recalled exploring the isolated *Jornada del Muerto* as a child.

Three of the other options that were considered for the test beside the *Jornada del Muerto* Valley were situated in New Mexico: the Tularosa Basin, the lava beds—now the El Malpais National Monument—south of Grants, and an area between Cuba and Thoreau. The other possible locations outside of New Mexico were an Army training area in the Mojave Desert; San Nicolas Island in California; Padre Island, Texas, in the Gulf of Mexico, and San Luis Valley in Colorado. The training area in the Mojave Desert came first; but, when General Groves realized that the commander of the Californian training area was a man he despised, General George Patton, to whom he would have to ask permission, he decided on the second choice, the *Jornada del Muerto,* in late August 1944.[5]

The choice of the codename "Trinity" has been attributed various origins. According to New Mexico historian and specialist of the Trinity test Ferenc Morton Szasz, Robert W. Henderson of the Explosives Division affirmed that, while they were trying to find a way to haul the huge steel cylinder Jumbo from the railway to Ground Zero, Colonel Lex Stevens commented on the name of the railroad siding called "Pope's Siding." Stevens "remarked that the Pope had a special access to the Trinity, and that the scientists would need all the help they could get to move Jumbo to its proper spot."[6] Another historian, Robert Jungk, thought the name "Trinity" came from a turquoise mine in the Los Alamos area, "which had been laid under a curse and, therefore, abandoned by the superstitious Indians." He also mentioned the

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[4] Larry Calloway, "N.M. Gave Birth To Atomic Bomb," *Albuquerque Journal,* Albuquerque, NM, 19 September 1999, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 9, Folder 11, Trinity Site Recollections, 1945-1999.

[5] Gregory Walker, "Trinity Site," *Trinity Atomic Web Site*, Gregory Walker, 1995-2005, http://www.abomb1.org/trinity/trinity1.html, accessed May 16, 2014.

[6] Ferenc M. Szasz, *The Day the Sun Rose Twice: The Story of the Trinity Site Nuclear Explosion, July 16, 1945*, Albuquerque, NM: University of New Mexico Press, 1984, 40.

fact that three bombs were under construction and that they formed a kind of "hellish trinity."[7] But the most recurrent story is that Oppenheimer thought of the codename. Journalist and test witness Lansing Lamont reports that Oppenheimer selected it after reading a sonnet by British poet John Donne, which referred to the "three person'd God."[8] Finally, Szasz estimates that the most likely interpretation of the name came from historian Marjorie Bell Chambers who maintained that Oppenheimer's use of the Trinity should be understood as the Hindu concept that brings together the gods Brahma (the Creator), Vishnu (the Preserver), and Shiva (the destroyer). As Oppenheimer was known for having taught himself Sanskrit and quoted a line from a sacred Hindu text, the *Bhagavad-Gita*, Chapter 11, verse 32 "I am become death, the shatterer of worlds,"[9] after witnessing the blast, this explanation appears as the most convincing. It is also consistent with the tendency among atomic scientists and scholars of appealing to mythic images and characters when describing atomic power.

Despite its second place, the site had the advantage of closeness with Los Alamos (230 miles or 370 kilometers), a suitable weather, seclusion, and the fact that it already belonged to the military. An apparent easy access to the land ranked high on the list of the site's qualities because all General Groves had to do was to ask the Air Force, which controlled the Alamogordo Bombing Range then connected to the Alamogordo Airfield, for permission to use an 18-by-24-square-mile portion (29 by 39 square kilometers) of the desert. That was without counting the issue of local desert dwellers: the ranchers who leased their lands to the Army until the end of the War. The test necessitated forbidding all grazing permits around the site, and some herders left cattle on the range out of defiance. Gerard J. DeGroot, author of *The Bomb*, calls these animals "the first martyrs of the atomic age."[10] Some of the ranchers' houses earned national fame in their role during the Trinity operation. For example, the bomb was assembled at the ranch house of George McDonald two miles (3 kilometers) south of Ground Zero, and the soldiers were housed at the Dave McDonald ranch, his brother—father of interviewee David McDonald.[11] The McDonald Ranch is now part of the memory of

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[7] Robert Jungk, *Brighter Than a Thousand Suns: A Personal History of the Atomic Scientists*, New York, NY: Harcourt Brace Jovanovich, 1958, 197.
[8] Lansing Lamont, *Day of Trinity*, New York, NY: Atheneum, 1965, 70. "Holy Sonnet 14" that reads, in part, "Batter my heart, three-person'd God, for you,/ As yet but knock, breathe, shine, and seek to mend;/ That I may rise and stand, o'erthrow me, and bend,/ Your force to break, blow, burn, and make me new…" John Hayward, ed., *John Donne: Complete Poetry and Selected Prose*, New York, NY: Random House, Inc., 1949, 285.
[9] James W. Kunetka, *City of Fire: Los Alamos and the Atomic Age, 1943-1945*, Albuquerque, NM: University of New Mexico Press, 1979, 170.
[10] Gerard J. DeGroot, *The Bomb: A Life*, Cambridge, MA: Harvard University Press, 2005, 56.
[11] Bartimus, et al., *Trinity's Children,* 11.

Trinity, often referred to as an abandoned ranch without mentioning the 1942 eviction. The house is present in all exhibitions about the first atomic explosion and has been transformed into a museum where visitors make a first stop before going to Ground Zero. During the operations, the McDonalds "returned periodically, before and after the test, to tend their property and keep up their claims."[12]

But the local population and authorities did not only participate in the Project by providing the land. The town of Albuquerque, for instance, participated by receiving vast quantities of material that would then be used to conduct and monitor the experiment. These shipments were addressed to a Mr. J. E. Burke,[13] Department of Physics, the University of New Mexico, but the supplies then were freighted by train to a place on the outskirt where Army engineers collected and trucked them down to the site.[14] Secondly, a local business, New Mexico's largest construction corporation run by Ted Brown in Albuquerque, was chosen to oversee the construction of the site; two hundred workers were brought to build roads and temporary dwellings. A real frontier town mushroomed in a few months, and by April of that year, the place was transformed.[15] In one year, the site in the desert grew into a five-hundred people community; by mid-July 1945, the site housed 250 scientists and technicians, and an equal number of soldiers.[16]

Bainbridge's group organized a rehearsal in May with a hundred tons of TNT and plastic tubes containing fission products to simulate radioactivity, but the full-scale test would be forty to fifty times more powerful. The mighty detonation on July 16th exceeded all expectations; its magnitude was described in countless metaphors and superlatives. As the test neared, anticipation and stress reached such a level among participants that Groves requested psychiatrists "to assist scientists in keeping a mental equilibrium."[17] Some became famed for their attempts to release the general pressure such as Enrico Fermi who organized a betting pool on whether the bomb would ignite the atmosphere, destroy New Mexico, or devastate the whole planet. At 5:30 in the morning of July 16, 1945, an atomic light illuminated the New Mexican sky, the thunder of the explosion reached a group of scientists' wives at the

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[12] Hales, *Atomic Spaces*, 302.
[13] J. E. Burke could stand for Jeremiah E. Burke who was a superintendent of the Boston Public school. A school named after him opened in 1934 in Dorchester, MA. But it could also be a fictitious name referring to the short form of Albuquerque: "Burke."
[14] Simmons, *Albuquerque, a Narrative History,* 367.
[15] Hales, *Atomic Spaces*, 307.
[16] Hacker, *The Dragon's Tail*, 75.
[17] Gerard H. Clarfield and William M. Wiecek, *Nuclear America: Military and Civilian Nuclear Power in the United States, 1940-1980*, New York, NY: Harper & Row, 1984, 51.

Laboratory, and the now strangely familiar mushroom cloud towered over the desert. Many observers have offered their accounts of the birth of the atomic age. Among the repeated nouns and adjectives used in their description, "beautiful," "terrifying," "awe," and "horror" probably come first. The successful test was met with elation by the group of men and women who had dedicated months to years of their lives to attain that objective. Following President Harry S. Truman's broadcasted revelations about how New Mexico had contributed to the favorable outcome of the scientific battle, residents in the state shared in the nation's pride for having put an end to World War II. The knowledge that the critical phase of the Manhattan Project had occurred in their state gave the local population an unprecedented sense of belonging to the Union. The initial significance of the Project for New Mexico was, therefore, defined by a sense of patriotism and hope for new opportunities.

b. Local witnesses of the Trinity test

The scientists' reactions varyingly attempted to express the significance of the awe-inspiring event. The two most famous examples are Oppenheimer quoting the Bhagavad-Gita and Kenneth Bainbridge declaring "we are all sons of bitches." General Thomas Farrell, Deputy to General Groves, summarized the effects of the atomic spectacle in a list of adjectives, "unprecedented, magnificent, beautiful, stupendous and terrifying," and reasserted, like many others, the exceptional and unique nature of the event. Farrell declared, "No man-made phenomenon of such tremendous power had ever occurred before."[18] Their reactions have been repeatedly quoted, but they were only the most famous witnesses to the blast. Soldiers who were present recalled the day of the explosion; one of them, Max Coan, has associated that moment with his attachment to the region:

> The magnitude of the occasion etched more deeply the vivid picture of New Mexico in my memory. […] Now an 'exile' from New Mexico, the atomic bomb debut is just another one of the things I enjoy recalling about the Land of Enchantment. I can't remember when I first started liking New Mexico, but it must have been that first day when I stepped off the troop train to the hot platform of the railroad station in the quiet little city of Alamogordo.[19]

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[18] Gregory Walker, "Trinity Atomic Test July 16, 1945," *Trinity Atomic Web Site*, Gregory Walker, 1995-2005, http://www.cddc.vt.edu/host/atomic/trinity/tr_test.html, accessed May 16, 2014.
[19] Coan, "Exile from Enchantment," *New Mexico Magazine*, 21.

Apart from soldiers and scientists, other less expected individuals witnessed the test. Up to 250 miles (80 kilometers) away from Ground Zero, American citizens heard, saw, or felt the explosion. In Gallup, 235 miles away (278 kilometers), houses shook and windows blew out. Years later, various New Mexican newspapers published the testimonies they had been banned from publishing on that day. The MED had planned the release of articles in the press that would justify the event to the public without risking any security breech on the real nature of the explosion. Defense Department officials had prepared six different stories, including a scenario in case of civilian deaths in the region of Alamogordo. Newspaper publishers of several major local publications received the visit of Federal Bureau of Investigation (FBI) agents on the next day to suppress all stories that could potentially raise questions about the test.[20] Meanwhile the radio in Albuquerque broadcasted the news that an ammunition storage site had exploded in the area of Alamogordo. As the test had been successful, without any incident, the simplest explanation was used.[21]

The news made the front page of some newspapers, but others such as the *Roswell Daily Record* published only a small article under the headline "Ammunition Blasts at Magazine on Alamogordo Field." The newspaper believed the light was caused by the descent of a meteor and had been preparing to publish the headline "See Great Blaze of Light in Sky," a fact which might explain why they decided to publish the Army's official story in a much less sensational way. The news was kept out of the media in the eastern part of the country, and most of southwestern residents believed the official version. Nevertheless, New Mexican witnesses later claimed that they were not fooled by the cover story that did not make any sense to them. Newspapers and wire services were swamped with questions from local observers anxious to know what had happened or warn that something had happened. Near

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[20] Dennis Eskow, Science Editor, "How They Hid The Bomb," *Popular Mechanics*, New York, NY, August 1985, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 9, Folder 11, Trinity Site Recollections, 1945-1999.

[21] The Bulletin in *The Albuquerque Tribune* on July 16, 1945 reads "Alamogordo, N.M., July 16 - William O. Eareckson, commanding officer of the Alamogordo Army Air Base, made the following statement today: Several inquiries have been received concerning a heavy explosion which occurred on the Alamogordo Air Base reservation this morning. A remotely located ammunition magazine containing a considerable amount of high explosive and pyrotechnics exploded. There was no loss of life or injury to anyone, and the property damage outside of the explosives magazine itself was negligible. Weather conditions affecting the content of gas shells exploded by the blast may make it desirable for the Army to evacuate temporarily a few civilians from their homes." Philip L. Cantelon, Richard G. Hewlett, and Robert C. Williams, eds., *The American Atom: A Documentary History of Nuclear Policies from the Discovery of Fission to the Present*, 2nd ed., Philadelphia, PA: University of Pennsylvania Press, 1991, 54.

Silver City, NM, forest rangers called a nearby observatory to see if there had been an earthquake. Some people thought they had heard multiple explosions.[22]

And so despite the secrecy and security measures, the exceptional nature of the explosion could not go completely unnoticed in New Mexico or in western Texas where there were also a few sighting stories. The story that became most famous, a legend even, was that of Georgia Green, an eighteen-year-old blind music student from Socorro, NM. She attended the University of New Mexico in Albuquerque, and on July 16, 1945, her brother-in-law was driving her back to classes after her summer vacation. The blind girl felt the flash and exclaimed, "What's that?" before they drove off the road. The anecdote was widely retold in the press and became the source of speculations: was the light of an atomic blast so bright that even the blind would see it? The reporter Rolf Sinclair went to meet with Georgia's sister and brother-in-law in 1989. They explained that their sister had enjoyed telling that story; but, although she did not have any vision, she was able to distinguish light and dark so there was no special quality to the atomic light except from its exceptional brightness that she noticed. The legend was born nonetheless, and "the blind girl" became a recurring character in newspapers articles, in novels, and even in General Groves' memoirs.[23]

In Socorro, Lee Coker "was slicing bacon at his family's ranch just before dawn when a sudden terrific light and a strange-looking cloud filled the kitchen window. His infirm father, hobbling half-way between the house and the outdoor toilet screamed, 'God Almighty!' and thought the world was coming to an end, recalled Coker, now 80."[24] In San Antonio, NM, Rowena Baca, grand-daughter of Joe Miera, the owner of the Owl Bar & Café where scientists came to drink beer during the Manhattan Project, was shoved under her bed by her grandmother because the older lady thought it was the end of the world. Baca said, "I think most of us would just like to forget what was a very scary day." Her grandfather, Joe, had Army engineers camping on his property and renting the cabins behind his bar; that morning, the soldiers told him to come outside promising that he "would see something that had never

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[22] Elvis E. Fleming, "Civilian Reaction To The First Atomic Bomb Test," Address at the Roswell Public Library, 17 July 1983, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 8, Folder 18, Elvis E, Fleming—"Local Reaction to the First Atomic Bomb."

[23] Rolf Sinclair, "The Blind Girl Who Saw The Flash Of The First Nuclear Weapon Test," *Skeptical Inquirer*, Amherst, NY: Committee for Skeptical Inquiry, Vol. 18, Fall 1993, 63-67, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 9, Folder 11, Trinity Site Recollections, 1945-1999, and in Groves, *Now It Can Be Told*, 435.

[24] David Smollar, "First A-Test Site: Bleak Desert Spot," *Los Angeles Times*, Los Angeles, CA, 16 July 1985, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 8, Folder 7, Trinity 40th Anniversary, 1985.

before been seen in the history of the world." Miera saw the light, felt the shock wave, and heard the window panes in his house breaking because of the shock. His description of the noise was of a mixture of "an airplane, a freight train, and thunder all rolled into one!" In Roswell, Police Chief Lloyd Blakeney who witnessed the light said it was "about a mile wide and lit up the western sky for several second." In Carrizozo, NM, a resident said, "It sure rocked the ground. You'd have thought it went off right in your back yard!" In Bingham, Mr. and Mrs. Harold Dean who ran the Post Office thought the Japanese had attacked. Hugh McSmith, owner of another store in Bingham, was awoken by a B-29. The plane carried Luis Alvarez and Dean Parsons who had come from Kirtland Field to observe the blast from the air. He thought their plane had crashed in his back yard too but the noise he heard actually came from the shattering of his water cisterns when the shock wave hit them. Again, another rancher near Alamogordo was suddenly awakened and also thought an airplane had crashed in his yard; he said, "It was like somebody turned on a light bulb right in my face!"

In Ancho, north of Carrizozo, fifty miles (80 kilometers) and a mountain range away from the Trinity site, Richard Harkey was waiting at the train station with his father. He remembered that "everything suddenly got brighter than daylight. My dad thought for sure the steam locomotive had blown up." In Oscuro, rancher Dolly Onsrud saw the strange mushroom cloud rising on the other side of the mountains where she used to own cattle-grazing land before ceding it to the Army in 1942. At the end of the Oscura range, Bill Gallacher, fifteen years old at the time, recalled his father simply saying "Damn" when the bright light entered the ranch house. In the sky, John R. Lugo was on his way to the West Coast flying a Navy transportation plane 30 miles (48 kilometers) east of Albuquerque. When he saw the light, his first impression was "What a ball of fire! It was so bright it lit up the cockpit." He then radioed Albuquerque to ask about the fireball he saw to the south. He was given no explanation but was told not to fly south.

Some stories also centered on the very strange unknown effects of an atomic blast. William Wrye and his wife, Helen, slept through the event on their ranch twenty miles (32 kilometers) northeast of Trinity, but they became aware that something had happened at breakfast when "some soldiers with a black box appeared near the stock tank. 'I went out there and asked what they were doing, and they said they were looking for radioactivity. […] I told them we didn't even have the radio on.'" According to the article, Wrye's whiskers stopped growing that summer and came back white a few months later before returning to black. Half the coat on his black cat turned white, and his cattle also "sprouted white hair

along one side." When these effects of fallout began to show in the summer and fall of 1945, some residents tried to get compensation money and claimed they had suffered various grievances including "a frost-colored 'atomic calf' at Alamogordo, born soon after the explosion," a woman who allegedly lost more than twenty pounds, a man claiming his hair and beard had turned prematurely gray, and a white-spotted black cat in Bingham belonging to Hugh McSmith and re-baptized "Atomic." California promoter offered $50 to M. McSmith to display the cat in a side show.[25]

All these testimonies were used *a posteriori* as tales on the birth of a new age. They were dramatized, sometimes exaggerated, and often presented in a humorous or ironic light. The stories provided a form of comic relief for an event that is fraught with complex consequences. Humor is created by emphasizing the discrepancy between the momentous historic moment and the mundane everyday triviality of the scenes in which are set the witnesses cooking breakfast, going to an outdoor bathroom, or waiting for a train. Sometimes the articles also underscored the naivety of reactions, which can make them comical, such as William Wrye's confusion of radioactivity with the radio. The humor, however, obscured the anguish expressed by Rowena Baca who said they would all like to forget that scary day.

The stories also show the pride of some residents in having seen a historic development. A certain duality between fear and pride was created then, and New Mexicans would continue to be confronted to this mixture of competing sentiments in the postwar years. The fact that New Mexico had participated in or been privy to a historic battle of laboratories ushered in a new age fueled patriotic sentiments and gave the state an opportunity to affirm its American identity. As proof, while the national headlines on August 6th and 7th disclosed the dropping of an atomic bomb on Japan, "local media stressed equally the role played by the nearby Manhattan Project facility"; the editor of *Albuquerque Journal* "noted that the state had played a part in the development of 'one of the greatest scientific advances in history.'"[26]

Having hosted the birth of the atomic age, New Mexico capitalized on the era to attract new investments and economic growth. For example, some debated on what would happen to the birthplace of the atomic age. Some thought that it might become a tourist's destination and that close towns would benefit from it. Others suggested that the site should be kept in the

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[25] All the quotes and testimonies are from Calloway, "N.M. Gave Birth to Atomic Bomb," *Albuquerque Journal*, and Fleming, *Civilian Reaction to the first atomic bomb test* in Ferenc M. Szasz Paper Collection.
[26] Ferenc M. Szasz and George E. Webb, "New Mexican Response to the End of the Second World War," *New Mexico Historical Review*, Albuquerque, NM: University of New Mexico, Vol. 83, No. 1, Winter 2008, 20.

same condition in order to continue research and experiments, but enthusiastic New Mexican boosters had the idea to transform it into a national Park.[27] The tourism industry was a long-standing pillar of the local economy, and New Mexican businessmen saw an opportunity to make profits on a new kind of tourism: nuclear tourism. Similarly, some also thought that Los Alamos should be frozen in time as an open museum dedicated to the great scientific achievement. The Laboratory became much too valuable in the following years to become merely a theme park. As for the Trinity Site, developing and maintaining the military range made the Army reluctant to manage potential atomic tourists, and safety experts at the Laboratory were worried that the radiation at Ground Zero might affect visitors and park rangers. The idea did not go through.[28]

2. Local fallout from the test

a. Radioactivity at Trinity

The Trinity test story symbolizes the introduction of the atomic dilemma in New Mexico between risks and benefits, between pride and fear. Historically, Trinity marks the beginning of the state's Faustian bargain with nuclear science because the test generated a wave of enthusiasm in the area and the state has endeavored to take maximum advantage of its reputation as the cradle of the atomic era since. However, Trinity also made the first local victims of radioactivity whose existence was long buried in secrecy. Barton C. Hacker, Laboratory historian at the University of California Lawrence Livermore National Laboratory, explains that "safety never commanded topmost concern at Los Alamos. Getting the job done came first. In testing the bomb, however, safety may have ranked even lower than normal." He quotes James Nolan, chief safety planner for Trinity saying, "Possible hazards were not too important in those days. There was a war going on…" and Hymer Friedell, second-in-command of the Manhattan District medical office who adds "The idea was to explode the

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[27] Ferenc M. Szasz, *Larger Than Life: New Mexico in the Twentieth Century*, Albuquerque, NM: University of New Mexico Press, 2006, 127. Szasz reports that, "on the day after Truman's announcement on Hiroshima, the Alamogordo Chamber of Commerce nominated Trinity Site for possible inclusion in the national park system. Newton B. Drury, director of the National Park Service, accepted the idea. Soon the Park Service drew up elaborate plans for a New Mexican national monument at Trinity. The venue would contain a paved pathway to the heart of the fenced-in area of Ground Zero, where the ball of fire touched the earth. Visitors could also drive about seven miles to one of the three wood-and-earthen command posts, possible via a fenced-in right-of-way. The proposed visitor's center would display numerous artifacts of early atomic history, probably flanked by a B-29 (perhaps the *Enola Gay* itself)."

[28] *Ibid*., 130.

damned thing… We weren't terribly concerned with the radiation."[29] As a precaution, all persons present at Trinity would have to wear a film badge, and most workers would carry pocket dosimeters. The desire by scientists and military personnel to know whether the "gadget" was viable and could be used in warfare trumped any hazards concerns. Tension built up in the months preceding the test as well as a growing desire for a form of liberation from the burdensome uncertainty. as a result, many participants later testified to a lack of attention to safety. Moreover, physicians believed that the dosage limit could be raised quite high in this case because it was a one-time high exposure. The effects of repeated low-exposures would only become worrisome to scientists a decade later.

A telling example of the prioritization of success over safety is the weather concerns. Weather was of paramount importance to protect the personnel and the public from fallout; Army weather experts, instrumented aircraft, weather balloons, radar, and smoke pots on nearby summits were all used to determine weather patterns. The optimum winds would be northwest through southwest because they were drier and would keep thunderstorms from bringing the radioactive particles down to the earth. The forecasters opposed the test dates for months because they predicted terrible conditions typical of a New Mexican summer—thunderstorms, rain, and wind. Toward the end, however, the provisions of weather experts were rejected because of the pressure that Washington put on Los Alamos to do the test before the start of the Potsdam Conference on July 16, 1945. The political pressure resulted in choosing a period of unpredictable winds that could become an issue in case an evacuation became necessary. On that day, a storm delayed the explosion until 5:30 a.m., and the strong wind blew the radioactive cloud to the north east. The cloud, although invisible after about a hundred miles (161 kilometers), traveled all the way to Indiana where Kodak employee Dr. J. H. Webb concluded that the spotting the company had observed on its films in the fall of 1945 must have come from a nuclear test. It was fallout from Trinity that "had contaminated the river water that the paper mill in Indiana had used to manufacture the cardboard pulp."[30] Therefore, although the first reports about Trinity proclaimed there had been virtually no

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[29] Hacker, *The Dragon's Tail,* 84-85. Even at the highest level of command, priorities did not rank safety higher but alongside or lower than secrecy. General Groves listed the principal security requirements in the following order: "barring strangers from the test site, preventing harm to project members, reducing chances that outsiders could learn of the explosion, safeguarding the public from fallout, planning for emergency evacuation, and forestalling any national press reports that might alert Japan." Widner, et al., *Draft Final Report of the LAHDRA Project*, chapter 10, 26.

[30] Widner, et al., *Draft Final Report of the LAHDRA Project*, Chapter 10, 22.

radiation beyond the detonation zone and little fallout, the Kodak story proves how far the effects of this first test had actually travelled.[31]

The purpose of this section is to retrace the steps that were taken prior to the test and after the explosion to protect the local population and acknowledge the physical impact of the blast on New Mexican residents. For Los Alamos scientists, the two main concerns regarding radioactivity during the test preparations were the particles on the ground and those in the cloud. Dr. Stafford Warren, as chief medical officer of the Manhattan Engineer District, was in charge of the fallout operations at Trinity and his team members, Joseph O. Hirschfelder and John Magee were responsible for researching the way radioactive particles released by the fire ball would spread; or, in other words, how fallout worked. In the spring of 1945, well into the test preparations, Hans Bethe had asked them to research the matter. Hirschfelder recounted how they studied Department of Agriculture Soil Conservation reports and Bagnard's treatise, *The Physics of the Blown Wind*, to understand the role played by the wind in picking up the particles; then, they turned to studies of air pollution from industrial smokes, airplane trails, the distribution of poison gases in chemical warfare and "consulted with the top military meteorologists with respect to air circulation in the upper atmosphere for distances of thousands of miles."[32] The two scientists thus came to understand the workings of radioactive clouds by deriving their analyses from comparable yet different phenomena as Trinity's radioactive cloud would be a first. A few preliminary tests were run using TNT (including the 100 tons TNT test on May 7, 1945) and plutonium to observe the progression

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[31] Tad Bartimus shows the gradual erosion of secrecy over the years in the results reported at Trinity from the 1948 report that stated that "the amounts of radioactive fission products to be found in any one place throughout this area are relatively small except at or near the detonation point," to the 1978 report that found "plutonium concentrations off the missile range amounted to only half the Environmental Protection Agency limit at the time," and finally the 1983 field investigation that noted that, "Even after 38 years, there are large areas (near ground zero) where vegetation is not growing." Bartimus, et al., *Trinity's Children*, 18-19.

[32] Joseph O. Hirschfelder, "The scientific and technological miracle at Los Alamos," in Lawrence Badash, Joseph O. Hirschfelder, and Herbert P. Broida, eds., *Reminiscences of Los Alamos, 1943-1945*, Dordrecht, Holland: D. Reidel Publishing Company, 1980, 74. Also see J. O. Hirschfelder and John Magee, "Danger from Active Material Falling from Cloud—Desirability of Bonding Soil Near Zero with Concrete and Oil," and "Improbability of Danger from Active Material Falling from Cloud," Memos to K, T, Bainbridge, LA1027DEL, Los Alamos, NM, 16 June 1945 and 6 July 1945, LA1027DEL, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 8, Folder 47, Memos by J. O. Hirschfelder and John Magee Concerning Fate of the Active Material Following the Trinity Shot, Document LA 1027, 1945. In the June 16, 1945 memo, the authors wrote, "There is a definite danger of dust containing active material and fission products falling on towns near Trinity and necessitating their evacuation. This is shown by the following calculations based on the assumptions that: 1) The active material condenses on the surface of the normal Trinity dust […] 2) The dust on which the active material is deposited is quickly (3 minutes) raised to a height of approximately 12,000 feet. […] 3) The dust settles in accordance with a modified Stokes law like normal industrial dust […] 4) The material as a whole is carried along at a wind velocity of 30 miles per hour."

of explosion clouds and how they could affect towns in the area. These were not conclusive as the contamination of nearby streams and communities remained possible. The biggest worry was the unpredictable effect that rain might have on the radioactive particles. In spite of these concerns, the information was compartmentalized and the Los Alamos Health Physics Group did not have the power to cancel the test.

Stafford Warren expanded the safety zone from twelve to thirty miles (48 kilometers) in order to encompass the Mescalero Apache Reservation and other smaller towns, and an evacuation plan was designed, but the zone also conveniently avoided bigger towns like Roswell that would have been complicated to evacuate.[33] The evacuation plan provided that an evacuation detachment stationed at Socorro during the test would be sent to escort the families threatened by fallout to a hotel in town. In case a whole town was in danger, Major T. O. Palmer, leader of the detachment, had "commanded enough jeeps and trucks to remove as many as 450 people to safety; he also stocked enough tents, food, and other supplies to see them through two days."[34] They could also ask for help from the Alamogordo Air Base, which could furnish barracks for temporary housing. The Army would justify the evacuation by explaining that a large ammunition dump filled with gas shells had exploded. Before ordering the area to be cleared, the military waited on the result of the data collected by monitors: only if they confirmed serious danger would an evacuation order be issued as a last resort so as not to jeopardize secrecy over an inconsequential threat.

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[33] Hales, *Atomic Spaces*, 304.
[34] Hacker, *The Dragon's Tail,* 91.

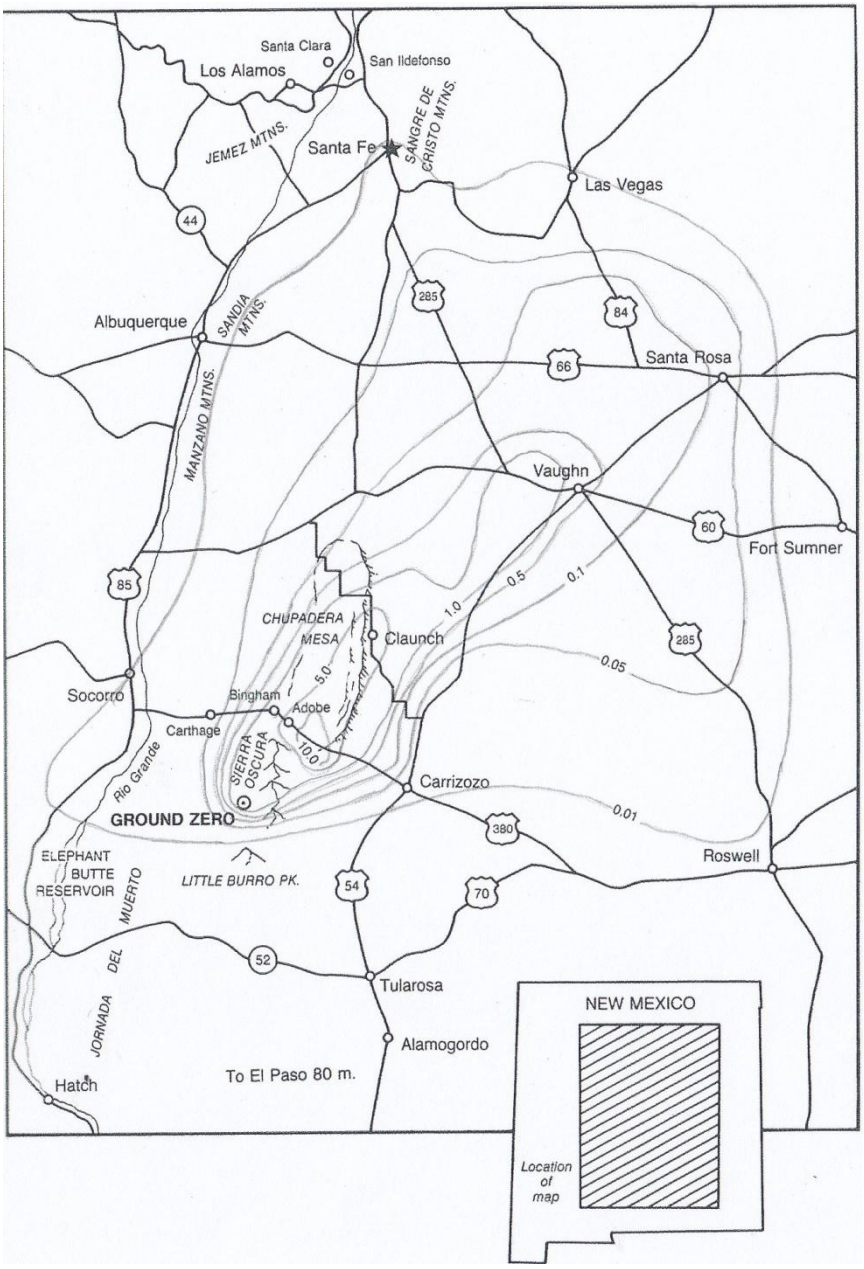

Fig. 23: Fallout from the Trinity Test. Source: Ferenc M. Szasz, *The Day the Sun Rose Twice: The Story of the Trinity Site Nuclear Explosion, July 16, 1945*, Albuquerque, NM: University of New Mexico Press, 1984, 42. Gray lines show early measurements of fallout pattern in Roentgens. Data from LA 1027-DEL.

On the day of the test, Stafford Warren was at a post six miles (10 kilometers) from Ground Zero with the high command and would deploy security agents to monitor the habitations downwind. Due to misinterpretation of the wind direction, however, the radiation monitors were deployed upwind, and they did not have time be relocated. After the explosion, Joseph Hirschfelder accomplished his monitoring mission; he described following the radioactive cloud and monitoring its fallout. He remembered driving by a mule that looked paralyzed; then, at a small store, a man told them that "You boys must have been up to

something this morning. The sun came up in the west and then went down again."[35] At the Army searchlight post, soldiers were roasting steaks at the time fallout arrived and released "small flaky dust particles." The decision was made to bury the steaks and to send the crew back to their base camp. The soldiers scrubbed the car that had turned radioactive; but, once the two scientists had returned to the Lab, the radioactivity that emanated from them was still high enough to be picked up by their Geiger counters. In this instance, the monitors arrived on time to tell the soldiers to leave, but it was not the case for all.

b. The first casualties of the atomic age

Forty-four monitors, scientists, and Army intelligence agents were posted. The evacuation plan was designed to vacate the area if something went wrong; but, when the monitors got to the families who could have benefited from a temporary relocation, it was already too late. At a time when safe radiation dosages were still unsure, determining at which point fallout would be a real threat was a complex decision and could easily be fixed according to the secrecy requirements. The limit was set by Stafford Warren and Louis H. Hempelmann, head of the Los Alamos Health Group, to a total dose of 75 roentgens over two weeks that would not result in injuries or radiation sickness.[36] The full effect of radioactivity on the human body remained uncertain at the time—less than fifty years after the discovery of radioactivity by Antoine Henri Becquerel in 1896—and the fixing of safe levels even more debatable.[37]

So the monitors at Trinity were in charge not only of asserting the level of radioactivity but also of determining whether that level was high enough—in other words dangerous enough—for the surrounding towns and ranches to be evacuated. While personnel at the base knew of the danger, had safety directions to follow, wore badges, and carried dosimeters, the

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[35] Hirschfelder, "The scientific and technological miracle at Los Alamos," in *Reminiscences of Los Alamos*, 76-77.

[36] Hacker, *The Dragon's Tail,* 93. Louis H. Hempelmann Jr., only twenty-eight and just out of medical school, was chosen by Oppenheimer to the head of the Radiological Safety Group at Los Alamos. He had worked at the Berkeley Radiation Laboratory where he had studied radiobiology with John H. Lawrence and Robert Stone and since Lawrence was not available, Hempelmann was offered the job.

[37] After 1936, the dosage considered secure for humans was 36.5 roentgens per year or 0.1 per day. It dropped to 15 per year in 1950 and 5 per year in 1957 with the discovery of radiation-induced leukemia. The measuring unit has now become the REM (Roentgen Equivalent Man), which measures the biological impact of roentgen on humans. The Rem and the Roentgen units are not exactly equivalent but they are comparable since one roentgen deposits about 0.96 rem in biological tissue. Today, dosages are expressed in millirems. Since 1957, 5,000 millirems per year is the occupational limit for an adult worker, including soldiers who are exposed to radiation. In addition, lifetime cumulative exposure should not exceed the equivalent of the person's age multiplied by 1,000 millirems. Massachusetts Institute of Technology, "Radiation, how much is considered safe for humans?" *MIT News*, Cambridge, MA: MIT News Office, http://newsoffice.mit.edu/1994/safe-0105, accessed May 19, 2014.

population's safety relied utterly on the monitors' responsiveness and decision-making and on the readiness of the Palmer detachment in Socorro. In the end, the towns of Carrizozo, Bingham, and Vaughan were closest to being evacuated; but the radioactivity levels, while momentarily bothersome, did not prove high enough. The findings of the Los Alamos Historical Document Retrieval and Assessment Project (LAHDRA) conducted in 2009 led to the following statement about the balance between safety and secrecy:

> Historical records indicate that pressures to maintain secrecy and avoid legal claims led to decisions that would not likely have been made in later tests. Even though exposures rates, total exposures, and alpha counts exceeded pre-established limits were measured and projected; a 'cover story' was in place that would have provided an avenue for relatively inconspicuous evacuation of selected residents; and evacuation of personnel, vehicles, shelters, and supplies were on standby, no evacuations of members of the public were conducted.[38]

The one area that raised genuine concern was the place baptized "hot canyon" by John Magee. Hoot Owl Canyon was twenty miles (32 kilometers) north-east of Ground Zero, in the Chupadera Mesa, right in the path of the cloud, and received the highest intensity of gamma rays. Three hours after the explosion the rates at this location were still extremely high—twenty roentgens per hour; that was the equivalent of a year's maximum dose (36.5) in less than two hours. After this discovery, monitors had to take scrubbing showers and get rid of their cars and clothes. They did not return to the canyon until the next day. In the early planning months for the test, the Army and scientists had studied state and county maps and aerial photographs, and Palmer's group had made field searches in the countryside to detect, list, and map all habitations in the area. Hoot Owl Canyon was thought to be uninhabited. Yet, on July 17, Hempelmann and Friedell discovered two families.

The Ratliff family was found at their ranch on a homestead parcel: an elderly couple named Minnie and Monroe, their twelve-year-old grandson, dogs, and livestock—200 goats raised for their hair, some turkeys and donkeys—had been missed on Palmer's map of inhabited localities. The monitors arrived a day after the radioactive cloud reached their ranch, and the personnel decided, after consulting with Col. Stafford Warren, to leave them there.[39] The second family was their neighbors, the Wilsons, who ranched up the road. Hempelman

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[38] Widner, et al., *Draft Final Report of the LAHDRA Project*, Chapter 10, 37.
[39] Hales, *Atomic Spaces*, 328. Hales adds that they "unsurprisingly" decided to leave them.

calculated that the "Ratliffs received at most a total of 47.0 roentgens of whole-body gamma radiation in the two weeks after Trinity." He went to see the families in August and observed that the thick adobe walls must have protected the dwellers from most of the radioactivity. Only Mr. Ratliff had spent a lot of time outdoors and told Hempelman he had seen the ground "covered with light snow."[40] The effects of fallout were visible on animals but not on humans. The animals in hot canyon received around 2,000 roentgens on the day of the blast. Their milk cows displayed burns, loss of hairs, and bleeding. The problem was that the cows would eat the grass from a ground that was most likely contaminated, and the family would then drink their milk. The Ratliff family also used a cistern that collected rain for drinking water. Hempelmann requested the District that "the health of persons in a certain house near Bingham, NM, be discretely investigated."[41] The reason behind the visits was kept from the public and from the families.

The doctor's last visit at the Ratliff ranch occurred in November. The grandson was no longer there, but the couple had a two-year-old niece in their care. All family members looked in good health, and the animals had recovered but still showed some signs of their injuries.[42] Hempelmann concluded there was no link between the injuries on animals and humans because he did not find any serious injuries among the population and thought that? after people had washed and changed their clothes, there would be no residues from fallout on their skin. Between 1945 and 1947, the Ratliff ranch received seven visits from "LANL and MED medical personnel, health physicists, and Army Intelligence agents, 'under suitable pretext,' to check on the visible condition of the residents."[43] There have been no records about what happened to the Ratliff and Wilson families since. Ty Bannerman, a non-fiction writer living in Albuquerque whose parents came to New Mexico to work at the Los Alamos Lab in the 1950s, wrote about Minnie and Monroe Ratliff. He searched for information on what happened to the family after the blast and asked the question of why the government did not "continue to follow up with the Ratliffs in the years after the Trinity test?" pointing out that, only nine years later, the AEC made the decision to indefinitely continue monitoring the

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[40] Hacker, *The Dragon's Tail,* 104-105.
[41] Widner, et al., *Draft Final Report of the LAHDRA Project*, Chapter 10, 37.
[42] Hacker reports, "One bitch still limped, although her paws showed none of the rawness and bleeding – the apparent aftermath of beta burns—seen on the August visit. Patchy and discolored coats also marked a number of animals, cows as well as dogs." Hacker, *The Dragon's Tail,* 105.
[43] Widner, et al., *Draft Final Report of the LAHDRA Project*, Chapter 10, 37. Also see Thomas E. Widner, "The World's First Atomic Blast and How It Interacted with the Jornada del Muerto and Chupadera Mesa," *Geology of the Chupadera Mesa Region*, 60th Field Conference, New Mexico Geological Society Guidebook, 2009, 425-428.

Marshall islanders affected by the 1954 Castle Bravo blast. Bannerman found little information during his research because "the U.S. government appeared to keep no records on [the Ratliff family's] whereabouts after 1946" and they did not leave any written or oral history to their seven children. Their relatives in Hobbs, NM, did not know about their link to the Trinity story. Bannerman ends his essay writing that "The Ratliffs were not 'important' to anyone but themselves and their family, few books record their existence and none fill in the gaps in their lives, and I doubt that any ever will. But they were the first to set foot on this path that most of us have lived our entire lives on: that of the unwitting participants, the victims and footnotes to the nuclear age."[44] This comment underlines how local stories of the nuclear age have fallen into an historical void.

In December, after threats from influential ranchers to sue over the damage to their cattle, the Army bought the most severely harmed animals displaying beta burns from those who agreed to sell them. According to Peter Hales, the Army bought 75 of the 600 worst-injured animals "not to get them out of the food chain, but to quiet the complaints of locals by creating an observation program. […] The rest remained, gave milk, were fattened, slaughtered, and went to market."[45] A letter sent in 1960 by Wright H. Langham, monitor at Trinity and leader of the biomedical research group at the University of Tennessee, provides a detailed account of what happened to the irradiated cattle after the test. Langham was the monitor in the area where the cattle had been grazing 15 to 20 miles (32 kilometers) downwind from Ground Zero, but he was not the one who discovered them. Langham explained that none of the monitors or other Project personnel had seen the cattle but

> the existence of the first atomic bomb casualties was called to our attention by a letter dated October 11, 1945, written by a Carrizozo, New Mexico, attorney to the Commanding Officer of the Alamogordo Air Base, filing a claim for injury to cattle of the Red Canyon Sheep Company by the nuclear explosion of July 16, 1945. Evidently the rancher had noticed the condition of his cattle and had associated their condition with the fact that they were grazing about 15 miles [24 kilometers] from the bomb site

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[44] Ty Bannerman, "The First," *The American Literary Review*, Denton, TX: University of North Texas, Department of English, Creative Writing Program, http://www.americanliteraryreview.com/ty-bannerman---the-first.html, accessed April 21, 2015.
[45] Hales, *Atomic Spaces*, 129.

on July 16, 1945. He noticed that the majority of them had turned gray on their backs, some of them had lost their hair, and others had thick scabbing of the skin.[46]

People from the Los Alamos Scientific Laboratory (LASL) went to verify his contentions, and, indeed, 45% of the herd had the symptoms. They bought three animals to be examined at the Laboratory, and the study revealed that, except from the skin and hair, the animals were unaffected. Other ranchers filed claims and another inspection followed suit "with instructions to buy at current market prices all cattle showing visible damage." According to Langham, LASL bought about 150 heads of cattle and shipped 17 to Los Alamos and the rest to Oak Ridge under the care of a veterinarian "to study them and see if they developed any long-term effects." Many cows were pregnant and had calves; thus, when they were turned over to Dr. Charles S. Hobbs of the Animal Husbandry and Science Department at the University of Tennessee, there were 211 animals. Dr. Hobbs requested James M. Bird write his master's thesis on the subject in which he concluded that the irradiated herd did not present a notable difference in general health, growth, breeding efficiency, and relative fertility to the control herd; the effects of the irradiation were confined to the hair and skin. He remarked, for example, that there were more deaths among the controls than among the irradiated. The calves in both herds performed equally, and the wounds healed at the same rate.

These first casualties of the atomic age, be they residents or their animals, were thus included in the experiment and provided much valued scientific information about the effects of radiation on living beings. While it could not be said that the local population was used as guinea pigs, contrary to atomic soldiers in the 1950s test series,[47] the exceptional circumstances of the War, the strong emphasis on secrecy, and the medical uncertainties of atomic pioneers deprived these residents of any knowledge about what had happened to them and of any full monitoring of the long-term impact of both external and internal exposure on their health. With the retrospect of modern science, LAHDRA listed the various possibilities

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[46] Wright H. Langham, Biomedical Research Group Leader, Letter to Madame Jacqueline Juillard, Ingénieur-Chimiste EPUL-SIA, Colovrex, Geneva, Switzerland, 11 January 1960, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 8, Folder 45, Livestock and Radiation, document LASL 431 and letter about Atomic Bomb effect on Alamogordo Cattle, 1948-1961.

[47] During the test series at the Nevada Test Site in the 1950s, groups of soldiers were stationed close to Ground Zero in order to see the effect of an atmospheric nuclear blast on humans and establish tactics to fight a nuclear war. See Howard L. Rosenberg, *Atomic Soldiers: American Victims of Nuclear Experiments*, Boston, MA: Beacon Press, 1980, and Joseph Masco, *The Nuclear Borderlands*, "Above-ground Testing (1945-1962): Tactility and the Nuclear Sublime," 55-67.

through which the public may have been exposed to radiation and radioactive particles from the test. It could have been through direct radiation from the blast; external irradiation from the cloud passing above; from being immersed in the cloud; from contamination on the ground on the skin, hair, or clothing; or internal irradiation from inhalation of contaminated air or fallout particles, or ingestion of contaminated food or water.[48]

As already mentioned, the Ratliff family drank water from a cistern behind the house that collected rain water from their tin roof—most ranch houses in the area had metal roofs to facilitate the retention of water in that way. Information about the public exposure from Trinity from the material that has been published to this day is wanting especially because the internal irradiation was not taken into account. This last element was one of the shortcomings that health physicist J. Newell Stannard identified in *Radioactivity and Health: A History* in 1988. He underscored the "lack of any measures for detection of internally deposited radionuclides, such as bioassay, nose swabs etc." The combination of the following factors at Trinity led LAHDRA to the conclusion that "internal radiation doses could have posed significant health risks for individuals exposed after the blast": the detonation of the "Gadget" close to the ground increased the amount and spreading of radioactivity; people living less than twenty miles (32 kilometers) from Ground Zero were not relocated; the terrain and wind pattern created "hot spots of radioactive fallout," and the ranchers' lifestyle necessarily resulted in the intake of contaminated milk, water, homegrown vegetables, and meat from irradiated animals.[49] But the scientists of July 1945 were primarily concerned with the immediate effects of the radiation released by the test. The long-term effects were not the focus of any research; hence, "no evidence was found of steps being taken to reduce exposures to ranchers who continued to live in the fallout zone after July 1945." Hempelmann later wrote that some may have been overexposed; but, as there was no way to prove this, it went unnoticed. Therefore, because of a lack of continued monitoring, there are no available data on the full impact of the Trinity test on the New Mexican population.[50]

Meanwhile, another issue related to radioactivity arose when it became clear that Trinitite, the green glassy material produced by the first atomic blast, was not the best

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[48] Widner, et al., *Draft Final Report of the LAHDRA Project*, chapter 10, 27.
[49] *Ibid*., chapter 10, 40.
[50] *Ibid*., chapter 10, 37. This lack of data also concerns what is called the stochastic effects associated with long-term, low-level exposure to radiation. These effects include various forms of cancer and genetic consequences, and usually show years after the first exposure.

souvenir to keep from one's visit to the site.[51] Many of the scientists and early visitors took some of the material home as a reminder of that day or simply as a tourist souvenir. Martha Bacher Eaton remembered playing with the fragments that her scientist father had brought home until he took them away because they were dangerous. When she was diagnosed with breast cancer, her doctors became interested in the fact that she used to play with these radioactive rocks in her childhood.[52] The El Rio Motel in Socorro sold the green rocks to tourists over the counter. A Santa Fe bank rewarded new customers with free samples accompanied by a warning: "do not hold near body more than twenty-four hours." A woman even made a Trinitite necklace.[53] Army officers still display Trinitite at the site for visitors to see today, along with Geiger Counters to measure the remaining radioactivity. The question the Army was confronted with was, because radioactivity was higher than expected in that zone, what should be done with Ground Zero and the Trinitite. According to a memorandum by test director Kenneth Bainbridge, the options to cover up the radioactivity were either to seal it with cement or dump it in the Rio Grande![54] In 1952, the government had the area bulldozed and the Trinitite removed. The Trinity site was considered too small to conduct more nuclear tests, so the following tests took place in Nevada.[55]

3. A pivotal decision

Concerns similar to what should become of Trinity followed the test and centered on the future of the other wartime atomic sites. What should be done with Hanford, Oak Ridge, and Los Alamos? Should they be dismantled or maintained? The debate extended in the months after the end of the War. The outcome of these deliberations would turn out to be particularly pivotal for the state of New Mexico.

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[51] The formation of Trinitite actually acted as a protective barrier for observers as it sealed the ground, preventing deadly particles from rising up in a dust storm and endanger those who were not wearing masks, but that protection did not make it safe for people to be in contact with the rocks for too long. Hales, *Atomic Spaces*, 325.
[52] Mason, *Children of Los Alamos*, 54.
[53] Szasz, *Larger than Life*, 128.
[54] Bartimus, et al., *Trinity's Children*, 17.
[55] Widner, et al., *Draft Final Report of the LAHDRA Project*, chapter 10, 41. For more information on the effects of Trinitite and the National Historic Site proceedings at Trinity, see Frederic L. Fey, Jr., "Health Physics Survey of Trinity Site," Los Alamos, NM: Los Alamos Scientific Laboratory of the University of California, LA-3719, UC-41, TID-4500, 16 June 1967, and Leslie P. Arnberger, Regional Director, Southwest Region, "Review of Proposals for Establishment of Trinity National Historic Site," Memo to Chief, Office of Park Planning and Environmental Agency, L58(SWR)PP, Santa Fe, NM, 11 April 1979, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 8, Folder 48, Trinity Site 1945-1979.

a. From World War II into the Cold War

The Manhattan Project was the first measure of retaliation in atomic matters based on the belief that Nazi Germany was ahead of the U.S. in the competition to revolutionize modern weaponry. After 1945, American military and political leaders thought their atomic hegemony would last; the most optimistic, such as General Groves, thought the Soviets would need twenty years to catch up whereas pessimists, including some of the Project's most knowledgeable scientists, believed they could do it in four. They were proven right as the U.S.S.R. detonated its first fission bomb in Kazakhstan on August 29, 1949. Other countries followed the two giants in their battle of arsenals: Great Britain in 1952, France in 1960, and China in 1964. The atomic bomb instituted a new political order that swayed the balance of power among the possessors of the ultimate weapon. In response to the Soviet A-bomb, the United States developed and tested in 1952 a hydrogen bomb called the "super" by its father, Edward Teller, and "a weapon of genocide"[56] by the father of the atomic bomb and opponent to the development of H-bombs, Robert J. Oppenheimer.

In less than a year, the Soviets had also tested a thermonuclear weapon. Strategic thinkers soon concluded that the escalation of armament and technological progress "had made nuclear war obsolete."[57] The unconceivable destructive potential of the U.S. and Soviet Union's new gadgets could not sensibly be used in warfare. Their role as deterrents kept the Cold War from turning "hot." As Kevin Fernlund put it in a 1994 article for the *New Mexico Historical Review*, "Great power rivalry was hardly new. […] What clearly set the Cold War apart from these [French-British antagonism and struggles between Greeks and the Trojans] and other conflicts was that this new set of belligerents had the power to destroy themselves, and much of the civilized world, in a single battle."[58] Or else, in the words of the great historian of the atomic bomb Richard Rhodes, the lesson of the Cold War was that destructive technology had attained its apogee with nuclear weapons thus shifting the focus of large-scale

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[56] Bird, et al., *American Prometheus*, 422. It is also interesting to note how historians of the Cold War have tapped into mythology to find images and characters that would embody the change in human condition that was the appearance of nuclear power, as if there was a spiritual aspect to it. The most recurring myths are those of the titan Prometheus who stole fire from the forge of the god Hephaestus and gave it to humanity, and that of Phaëthon, son of the sun god Helios, who demanded to be allowed to drive his father's chariot of the sun and lost control of the horses, turning the ride into one of terror, burning living beings, and creating deserts. The myth of Pandora's jar releasing the evils of humanity, the legend of Aladdin's genie in a bottle, or such book titles as Norman Moss's *Men who Play God* indicate a propensity to place nuclear weapons in the realm of abstraction because they never were and can never rationally be used again. Norman Moss, *Men Who Play God: The Story of the Hydrogen Bomb and How the World Came to Live with It*, New York, NY: Harper and Row, 1968.
[57] Clarfield, et al., *Nuclear America*, 89; 83.
[58] Kevin J. Fernlund, "Mining the Atom: The Cold War Comes to the Colorado Plateau, 1948-1958," *New Mexico Historical Review,* Albuquerque, NM: University of New Mexico, Vol. 69, No. 4, October 1994, 349.

war from finding ever mightier attack tactics to developing defense strategies and instruments that could compete with such apocalyptical devices. Rhodes laments, "So cheap, so portable, so holocaustal did nuclear weapons eventually become, that even nation-states as belligerent and the United States and the Soviet Union preferred to sacrifice a portion of their sovereignty […] rather than be destroyed in their fury."[59] Out of the adherence to the doctrines of retaliation was created the new doctrine of nuclearism, which was understood as the faith in nuclear weapons to maintain national security. In five years, the United States went from an atomic arsenal of two bombs to 298. By 1953, that number had reached 1,161.[60] And the American West became dotted with the new temples of nuclearism: military bases, command centers, proving grounds, training schools, nuclear test sites, bombing ranges, missile fields, arsenals, laboratories, weapons plants, naval yards, and strategic mining sites.

The few years between the end of World War II and the beginning of the Cold War[61] were decisive for the state of New Mexico because this period traced a scientific route for the region to the present. Los Alamos made the headlines of newspapers throughout the nation, earned international fame, and officially became the Los Alamos Scientific Laboratory in 1947. Operation Crossroads in the Pacific provided more work for the atomic scientists. A branch of the expanding research center migrated to Albuquerque and later became the Sandia Laboratory, operating a radical physical transformation on the regional city. The end of the 1940s and the following decade accelerated the development of the state to an unprecedented extent. The Manhattan Project thus ignited a socio-economic revolution in New Mexico. The use of the term "revolution" is justified by the magnitude of the transformation from a predominantly pre-industrial agricultural and pastoral region, struggling against the devastating effects of the Great Depression and the dwindling of resources, to a symbol of the dawn of a new age at the forefront of technology and scientific research. Therefore, the postwar period (1945-1947) was a historical crossroad. Without entering into fruitless speculations as to how New Mexico would have evolved if Los Alamos had been deserted, it seems important, to investigate the reasons why the government and the Army decided to maintain their wartime installations in the state. New Mexican lives were radically changed by this decision that resulted from a period of debate between those who desired to prolong

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[59] Rhodes, "The Atomic Bomb in the Second World War" in *Remembering the Manhattan Project*, 29.
[60] DeGroot, *The Bomb*, 161.
[61] The start of the Cold War is traditionally set in 1949 when the Soviets detonated their first atomic bomb, although some historians (Gar Alperovitz was the first) have argued that the Japanese bombings were actually the first event of the Cold War.

the use of New Mexican qualities to make it a bastion of the emerging national atomic complex and those who rejected the region on the same grounds that had motivated its selection in 1942.

b. At a historical crossroad: the scientists' exodus

The future of the Laboratory started being discussed at Los Alamos even before the Japanese bombings. Should the research center be maintained, or should it be dismantled? Once the War was over, the characteristics of the Pajarito Plateau that had made the site so desirable—the seclusion, the topography, the climate, the distance from large cities—went back to being considered as the liabilities of the West. In the weeks following Japan's surrender on August 14, General Groves received the recommendation of General Thomas Ferrell to relocate the Laboratory's functions somewhere where "first class scientists will not flee in peacetime."[62] He suggested Berkeley, Chicago, or somewhere in the East. General Ferrell and others thought that the state lacked the appeal to be seen as permanent place of residence for the elite of physics and that, given the choice, talented scientists would not willingly choose to end up on a secluded mesa in New Mexico but would rather stay close to the great urban centers, in other words, closer to "civilization." As already mentioned, some were in favor of Los Alamos becoming a museum town or a monument dedicated to the birth of the nuclear age; another group thought the Lab should conduct only peaceful research, and yet another group held that it should continue its work on atomic weapons.[63] In 1968, Glenn T. Seaborg, AEC Chairman, recalled the transformation of "this pastoral setting into a modern, bustling community" in his remark at the Lab's twenty-fifth anniversary celebration. When he joined the AEC's first General Advisory Committee, Seaborg saw Los Alamos as one of the first subjects under discussion, and some of his colleagues "maintained that it would never be possible to make Los Alamos attractive for competent scientists. It was too remote from civilization."[64]

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[62] Szasz, *Larger Than Life*, 128.
[63] See documents copied from the Los Alamos National Laboratory Records Center and Archives in University Libraries, University of New Mexico, Center for Southwest Research, MSS552BC, Ferenc M. Szasz Papers, 1894-2005, Box 7, Folder 4, Documents on Los Alamos, 1944-1946.
[64] Glenn T. Seaborg, Chairman of the U,S, Atomic Energy Commission, "Los Alamos: 25 Years in the Service of Science and the Nation," Remarks at the 25th Anniversary Celebration of the Los Alamos Scientific Laboratory, Washington, DC: United States Atomic Energy Commission, 15 February 1968, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 7, Folder 7, United States Atomic Energy Commission (AEC) and Los Alamos Scientific Laboratory, 1948-1968.

The Laboratory came close to being dismantled altogether if it had not been for the persuasion of Los Alamos' leaders. The indecision lasted for sixteen months while the Army continued to be in charge of the country's atomic organization until the Manhattan Engineering District was replaced by the AEC on January 1, 1947. Vincent C. Jones, author of *Manhattan, the Army and the Atomic Bomb*, describes the changes during this period as "the often perplexing and thankless task of administering on an interim basis, an atomic organization undergoing the severe stresses and strains of transition from a war to a peacetime status."[65] The interim period enabled the military head of Los Alamos, General Groves, to exert pressure to maintain the site. He was absolutely committed to keeping the facility that had proved to be such a valuable investment—the nation had already invested about $75 million in the Project. He strongly advocated for its preservation by arguing that "the United States could never reassemble a similar laboratory […] except in time of war."[66] This comment shows Groves' awareness that the circumstances of war allowed the District to make exceptional decisions extremely fast such as gathering up all the worldwide leading nuclear physicists, building a small town in a high desert but also condemning private and state lands, and evicting citizens from their homes. The transition from war to peacetime atomic research was delicate for the Army because its power changed, and Groves thought it would be a mistake not to hold on to what wartime military power had permitted to do in the West.

On the other hand, the behavior of the Laboratory staff members at Los Alamos aligned better with General Ferrell's claim that New Mexico was not right to host a permanent research center. The end of 1945 and 1946 were marked by a massive scientific exodus. This outflow can be explained by several factors. Many scientists considered their job to be done and desired to go back to the life they had put on hold for the duration. Most great scientists of the wartime period aspired to go back to academia. Their mission accomplished, some hoped that the United States would not keep on building more destructive bombs. Officially, "some wished to remain at Los Alamos, but were committed to other positions. Others were indifferent to the Laboratory's future after victory was won. As the technical and administrative future of the project was unclear, others preferred not to gamble on the

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[65] Jones, *Manhattan, the Army and the Atomic Bomb*, 600-601.
[66] Szasz, *Larger Than Life*, 136.

outcome."[67] Some of them, along with their families, had never grown fond of the desert and high altitude climate; they missed the sophisticated and cosmopolitan feel of the busy university towns. For some Hill-dwellers, the romantic charm of the region ceased to work as the special atmosphere of the Manhattan Project faded. The nostalgia for the years of intense dedication to winning the War and for the unique concentration of internationally renowned Nobel Prize winners endured and has been put forth as a heritage by LANL. Departures were also motivated by more practical reasons that centered on the fact that the community was built as a temporary arrangement. Los Alamos lacked the basic urban development of a regular, peacetime town. The water shortage during the winter of 1945 did not help the morale of those who had stayed and resented the temporary character of their community. Complaints about housing, for instance, inundated the Los Alamos directors and multiplied after the War, making it clear that the living conditions would have to be improved to stop the flow of leaving staff and attract new employees. This task would begin with the construction of better housing units.

One of the first top scientists to leave his position and go back to the University of California, Berkeley, was Oppenheimer. Nonetheless he believed, like Groves, that the research facility should be maintained, and the two men met with the Los Alamos scientists and technicians to assure "staff members that the laboratory would continue to be a center of weapons research, that security would be less strict, and that the work schedule would be more relaxed." The new Laboratory director, Norris Bradbury, facing his first challenge in this exodus, announced a program in October 1945, with attractive activities to retain as many people as possible. The staff would be "reengineering implosion weapons, research on the feasibility of the hydrogen bomb, further Trinity-type tests, and study of constructive uses of atomic energy."[68] At the same time, Bradbury developed his first idea to facilitate the shift from practical to fundamental research. From September 1945 to June 1946, the Laboratory set up a miniature university with courses at the undergraduate and graduate levels, but the

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[67] See documents copied from the Los Alamos National Laboratory Records Center and Archives in University Libraries, University of New Mexico, Center for Southwest Research, MSS552BC, Ferenc M. Szasz Papers, 1894-2005, Box 7, Folder 4, Documents on Los Alamos, 1944-1946.

[68] Jones, *Manhattan, the Army and the Atomic Bomb*, 581-582. Various programs were also introduced as stimulus for the scientists who remained (and to attract new staff members) including the Los Alamos University in September, various conferences throughout 1946, the Health and Safety program, continued work on weapon engineering to improve the design of the bomb, and technical direction of the Crossroads Operation. From documents copied from the Los Alamos National Laboratory Records Center and Archives in University Libraries, University of New Mexico, Center for Southwest Research, MSS552BC, Ferenc M. Szasz Papers, 1894-2005, Box 7, Folder 4, Documents on Los Alamos, 1944-1946.

idea could not be fully developed for security reasons because the research was classified and dissertations could not be published. In August, a five-day physics conference was held at Los Alamos calling back some of the most prestigious scientists including Oppenheimer, Enrico Fermi, John Manley, and Richard Feynman, and totaling over 300 attendants from universities throughout the country.

Preparations for Operation Crossroads and the construction of the fast-neutron nuclear reactor dubbed Clementine helped restart the machine of atomic research, but the desertion of Los Alamos by some of its top scientists was a major challenge for the planning operations.[69] In a letter from Norris Bradbury to Vice Admiral W. H. P. Blandy, commander of the naval atomic tests in the Pacific, the Los Alamos director complained that he was losing his scientific personnel who were accepting positions in universities and in the industry. The main reason to their departure according to him was "the absence of legislation on the subject of atomic energy" that prevented his personnel from predicting "the character, extent or even general philosophy of research on atomic energy." He warned that the exodus would affect the timetable of the naval tests, which would be "barely possible in early summer 1946."[70] After Crossroads, Bradbury was still confronted with speculations on the future of the Lab. He recalled the challenge "to pull together a loyal staff, a staff who believed that the laboratory should be there and in general agreed what it should do, what kind of laboratory it should be, and what its responsibility to the country should be." He mentioned that there was still "one school of thought that said that Los Alamos should be deserted. Put a fence around it, everybody go away, leave it as a monument of man's inhumanity to man."[71]

c. At a historical crossroad: Los Alamos becomes permanent

Bradbury's wish was officially satisfied on August 1, 1946, when President Truman signed the Atomic Energy Act that created the AEC. The Commission officially replaced the MED five months later, assuming responsibility for all property that had so far been under custody and control of the District. The future of the Lab now depended on the AEC's policy. By the end of the year, Bradbury had devised his laboratory's new role, which would focus on

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[69] The Crossroads series was conducted at the Bikini atoll in the Pacific beginning on July 1, 1946. The purpose of the operation was to test the effectiveness of the atomic bomb in naval combat. The preparations involved "assembling and testing the weapons components, preparing a technical handbook, and furnishing much additional technical data." Jones, *Manhattan, the Army and the Atomic Bomb,* 594.
[70] Hunner, *Inventing Los Alamos,* 97.
[71] Norris Bradbury, "Los Alamos—the first 25 years," in Lawrence Badash, Joseph O. Hirschfelder, and Herbert P. Broida, eds., *Reminiscences of Los Alamos, 1943-1945,* Dordrecht, Holland: D. Reidel Publishing Company, 1980, 163.

managing the nation's atomic weapons, providing for all future weapons design, overseeing future atomic testing, and engaging in basic research into peaceful uses of the fission atom.[72] To accompany Bradbury's management efforts to stem the exodus, the Army proceeded to make the town more attractive and boost the population's morale by publishing *Los Alamos Times*, starting in March 1946, and by organizing satisfaction questionnaires to Lab employees and families. The results of these surveys were striking: most wanted the Lab to be moved closer to a big city, a majority of the respondents (99%) thought the administration of the Lab should not remain under military control but should be turned over to a civilian organization, and only 35% wanted the Lab to stay in Los Alamos.[73] These results were a clear rejection of the general environment of the Lab, so this environment had to change and conform to the desires of the incoming population. The look of the town gradually changed to accommodate their suburban needs.

The improvements to the town including movie theaters, sports halls, a first sports club named the Los Alamos Atomic Bombers, a small stadium dedicated to the victim of a radiation incident, Louis Slotin,[74] a recreational hall, a bowling alley, stores, better schools, a market, filling station and garage. Later, swimming pools and, eventually, a golf course made a significant difference in the town's appeal to employees but further differentiated the Hill from surrounding communities.[75] When the county of Los Alamos was created on June 10, 1949, the division between the town and the rest of the state became cartographic. The same year, White Rock, the town's first suburb, was built with laboratory funds as a temporary housing project for construction workers and their families. The scientists' colonization of the Pajarito Plateau thus followed its course from invasion in the name of the war effort and a temporary secret Army camp to a permanent settlement. In the following decades the scientific community evolved toward normalcy, endeavoring to import the markers of eastern urban life into the small isolated mesa.

The AEC declared LASL and the Los Alamos community officially permanent in 1948. Once the certainty of the Lab's future had been established and funds had been invested in better living conditions, the trend was reversed and new scientific immigrants poured in once more. The Lab grew proportionally to the infusion of government money and multiplication of contracts to build up the American stockpile. On August 29, 1949, the Soviet Union

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[72] Szasz, *Larger Than Life*, 143.
[73] Hunner, *Inventing Los Alamos*, 98-99.
[74] For details on the incident, see Part 3, Chapter 3, The obsession of secrecy, The secrecy/security paradox.
[75] DeGroot, *The Bomb*, 161.

detonated its first atomic bomb, codenamed Joe-1, at the Semipalatinsk test site. This date historically marks the beginning of the Cold War; but for New Mexico, it gave the cue for the scientific and economic revolution to continue to spread. After losing the nuclear monopoly, it became clear to American leaders that the U.S. had to pursue its atomic research and increase the number of atomic bombs at its disposal. As a consequence to this turn of events, the desert was made more attractive to atomic scientists because it became synonymous to seemingly unlimited government funding and astronomical research grants, luring them into participating in the scientific conquest of the West. The postwar immigrating crowds had little in common with the wartime atomic pioneers because the reasons and circumstances for their coming to Los Alamos differed entirely. The scientific pioneers had been in a mind frame of urgency and transition: Los Alamos was never meant to be their permanent residence. For their successors, however, the incentive and intent were altogether different. So, rather than pioneers, they became actual settlers. As we will see next, the nature of the new generation of atomic immigrants' motivation in settling in New Mexico gradually modified their relations with the environment but also with local communities.

4. Conclusion to Part 2

Thus New Mexico was profoundly changed by World War II as argued by Gerald Nash in *The American West Transformed: The Impact of the Second World War.* Yet, these changes flowed into the state through intensive militarization, seizure of land, and influx of settlers. This familiar pattern of colonization was dimmed by the exceptional circumstances of war and the additional dimensions of patriotism and sacrifice. In a region desperate for new opportunities and national recognition beyond clichés of the "Old West," the arrival of new industry was a bonanza. Ironically, it was those very clichés that guided the Manhattan Project toward New Mexico, as they were deeply set in the vision of its leaders and its pioneering scientists. With the new opportunities came the illusion of freedom from outside sources of capital (eastern markets) and the renewed hope for economic prosperity. Yet, in the transition from World War II to the Cold War, the pattern of colonization was maintained and even reinforced by a mechanism involving federal funds, corporate interests, and secrecy.

The Trinity test allowed a first extension of nuclear science outside the fence around the secret laboratory and linked the Project and the wider militarization of the state. These connections between centers of scientific research and military bases repeated themselves afterward, weaving a military-scientific web across the region. In addition, the test revealed that national security and secrecy were prioritized over the local population's safety. Like in

Los Alamos, where locals were used as cheap, convenient labor that helped keep the Lab secret, ranchers and residents around Trinity, such as the Ratliff family were given a status of inferiority as they were not told what had actually happened and how it could affect them. Nevertheless, at the end of the war, New Mexico took its share of the glory and celebrated its role in victory.

The four years following the end of World War II determined Los Alamos' potential for sustainability. The issues raised by the end of the War—the scientific exodus, the transition to civilian management, deciding on a research program and purpose, and attracting new personnel—deeply questioned the choice of New Mexico as an appropriate environment for nuclear research. Instead of giving the Pajarito Plateau back to the homesteaders and Pueblo Indians, as Oppenheimer allegedly suggested ("Let's give it back to the Indians"[76]), the Army and then the AEC made the decision to seek return on the wartime investment by modifying the immediate environment on the mesa to meet the scientists' needs and desires. The novelty of Los Alamos gave the town an air of having been transplanted from a suburban community somewhere in the richer part of the country and replanted in a developing society that was still anchored in its agricultural past. It became the "ultimate company town."[77]

As the United States and the Soviet Union entered a new armaments race that would redefine the rules of diplomacy and war in the twentieth century, the state of New Mexico became increasingly involved in the construction of America's supremacy. Science, high technology, weapons research, production, testing, and storage, uranium mining, and nuclear waste management came to form a new pillar of the state's economy. The nuclear industry spread to other areas of the state through the channels that the Army and the Manhattan Project established during the War. The financial benefits were enormous for New Mexico and New Mexicans. The multiplication of testing series and the government requesting ever more destructive weapons guaranteed constant and rapid growth for the industry while hazards were carefully maintained under a veil of secrecy. The influx of atomic immigrants to the new research centers had a massive spin-off effect on local businesses and meant that their growing work facilities would provide more jobs for local workers. The decades following the decision to maintain and expand atomic research in New Mexico set up the mechanisms of the state's Faustian bargain with nuclear science that is at the heart of this thesis.

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[76] See Part 1, Chapter 3, The Manhattan Project: Oppenheimer's love story with the Land of Enchantment.
[77] Linda Aldrich, "Zia Company 1946-1986," *New Mexico History.org*, Santa Fe, NM: The Office of the State Historian, http://newmexicohistory.org/people/zia-company-1946-1986, accessed May 28, 2014.

This second part demonstrated how the region's past worked as a vector to shape its future and how the two are connected by the colonial framework. This colonial framework is similar to the one repeatedly used by the Western World to impose its domination on the rest of the world through modernity, science, technology, and a strong belief in the superiority of its institutions.[78] But the particularity of internal colonialism is that the lines between conquerors and conquered are blurred and motivations on both sides are fragmented by complex relations. After studying the workings of this Faustian bargain, I will dwelve into these relations.

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[78] See Niall Ferguson, *Civilization: The West and the Rest*, London: Allen Lane, 2011. Ferguson argues that "the West" conquered its rivals, partly, by its scientific superiority and that the rest of the world suffered from its lack of modern science and technology which were, fundamentally, Western products. See also Anders Stephanson, *Manifest Destiny: American Expansionism and the Empire of Right*, Hill and Wang Critical Issue, New York, NY: Hill and Wang, 1996. Stephanson argues that the process of Manifest Destiny can be traced back to the British settlement of northern America. He uses the Manifest Destiny expression to refer to a belief in a "providentially assigned role of the United States to lead the world to new and better things" (xii).
This Western view was also applied internally in the U.S., as bringing science and technology into its most remote regions was considered as a great opportunity and improvement.

PART 3: THE WORKINGS OF A FAUSTIAN BARGAIN

CHAPTER 1: THE NUCLEAR GOLDEN GOOSE

This part addresses what has become New Mexico's grandest dilemma of the twentieth century. I will here explore the workings of New Mexico's Faustian or Devil's bargain with science. From the moment the spotlight hit Los Alamos after the War, to the end of the Cold War and into the twenty-first century, the fate of the state and that of the military-scientific complex have been tightly interweaved. They reinforced each other at times but also weakened each other because of the risky nature of their alliance. The pact between the state and nuclear science was sealed[1] in the glorious moment of scientific victory when the atom was presented as a futuristic panacea, and in the following thirty years secrecy and federal policies helped forge America's nuclear empire. I will first focus on the immense leap forward that New Mexico took into modernity and industrialization after the War thanks to the development of its new scientific and nuclear industries.

The end of the War had multiple effects in New Mexico where many families had enlisted members who fought in the Pacific. The revelations on the Lab turned the attention to the state's prominent role in the war effort and the pride of having participated in victory was enhanced by the number of New Mexican casualties, i.e., 2,032 men.[2] Another result was that the communities around the "Hill" finally had an understanding of all they had been observing for the past two years: the explosions, the soldiers, the gated community, and the influx of Americans and foreigners. The communities of Los Alamos and Santa Fe formalized their first official meeting in December 1945, when the secrecy ban was lifted; the Hill dwellers "made a grand debut into the society of Santa Fe" at the Museum of Anthropology. A special committee of Santa Fe citizens staged the event and the museum "replaced its Indian exhibits with pictures of atomic experiment and Hiroshima damage."[3] And thus, in one giant leap, the images of ancestral techniques and cultures were replaced by images of an atomic future based on new, lethal technology.

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[1] This pact was principally instituted by the government and the Army, but it was also enthusiastically encouraged locally by politicians, businessmen, and the general population who saw employment opportunities in the budding installations.

[2] The U.S. National Archives and Records Administration, "World War II List of Dead and Missing Army and Army Air Froces Personnel from New Mexico," *National Archives*, http://www.archives.gov/research/military/ww2/army-casualties/new-mexico.html, accessed February 18, 2015.

[3] Steeper, *Gatekeeper to Los Alamos*, 113. The event also symbolized the end of rumors and the tying of new bonds between the two communities. For example, some Los Alamos women invited their new friends from Santa Fe to visit Los Alamos and Santa Feans created a Citizens' Committee for Atomic Energy.

Most importantly, the economic future of the whole region was tied to the decision to maintain or disintegrate the facility, and the jobs of workers who had taken part in the Manhattan Project at site Y were at stake in the decision. The first generation of workers perceived the presence of Los Alamos as a formidable source of employment which enabled them to stay close to their homes, therefore the news that it would become permanent was received with enthusiasm. The repercussions of the few months between Hiroshima and the 1946 Atomic Energy Act exceeded all expectations. The end of the 1940s and the 1950s were a period of scientific and economic boom in New Mexico. The pace of the construction of New Mexico's atomic and scientific complex was cadenced by the demands of the Defense Department, which included research and development in the field of nuclear weapons and of applications of nuclear energy, as well as numerous testing operations. Following the explosion of Joe-1 in the Soviet Union, the American atomic scientists concentrated their efforts on building yet another, new kind of nuclear weapon, using hydrogen in addition to plutonium.

The "Super" program to build a thermonuclear bomb led by Edward Teller and Stanislaw Ulam has been viewed as the replacement of the fear of a German atomic bomb by the fear of a Soviet hydrogen bomb and brought back an atmosphere of frenzied intellectual motivation at the Los Alamos Laboratory. A sense of urgency led the Lab to resume the wartime pace of work six days a week and "a fresh spirit of endeavor enlivened the laboratories."[4] A new technical area was especially built on South Mesa in February 1950, and in three years (1949 to 1952) the population on the plateau almost doubled. The Mike test on November 1, 1952, brought the hydrogen bomb to the world by vaporizing the atoll of Eniwetok in the Pacific. In New Mexico, the Super program accelerated the trend of ever increasing funds from $45.4 million in 1951, to $63.4 in 1952, and $95.3 in 1953.[5] The military funds for research during World War II had averaged $245 million per year but by the first decade of the Cold War, they had reached $1.5 billion, totaling $5.1 billion with indirect research in 1957.[6] The work rhythm at the Laboratories and the funding levels were in tune with the rhythm of nuclear tests series throughout the 1950s and 1960s until worldwide public concern over the dangers of radioactive fallout led nuclear nations—the

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[4] DeGroot, *The Bomb*, 176.
[5] Hunner, *Inventing Los Alamos*, 163.
[6] DeGroot, *The Bomb*, 159. For fiscal year 2012, the lab budget was $2.242 billion. "Budget," *Los Alamos National Laboratory*, Los Alamos, NM: Los Alamos National Security, LLC for the United States Department of Energy's National Nuclear Security Administration, http://www.lanl.gov/about/facts-figures/budget.php, accessed February 18, 2015.

Unites States, the Soviet Union, and the United Kingdom—to sign a treaty banning aboveground testing of nuclear weapons. In the eighteen years between Trinity and the 1963 Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space, and Under Water, the United States tested 228 nuclear weapons on the continent and in the Pacific.

Test Series	Year	Location	Number of Tests	Number of Personnel*
Project Trinity	1945	U.S.A.	1	164
Operation Crossroads	1946	Pacific	2	40,112
Operation Sandstone	1948	Pacific	3	11,782
Operation Ranger	1951	U.S.A.	5	266
Operation Greenhouse	1951	Pacific	4	7,590
Operation Buster-Jangle	1951	U.S.A.	7	7,812
Operation Tumbler-Snapper	1952	U.S.A.	8	8,710
Operation Ivy	1952	Pacific	2	11,650
Operation Upshot-Knothole	1953	U.S.A.	11	18,000
Operation Castle	1954	Pacific	6	12,700
Operation Teapot	1955	U.S.A.	14	8,700
Operation Wigwam	1955	Pacific	1	6,800
Operation Redwing	1956	Pacific	17	11,350
Operation Plumbbob	1957	U.S.A.	24	13,300
Operation Hardtack I	1958	Pacific	34	16,000
Operation Argus	1958	Atlantic	3	4,500
Operation Hardtack II	1958	U.S.A.	19	1,650
Operation Dominic I	1962	Pacific	36	22,600
Operation Dominic II	1962	U.S.A.	4	2,900
Plowshare Program	1961-62	U.S.A.	27	**

* These approximate numbers represent only Department of Defense personnel.
** Numbers for Plowshare not available.

Fig. 24: Summary of U.S. Atmospheric Nuclear Test Series. Source: Gregory Walker, U.S. Department of Energy and National Atomic Museum, Albuquerque, N.M., "Summary of U.S. Nuclear Test Series," *Trinity Atomic Web Site*, 1995-2005, http://www.cddc.vt.edu/host/atomic/atmosphr/ustable.html accessed May 21, 2014.

Over the same period, the face of New Mexico changed dramatically and its inhabitants partook in the development of the region's new economic pump. The 1950s atomic bonanza primarily affected three places in the central and northern areas of the state: Los Alamos, Albuquerque, and Grants. To the south, the development of WSMR and the University of New Mexico Tech were other manifestations of the new keen interest for defense-oriented research in New Mexico.

1. From army camp to dream town: the transformation of Los Alamos

a. A beautiful, useful, and appealing town

"Los Alamos…the World's Most Important Small Town" read the title of George Fitzpatrick's article in the August 1949, issue of the *New Mexico Magazine* following the

establishment of Los Alamos as the state's thirty-second county in June of that year. His description of the town gave equal emphasis to the scientific achievements of the Lab as to the "amazing" look of the town:

> The town surpasses anything that any high-powered real estate promoter in his most imaginative flights of fancy could have dreamed up. From a collection of tar-paper covered temporary buildings set in a hurry, Los Alamos is evolving into *the most modern community in the West*. Housing areas are laid out on far-advanced design for *beauty*, *utility*, and protection of playing children. Apartment houses have the 'new look'—so modern they seem to have come right out of the pages of the architectural magazines. New buildings like the Post Office and the big cafeteria were designed for *beauty* as well as *utility*. The big $4,000,000 community center, with its shops, recreational facilities, beauty shop, bank, 1,000-seat Theater, and super-market would be unique in any town.[7]

The repetition of "beauty" and "utility" combined with the quantification of the town's assets gives the text the impression of a piece of real-estate advertisement which praises the aesthetics and practicalities of a new suburban area. Modernity is probably also a central feature in the description to match the company town's reputation as the usher of a new modern age and bring contrast with George's Fitzpatrick's preceding article "The Secret of Los Alamos" in the issue of September 1945, in which he had dwelled at length on the geology and volcanic past of the Jemez Mountains.[8] Further in the article, the journalist insists on the variety of activities that are made available to residents: lectures, exhibits, square dances, sportsmen's movies, club meetings, rifle shoots, golf tournaments, sketch classes, bowling, skiing, skating, tennis, baseball, hockey, swimming, picnicking, and hiking. A long, non-exhaustive list of attractive pastimes which has led some residents, "whose date books are crowded with engagements daily and nightly two weeks in advance," to "think that Los Alamos is the most recreational-minded town in the country."[9]

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[7] George Fitzpatrick, "Los Alamos…the World's Most Important Small Town," *New Mexico Magazine,* Santa Fe, NM, August 1949, 21-22. Italics added by Lucie Genay.

[8] George Fitzpatrick, "The Secret of Los Alamos," *New Mexico Magazine,* Santa Fe, NM, September 1945, 10-11; 43. In this article, Ftizpatrick notes that, "Strangely enough, this laboratory which developed man's most powerful explosive force is located on the site of one of nature's most powerful explosions. […] The very land on which Los Alamos is located was built up by thick flows of rhyolite lava that came from Pelado Peak, one of the Valle Grande volcanoes." (10; 11)

[9] Fitzpatrick, "Los Alamos…the World's Most Important Small Town," *New Mexico Magazine,* 61.

By 1950, as demonstrated by Fitzpatrick, the Hill had already completely changed its appearance and looked much like any other permanent American town including lawns, fences, and numerous recreational facilities. The modernity of the place was indeed its most striking feature along with its population's tendency to hold advanced degrees, but these two elements were not without connection. In fact, the population was the exact reason why so much was invested in making the town "the most recreational-minded" in the country because its potential to appeal to sophisticated, city-dweller scientists was vital for LASL. A high quality of everyday life was the town's strongest asset to compete with other employers. As a result of this special population, Los Alamos also became advertized as one of the safest places in the United States. Robert McKee, who was at the head of the company in charge of maintenance and construction, affirmed, "the people, in general, at Los Alamos have to be above average, more so than in normal communities, due to the requirements of the Federal Government. As a result of these requirements, a citizen of Los Alamos does not have to worry about having his house broken into, nor the loss of property from his yard." The zealous efforts put into the creation of an attractive Ph.D. magnet[10] transformed the Army camp into a unique and thriving boom town where there were no old people, no cemetery, no unemployed people, no slums, and no beggars. If someone lost their job for any reason, they would leave and be replaced. From the earliest years, the schools were the town's crowning jewel, praised as "one of the nation's finest school systems with spick-and-span new buildings displaying latest architecture and furnished with the finest equipment obtainable" as well as "the best teachers and supervisory employees that are available in the country."[11] The social hierarchy based on the level of education inherited from the wartime years was perpetuated by the high numbers of degrees held by the Lab employees and the resulting competition at school raised the general academic level.

The town's reputation endured in the following decades and continued to attract transfers from other states such as interviewee Maxine Beckman who arrived in New Mexico in 1971 after having worked at the University of Santa Barbara in California. She was recruited at Los Alamos in the Cryogenics Department and then became the director's secretary. In listing her motivations for going there, her top two had to do with recreation;

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[10] Los Alamos was nicknamed "the physicists' Hollywood" because it was such a Ph.D. magnet and because of its recent historic concentration of Nobel Prizes during the war. Paul M. Sears, and University of New Mexico Bureau of Business Research, "Los Alamos— Boom Town Under Control," *Business Backgrounds*, No. 1, May 1953, Ralph Carlisle Smith Papers on Los Alamos 1924-1957, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS149BC, Box 2, Folder 70.
[11] Robert E. McKee, *The Zia Company in Los Alamos: A History*, El Paso, TX: Carl Hertzog, 1950, 24; 17.

first, she appreciated the area because her husband and she "thought [they] would really like living in the snow area, being able to ski," and, secondly, she looked forward to the possibility of playing tennis at a facility with sixteen courts. She later discovered other assets such as the fact that the schools, contrary to other places, had no funding problems and that, while her salary equaled the one she had in California, the cost of life was less expensive in New Mexico, being a much poorer state. She stressed how lucky they were to have all these recreational facilities and that she was aware that the government added them to "sell Los Alamos to people."[12]

On the other hand, the look of the town did not appeal to all newcomers. Harold Gibson, for example, migrated west from Boston in 1975 and had never heard of Los Alamos when he arrived in Santa Fe. In Pojoaque, someone told him he would love Los Alamos "if you are from back East," but when he visited the town his reaction was to say, "If I had wanted to live in Connecticut, I would have stayed back East" and he went to settle down in the valley.[13] This account is interesting because it shows that even over twenty years after the creation of Los Alamos County, its image of having been modeled on eastern standards for beauty, utility, and modernity had not worn off, and the town remained at odds with the looks of its New Mexican environment.

b. The Zia Company

The people who were behind this radical transformation from army camp to dream town actually were New Mexican local workers, mostly from the valley, who were hired by the Laboratory's contractors. Two main construction contractors had operated at Los Alamos during the War: the M.M. Sundt Construction Company of Las Vegas, NM, in 1943 and then the Robert E. McKee Company of Texas in 1944 and 1945. McKee received the same award as the University of California—Army-Navy Excellence Award—for achievements at Los Alamos. He later proclaimed that "every member of the firm at Los Alamos was proud of having played a part in the development. Even a small contribution to the entire program was something that no McKee worker would ever forget." His statement confirms that New

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[12] Maxine Beckman, Interview by Linda Campbell, 11 February 1995, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CD 26.
[13] Harold Gibson, Interview by Peter Malmgren, Chimayó, NM, 12 February 1996, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 47-48.

Mexican workers had a sense of personal satisfaction in having, even minimally, participated in the Manhattan Project.

At the War's end, the District initiated the creation of a new company at the suggestion of Colonel Alexander Stevens, a ranking engineer officer at Los Alamos. Robert McKee would remain at the head of the new main contractor but the name would change and was chosen in reference to the New Mexican flag symbol: the Zia symbol.[14] In March 1946, the Zia Company was incorporated and soon became the prime employer in northern New Mexico. According to Stevens' recommendations, Zia was to be in charge of "services necessary for the management, maintenance, operation, laboratory work, and such new construction as necessary […] as directed by the Atomic Energy Commission." The services to the community included tasks regarding personnel, safety, concessions, fiscal, property, warehouse, engineering, maintenance, and transportation.

The state of site Y after the War required a lot of work; McKee comments, "the inevitable waste in the necessary haste of war became evident." Constructions that had been meant to be temporary needed repairing; roads were torn up and needed to be paved; the telephone system maintaining communications had to be made more efficient; fallen and cut great pines had to be removed, and vehicles and utilities had to be replaced because they had been worn out or were no longer adapted to the small town's needs. Therefore the company had to hire blue-collar workers massively and, as in the wartime years, it found them in the surrounding Hispanic and Native American communities. When it began operations in April 1946, Zia employed a force of 1500 people. For some time, the company prolonged the bus

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[14] Zia is also the name of a Pueblo tribe northwest of Albuquerque. The Zia Pueblo Indians consider the sun as guidance, as a father, and a life-giver. The Zia symbol is, originally, a religious symbol of the Pueblo and goes back to their ancestors. It could be found on pottery used for religious purposes during the solstices for instance. Today, the pots that bear the sun symbol are not for sale; they are sacred and belong in the chamber of the medicine man. Rituals are conducted based on where the sun is setting on the mesa. Newborn children are lifted up to the morning sun. The rays symbolize the seasons, the cardinal directions, the stages of life (infancy, youth, adulthood, and elder) and the time of day (dawn, daylight, dusk, night). The circle represents the cycle of life. The rays are grouped by four to represent a strong body, a clear mind, a pure spirit, and devotion to the welfare of the people. The symbol was adopted to be on the state flag in 1925 after a contest that was won by physician and anthropologist Dr. Harry Mera. Mera saw the symbol on a piece of pottery of the late 1800s on display at the Museum of Anthropology in Santa Fe, and submitted a sketch of it. The symbol was painted red on a yellow background, the colors of Spain. Zia Pueblo members have been both honored and saddened by the way their symbol was used because no one came to ask the Pueblo for permission to use their symbol. They have asked for recognition of their intellectual property. "The Zia Sun Symbol," *New Mexico History.org*. The Office of the State Historian: Santa Fe, http://newmexicohistory.org/multimedia/videos/the-zia-sun-symbol accessed February 18, 2015. When the Zia Company was created, no one asked the Pueblo for permission either, despite its deep cultural and religious signification, and it thus came to be associated to a nuclear weapons laboratory.

system transporting laborers and mechanics back and forth as the Army trucks had done during the War. The Zia-operated buses went as far as a hundred miles (161 kilometers) to pick up workers but with the better housing conditions in the town and surrounding communities, the bus system was substantially reduced by 1950 because practically all workers living off-site used their own cars or publicly-operated buses to commute. In order to have a more comprehensive view of Zia's role at Los Alamos, here is a list of activities that the company used in its first institutional advertisement under the heading "what is the Zia company?"

1. It is your gas serviceman.
2. It is your carpenter.
3. It furnishes your heat.
4. It is your water company.
5. It repairs and maintains your streets.
6. It collects your trash and garbage.
7. It provides cleaning and maintenance service for many of your offices.
8. It operates your hotel.
9. It leases and administers many of your concessions and facilities.
10. It purchases and pays for many of your official supplies.
11. It services and maintains many of your work areas.
12. It furnishes maid an janitor service for your dorms.
13. It provides you with fuel, oil, ice, and wood.
14. It is your plumber.
15. It is your electrician.
16. It is your light company.
17. It is your gas company.
18. It runs your bus service.
19. It collects your rent.
20. It maintains your parks and recreational facilities.
21. It provides your official taxi service.
22. It repairs and maintains all your official vehicles.
23. It engineers, designs, and inspects some of your community facilities.
24. It constructs some of your official and community facilities.
25. It receives and warehouses much of your equipment and supplies.
26. It repairs and maintains your official typewriters, office machines, and equipment.[15]

In conclusion, there was little that the Zia Company did not do for the Los Alamos residents; a fact that led its leader to describe Zia as "the universal servant, everyman's handyman." Consequently, the Laboratory staff members and the Zia employees evolved in two separate worlds where one population was at the service of the other. The barrier between

[15] A few elements were missing in this long list such as: "operates the Los Alamos Weather Bureau and keeps meteorological record," "has operated the Fire Department," and "trucking operations to and from Los Alamos; cafeterias in the town and in the technical areas; a newspaper." McKee, *The Zia Company,* 32.

the two groups would become a growing socio-economic problem in the later years. Nonetheless, the life of these employees changed dramatically thanks to their work at Los Alamos. In his 1950 narrative of the company, Robert McKee describes the "prosperous" community, "especially in comparison to the rather thinly populated State of New Mexico, where the standard of living is average," praising its economic effects on the surrounding region and preaching the benefits of working there; he notes, "favorable working conditions and pay, and the continued demand for additional labor by the contracting companies, by Zia, and by the Atomic Energy Commission have beneficially affected the economy of the surrounding area."

TABLE I

AVERAGE RESIDENT POPULATION, LOS ALAMOS, BY FISCAL YEARS

Year	Population	Per Cent Change from Previous Year
1947	7,150	—
1948	8,200	+14.7
1949	8,643	+ 5.4
1950	10,620	+22.9
1951	12,000	+13.0
1952	12,800	+ 6.7
1953 est.	12,700	− 0.8
1954 est.	13,050	+ 2.8

Source: Atomic Energy Commission.

TABLE V

LOS ALAMOS PAYROLLS WITH MAJOR EMPLOYERS, FEBRUARY 1953

Employer	Employees	Monthly Payroll
University of California (Los Alamos Scientific Laboratory)	2,744	$1,225,000
The Zia Company	1,391	509,935
Atomic Energy Commission	760[2]	308,000
Total, major employers	4,895	2,042,935
Other workers[1]	874	364,664 est.
Total	5,769[3]	$2,407,599 est.

1. Includes school, library, medical center, and business employees.
2. Mostly guards and police.
3. Includes 1,173 workers commuting into county jobs. Does not include salesmen.

Source: Atomic Energy Commission.

Fig. 25: Population growth and employment at Los Alamos. Source: Paul M. Sears and Bureau of Business Research University of New Mexico, "Los Alamos—Boom Town Under Control," *Business Backgrounds*, No. 1, May 1953,, University Libraries, University of New Mexico, Center for Southwest Research, MSS149BC, Ralph Carlisle Smith Papers on Los Alamos 1924-1957, Box 2, Folder 70.

McKee also proudly exhibits a picture of Chief Tafoya, one of Zia's Indian employees, in his eagle-feather headdress to illustrate the fact that "Indians of the various tribes form an important part of the workers at Los Alamos" and that all of them "like everyone else, are employed at the same wages and under the same working conditions without discrimination." Emphasizing the slight paternalism of this presentation, McKee makes the statement that "the

building of Los Alamos and its operation have gone a long way toward improving the status of the Indians in the surrounding communities—some from the Santa Clara, San Juan, San Ildefonso, and other Pueblos."[16] According to reporters Mason Sutherland and Justin Locke of *The National Geographic*, some 500 Indians had jobs on the Hill in 1949; they worked as janitors, laborers, or maids. The reporters quote Mrs. Floyd saying, "Our Indian maid cheerfully works seven hours a day for $5."[17]

Fig. 26: Chief Tafoya, Zia Employee. Source: Robert E. McKee, *The Zia Company in Los Alamos: A History*, El Paso, TX: Carl Hertzog, 1950, 8.

It is statistically and factually proven that Los Alamos improved the economic status of the surrounding Native American communities thanks to these job opportunities and the income it generated, especially if one focuses on the postwar decade which was the most profitable to the pueblos before Los Alamos opened its gates to the outside world in 1957.[18] Yet, as early as 1948, Daniel Lang from *The New Yorker* reported that, despite the financial benefits, "in general the feeling is that it would be better if the Laboratory had never come and the little rich boys [from LARS] had never gone away. The Indians have once again found that the white man's ministrations are not necessarily a boon." The information about these sentiments came from Edith Warner who told the reporter what was being said in the Pueblo of San Ildefonso. Although they were earning money, Pueblo members had lost access to canyons that provided wood, water, and greens for their dances. "Whenever anything goes wrong," Warner said, "whether it is of personal nature or general, like the lack of water, they curse the Hill."[19]

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[16] All quotes above are from McKee, *The Zia Company*, 7; 1; 9; 32-33, and 20-21.
[17] Sutherland, et al., "Adobe New Mexico," *The National Geographic Magazine*, 813.
[18] Darryl Martinez, Interview by Lucie Genay, Governor's office of San Ildefonso Pueblo, NM, 17 September 2013.
[19] Lang, "A Reporter in New Mexico," *The New Yorker*, 76.

The weak competition among job seekers during that period allowed local workers to be hired quite easily. For example, when Zia put a propane plant into operation in urgency, they combed the villages and the entire Rio Grande Valley in search for workers and all available labor was brought to the Hill. In 1950, McKee expressed his optimism and complete faith in the potential of Los Alamos for growth and longevity, writing, "It is doubtful whether Los Alamos will ever reach a point where construction and expansion will entirely cease, as science is a matter of progressive development, rather than spontaneous achievement."[20] The town would always need new buildings and new equipment, so even if development slowed, it would never completely stop.

c. From farmers to atomic workers

The Laboratory represented hope for scientific achievements but also for economic stability in northern New Mexico "as former sheepherders, cowboys, miners, lumberjacks, and railroad employees found stable, relatively well-paying work in Los Alamos, thus ending their often migratory search for work."[21] These migrations dated back to the end of the previous century. By the end of World War II, however, the availability of farm-labor in the state had dropped even lower as a result of a general trend toward the decline of agricultural activities. An article in October 1945, entitled "No more Land," recounted the story of three soldiers who fought in the Pacific and had a dream of homesteading in New Mexico. Their dream was shattered because homesteading and farming were no longer an option in New Mexico at the end of the 1940s according to journalist Margaret Page Hood. Hood quotes experiment station economist Morris Evans explaining that the state was "classified in normal times as a surplus farm-labor state" or that it had "always been a reservoir of farm workers for the sugar beet fields of Colorado or the sheep camps of Wyoming." This meant that agricultural opportunities were insufficient, especially in the farms of the irrigated valleys in the northern and central part of the State which were too small to hire farm laborers.[22] Thus, all the surplus of laborers who previously had left the state for Colorado, Wyoming, Arizona, Montana, or California turned to the Hill and the Zia Company to find a new livelihood.

In addition to the penury of agricultural labor, many New Mexicans who had gone to find jobs in the war industries, such as on the naval shipyards in Oakland, California, were laid off at the end of the War. It was the case of interviewee Aaron Martinez's father who

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[20] McKee, *The Zia Company*, 23.
[21] Aldrich, "Zia Company, 1946-1986," *New Mexico.org.*
[22] Margaret Page Hood, "No More Land," *New Mexico Magazine,* Santa Fe, NM, October 1945, 43.

decided to go back to Chimayó to spend time with his elderly father. Martinez remembered wondering why they were going back to "this place" and whether his father was crazy when the family came back in 1945. His father found work as a mechanic helper on governmental vehicles at Los Alamos.[23] In the early years, many jobs in construction, mechanics, and janitorial works on the Hill were seasonal, meaning workers would get hired every summer and laid off every winter. Yet, despite this precariousness, the workers expressed genuine content with the new situation. Some commuters had over an hour-and-a-half drive to go to Los Alamos; some recall commuting in the back of pick-up trucks where they would light a fire.[24] Other families, like Patricia Trujillo-Oviedo's, had two dwellings; they kept the family house in Chimayó and had a trailer in Los Alamos during the week. Her family was able to buy a car and would lead an urban life during the week and a rural life on weekends. Interestingly, she remarked that although she was born in Los Alamos and felt comfortable in both cultures, she considered Chimayó was her home.[25]

As already mentioned, interviews of the first generations of Zia and Laboratory workers show that these populations perceived Los Alamos as a great opportunity for economic development, both on the scale of their individual families and of their communities in the valley. The testimonies focus most recurrently on the financial improvements and security provided by the new jobs. "Los Alamos has been very good to us," said Bernadette Cordova for instance.[26] Interviewees also insist on the potential for improvement, additional training, or further schooling once inside the Lab's system. Technicians were trained on the job to operate various machines and heavy equipment and thus gained in experience. Loyda Martinez told the story of her father who had a third-grade education. He worked as a janitor and as a truck driver before meeting a scientist, an "Anglo man," who mentored him to become a mechanical technician.[27]

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[23] Aaron Martinez, Interview by Peter Malmgren, 24 February 1996, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 55-56.
[24] Ruben Montoya, Interview by Carlos Vásquez, Santa Fe, NM, 9 August 1994, "Impact Los Alamos Project."
[25] Patricia Trujillo-Oviedo, Interview by Carlos Vásquez, Chimayó, NM, 27 October 1991, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CDs 36-37. There were in fact two different cultures from the beginning: the Los Alamos culture inspired by the scientific atmosphere at the lab and eastern cosmopolitan sophistication, and the New Mexican cultures of the valley combining Indian, Hispanic, and Anglo influences.
[26] Bernadette V. Cordova, Interview by Peggy Coyne, Española, El Wache, NM, 29 February 1996, "Impact Los Alamos Project."
[27] Loyda Martinez, Interview by Peter Malmgren, Chimayó, NM, 3 December 1995, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest

Another example is Nick Salazar of Chamita who wanted to "be somebody" and do something to other than work on a farm with sheep or cattle. After his time in the military, where he took administrative courses, he was hired for an administrative job at Los Alamos in 1950. He learned a lot while working on various projects, including the fusion project but also through additional schooling in nuclear and mechanical engineering at Santa Barbara, California, and at the University of New Mexico branch in Los Alamos. Eventually, he attained the highest position for an electrical/mechanical technician in his lab and started conducting experiments on his own. This treatment ensured that employees supported the Lab even after they retired. Salazar, for instance, continued working as a consultant and as a public relations specialist for Los Alamos when he retired. He believed the Lab had considerably contributed to the education and expanded the minds of many families in the valley. His experience in Los Alamos led him to see the pursuit of science as "very important" and of the work at the national laboratories as "invaluable."[28]

In more practical terms, Hipolita Fernandez, whose husband worked for Zia as a custodian for 43 years, plainly said that they lived more comfortably, that people could easily apply and succeed in getting a job despite a low level of education— up to sixth grade in the case of her husband. The people did not think of the atomic bomb in terms of deaths or of the impact in the world, but in terms of jobs.[29] Oftentimes interviewees mention the exceptional benefits that no other employer in the area could offer. Pedro Martinez, for instance, mentioned sick leave, retirement, and pay as what motivated him to apply for a job at Los Alamos. He guessed that most of these benefits, as well as the recreational facilities, had been originally set up for the scientists.[30] The pay—about 80 cents an hour in 1950-1951[31]—was more than in the mines or in the fields, and the work was not as hard. Danny Martinez, a mechanical engineer, stressed the fact that he enjoyed an eight-to-five schedule and was not physically tired going home; he said, "I am still having difficulties to believe that this is a job.

Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 65-66.

[28] Nick Salazar, Interview by Carlos Vásquez, San Juan Pueblo, NM, 29 July 1994, "Impact Los Alamos Project." Salazar worked in Los Alamos until 1991, first in the procurement division and then as a technician.

[29] Hipolita Fernandez, Interview by Troy Fernandez, Chimayó, NM, 27 February 1994, "Impact Los Alamos Project."

[30] Pedro Martinez, Interview by Peggy Coyne, 15 February 1996, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 67-68.

[31] Lebeo Martinez, Interview by Dot Waldrip, Albuquerque, NM, 18 November 1995, "Impact Los Alamos Project."

I was brought up thinking a job was a sweating tiring activity. It is incredible. I can play football with my son, things that my parents couldn't do because they had to work."[32]

Ruben Montoya, who worked for Zia between 1946 and 1952, started as a roadman for a $125 monthly salary and became a party chief with $200 a month, a wage he alleged to be only half that of his Anglo colleagues. He added that he would not pay much attention to the bomb because he was more interested in his immediate job, building roads and utilities.[33] According to Ramon Fresquez of San Pedro, who started working at Los Alamos in 1945, first as a carpenter and then as a clerk, raises (ranging between 7 cents and nothing) were given every six months or every year but depended on the recommendation of their supervisors who would see them in their offices for ratings. He commented, "They wouldn't ask you if you had anything to say because if you did, they would probably hold it against you later on, so we were afraid." He remembered that one of his white male coworkers was promoted right away instead of just getting a raise and explained they did not have any representation at that time; there was no "respect for the lower class" until the 1970s in his opinion.[34]

The salaries allowed families to become financially stable, take out loans in banks, buy property, cars, televisions, and appliances, and sometimes take care of an elderly parent. Merchant companies lost their best employees to the Lab because it could pay them more. According to Pedro Martinez, his native community of Alcalde "was dead" before Los Alamos, but people had "really prospered" since. Or else, Martinez talked about Chimayó, which was "nonexistent" before, but "now, [in 1996, year of the interview] look at all the beautiful homes there," he said. All of his children were working for LANL in the 1990s.[35] The before and after dichotomy discourse runs through the majority of testimonies by early beneficiaries of the scientific and economic upheaval. Josefita Velarde and C. L. Hunter, for example, went as far as calling Los Alamos a "life-saver." Hunter added that it was "probably the best thing that ever happened to [the] area because [they, Española] were just a sleepy little community." His father worked for an oil company at the time; he would sell gasoline

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[32] Danny Martinez, Interview by Carlos Vásquez, LANL, NM, 8 November 1991, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CD 57.

[33] Ruben Montoya, Interview by Carlos Vásquez, Santa Fe, NM, 9 August 1994, "Impact Los Alamos Project." Ruben Montoya's detachment toward the kind of work that was being done at Los Alamos proves that these workers did not have the luxury to consider ethics and politics. They were satisfied with earning a living there.

[34] Ramon Fresquez, Interview by Kenneth Salazar, San Pedro, NM, 14 March 1995, "Impact Los Alamos Project." Fresquez was once told that if he "didn't like it," he "had one thing to do and that was to quit." After he told his supervisor he was not going to quit, he did not receive his raise that year.

[35] Pedro Martinez, Interview by Peggy Coyne, 15 February 1996, "Impact Los Alamos Project."

and wax. The dealership was enlarged in 1948 and again in 1954 because business doubled yearly, with the gasoline sales doubling, even tripling annually. From a business standpoint, there were no drawbacks he could think of because the spin-off effect was dramatic for all businesses who could sell to Los Alamos. [36]

In consequence, working on the Hill became the ultimate goal for all local residents and for their children to achieve. According to Jose Benito Montoya, working for Los Alamos in 1952 was an honor because "[they] got things [they] never had before."[37] Danny Martinez recalled accompanying his father, who was a carpenter, to sell wood to the "rich people" who lived in Los Alamos. One of his uncles was a technician there and Martinez recollected how they "looked at him with envy" because he had "the constant job," "he had money, everything he wanted," and his conclusion was that "it seemed like a really good job to have."[38] Because many in her family worked there, Lucille Sanchez believed as well that working at Los Alamos was a "goal" to achieve. She took night classes for college credits while in high school for that purpose and got a job in the visitor liaison office, helping foreign workers, getting badges and contracts ready.[39] For Ed Sitzberger, whose father came to New Mexico in 1920 from Wisconsin, the fascination with Los Alamos dated back to a school football game in the 1940s. He had wanted to work there ever since. Finding work in New Mexico was difficult for him after college, so he was delighted when he was recruited on a construction project. He stressed the positive effects of the Lab on the area and how it was "always a trouble" for him "to deal with the negative you hear about the Lab." It bothered him "because of the major benefits that the Lab has generated for New Mexico." Among these benefits, he cited the "incredible" economic development, small businesses that depend on the Lab, and the higher pay than in any other job.[40]

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[36] C. L. Hunter, Interview by Steve Fox, Española, 9 August 1994, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 51-52. The adjectives "sleepy" and "little" are the same as those used by Richard Cook to talk about Española in the past, using the images of the Old West. (see Part 2, Chapter 3, Relations and cultural influences: the local perspective)
[37] Jose Benito Montoya, Interview by Steve Fox, Pojoaque, NM, 8 August 1994, "Impact Los Alamos Project."
[38] Danny Martinez, Interview by Carlos Vásquez, LANL, NM, 8 November 1991, "Impact Los Alamos Project."
[39] Lucille Sanchez, Interview by Carlos Vásquez, 27 October 1991, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CDs 30-31. Sanchez also said she was not sure why she did not get promoted over the eight years she worked at the Lab, but she believes it was discrimination because other new people came to the same department, with degrees that were inapplicable to that position, and were able to get a supervisory position.
[40] Ed Sitzberger, Interview by Linda Campbell, Cimarron, NM, 10 February 1995, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CDs 32-33.

Charles Montano, born in 1952 in Santa Fe, testified that his father's hard life working with cattle and his lack of education—he had a third-grade education, but could neither read nor write—was his greatest incentive to get a college education. The family lived on food stamps when his father could not find work. During summer breaks and after school, Montano would help him in construction and thus got a sense of how hard it was to make a living. He no longer wanted to work outdoors, dig ditches, mix concrete, and do construction work as his father had done. Montano's first contact with Los Alamos was when he would sell manure in potato bags loaded by hand to people who lived there; he could not believe the people would buy manure one dollar a bag. Reluctant to experience the culture shock of going beyond the boundaries of New Mexico, Montano attended the Highland University in Las Vegas. He declared, "I wanted to prove myself, I was as good as the Anglos who were living in the nicer homes."[41] Similarly, Aaron Martinez of Chimayó, who was hired by the Lab as a chemist in 1964, said he wanted to equal himself to the other chemists. For this reason, he started taking more classes than necessary to complete his degree. He reported feeling good associating with such brilliant colleagues, one of whom was awarded the Lawrence award. His dismissal in 1977 came as a shock but degrees had become an important selective criterion; he explained, "They had to get rid of many people. I didn't have a Ph.D. and other people who got fired didn't have a Ph.D. either. So I thought it was that degree, no matter how productive or good you are, you're protected."[42]

The envious feeling expressed by Charles Montano above can also be accounted for by the increasingly stark contrast Los Alamos displayed with the worker's environment. When asked about the difference between Los Alamos and Chamita, Ruben Waldo Salazar, who began work at Los Alamos as a lineman in 1944, replied that the main difference was how much money people had and, ironically, that the Los Alamos people "probably have more time for recreation."[43] Richard Cook, owner of the Bond mercantile company, explained that valley people knew little about the city on the hill in the 1950s. The striking aspect was how different the two communities started to look. Española did not have anything in comparison to the swimming pools, the new schools, the recreational centers and other facilities that Los

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[41] Charles Montano, Interview by Carlos Vásquez, 16 April 1996, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CDs 1-4.
[42] Aaron Martinez, Interview by Peter Malmgren, 24 February 1996, "Impact Los Alamos Project."
[43] Ruben Waldo Salazar, Interview by Peggy Coyne, Chamita, NM, 21 February 1996, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CD 29.

Alamos had because the area could not afford such equipments. Each group socialized among themselves, but the two rarely met outside the work circles that evolved side by side but independently. According to Cook, the difference in the quality of each community's educational system was positive because local children were able to benefit from it when their parents had dropped out of school at an early age to go work in the fields. Cook described this positive influence as a virtuous cycle mechanism in which surrounding villages and towns would see their prosperity grow with the growth of the Labs.[44] In addition, Alfonso Mascarenes of Dixon said Los Alamos had dramatically changed the rural lifestyle of his community which was replaced with "good jobs, good homes, good cars," and "a comfortable life" including more electricity, indoor plumbing, and easier access to water: things he did not have while growing up. In his opinion, the community had become more "independent," and like Cook, he believed the general level of education was better. The reason why he had left to California as a youth was that "the community in Dixon was not going to do anything for [him];" he wanted a "future for [him]self" and Los Alamos provided that future—he worked there as a chemist for over 27 years.[45] Statistics confirm the sentiment of superiority and separation in the early 1950s, as demonstrated by the Bureau of Business Research at the University of New Mexico in 1953:

> The new county still lives almost entirely on Federal Government funds and has no roots in the State's traditional farming and ranching, mining, lumbering, and trade. Naturally, then, it is basically different from the rest of New Mexico. In nearly every comparison of the 32 counties by income, employment, housing, health, and similar characteristics, Los Alamos stands either first or last. It leads in such favorable indicators as income per capita, percentage of college graduates, and number of homes with electricity; it is lowest in such attributes of substandard economy as inadequate housing, death rates, and unemployment.[46]

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[44] Richard Cook, Interview by Steve Fox, Española, NM, 8 August 1995, "Impact Los Alamos Project."
[45] Alfonso Mascarenes, Interview by Dot Waldrip, 14 January 1996, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 69-71.
[46] Sears et al., "Los Alamos – Boom Town Under Control," *Business Backgrounds*. In addition, "Los Alamos has inevitably had a disruptive effect on the ancient routines of these simple communities. In partial compensation it has also raised their cash incomes by providing jobs. Many of the villagers have been attracted to semi-permanent settlement in Los Alamos, to the extent that today about 7 per cent of the residents are Spanish-American.[…] The total non-white population in 1950, comprising Indians and Negroes and some Oriental groups, was less than 40 individuals."

The dream of living and working in Los Alamos hence became a family tradition: Florida Martinez was born in 1944, as her father worked as a seasonal worker for Zia, earning a living comfortable enough to raise his children. She stated that working for Los Alamos one day became her goal as a teenager. She asked her parents to go back to school because she could not get a job. After a year of business school, Zia hired her. She worked for them for twelve years until she applied to the Lab and became a senior secretary in the Laser Division in 1978. She appreciated the varied work experiences she got and grew comfortable despite being impressed by the people she worked with at first. In turn, her son's objective became to work for the Laboratory as well.[47] Social reproduction therefore intensified the next generations' desire for improvement and social ascension.

Without a good education, advancement was impossible. So, from an early age, children like Aaron Martinez, whose father had an eighth-grade education and his mother a tenth-grade education, understood that school would be primordial. His father sent him to private schools to that end. He became a chemist at the Laboratory in 1964, but competition was harsh because the Laboratory would pick the top people throughout the country and the world. Before his recruiting, he had asked his brother who already worked in Los Alamos for his opinion. His brother advised him not to come. Aaron interpreted this reaction as jealousy.[48] Jealousies toward people who had access to the Hill increased in the following decades as competition became harsher and positions scarcer. The positive aspirations inspired by the example of predecessors were increasingly replaced by tensions among members of the same age group between those who stayed and those who left.

The implications of this change will be further analyzed in Part 4 of this work; however, Fransisco Leroy Pacheco addressed this issue when talking about being considered as an outsider in his original community. He recalled the terrifying change to move from Mora to Los Alamos as a four-year-old boy. The place still looked like a military base with security guards, but was also a melting pot of people coming from all over the world. When his father worked for Zia in 1949, houses were only available for scientists and engineers—commuters would leave at 5:30 in the mornings to begin work at 7:30 a. m. The company eventually built small apartments for workers in the early 1950s. He recalled how rich people were, how well they ate, and how well they were dressed. He sometimes felt out of place at school because he

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[47] Florida Martinez, Interview by Carlos Vásquez, Chimayó, NM, 27 October 1991, "Impact Los Alamos Project."
[48] Aaron Martinez, Interview by Peter Malmgren, 24 February 1996, "Impact Los Alamos Project."

only had two shirts that would get washed every other day, while other children came to school with a different shirt every day. School was a culture shock. His parents encouraged the children to speak English to make sure they would not have an accent or mix the two languages. Bilingualism was one of the major difficulties for locals, both at school and at work. A majority of these families' mother tongue and exclusive language at home was Spanish. The work routines and protocols could be difficult to understand when group leaders spoke fast or used complex vocabulary to give instructions.[49] Speaking Spanish was discouraged on the Hill because, although parents did not speak English to their children, it was important to them that they should become fluent. As a result, in a family of seven or eight children born in the 1950s and 1960s where the parents worked at Los Alamos, typically, the four younger children would speak English while the four older children would speak Spanish.[50] Some of these children who were born in Los Alamos but had roots in the Spanish-speaking communities of the valley chose to attend Spanish classes at school to be able to communicate with their grandparents.[51]

Pacheco explained his father had driven to Taos, Las Vegas, and Albuquerque to find work. The first time he had applied in Los Alamos, around two hundred people from Española, Taos, Pojoaque, Las Lunes, and other communities were waiting in line to turn in their applications. Pacheco believed his father was hired because he was talented with his hands, could speak English well, and had a light complexion. After working for Zia, he worked for the Los Alamos University of New Mexico branch as a custodian. His father told him he wanted him to get out of Mora because there was nothing there for him. Some of his father's friends, who had stayed in Mora, became jealous of his parents when they came back on weekends; he recalled, "people would say the Pachecos from Los Alamos are in town." A few also were jealous of the schooling the children received. They believed living on the Hill meant they had everything they wanted, but they "did not live in a mansion." His brother and he were considered as outsiders, "branded," because they had left. As a result from these tensions, there were a few violent altercations. Pacheco also mentioned the points system which was established after the War to determine housing in Los Alamos. Points were

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[49] Hipolita Fernandez, Interview by Troy Fernandez, Chimayó, NM, 27 February 1994, "Impact Los Alamos Project."
[50] Danny Martinez, Interview by Carlos Vásquez, LANL, NM, 8 November 1991, "Impact Los Alamos Project."
[51] Patricia Trujillo-Oviedo, Interview by Carlos Vásquez, Chimayó, NM, 27 October 1991, "Impact Los Alamos Project."

determined by the type of work each individual had and these points determined what kind of house they could buy and where:

> "People in the same trade would live in the same neighborhoods at that time. When the government sold the houses up there,[52] you got points for the job that you had (the higher job you had, the more points you got). I asked my dad once 'how come we don't live there, where Jim or James live?' He would say, 'well, you know Jim's dad is a scientist, he has 5,000 points, and I only have 1,000.' So really quick, it became the blue collar/white collar separation of Los Alamos. In our neighborhood, you didn't have a single scientist. A couple of people who worked for the Lab, maybe, but all the others worked for Zia as electricians, plumbers, roofers, etc. Economic discrimination, that's what I call it. How do they know that my Dad didn't have $20,000 at the bank and couldn't afford to buy that house across the street? He couldn't because he didn't have the points. Then, they had 2 Junior high schools: one became the blue collar school and the other the white collar school. They had the new gym, the new lockers, the new books. At Pueblo Junior High, we had the old versions of all that."

On the other hand, Pacheco emphasized how amazing it was to be taught by teachers who had Ph.D.s. He said he felt a major difference when the doors to the town opened and the community ceased to be a little military base after 1957. Even in Junior High School, competition was enhanced, and people looked at him differently. For instance, Girls showed disappointment when he told them that his father worked for Zia. The first time he ever heard the term Mexican or Greaser was when he was twelve or thirteen years old from children talking about his friends who lived in Chama, Tres Ritos, Piñasco, and Española. He said he became the "Hispano buffering 'what do you mean you're saying that about X, he's my good friend, I just finished roofing his house down in Española with my father!"[53]

What comes out of these interviews that focus on the early times of the Lab (1943-1960) is a deep sense of satisfaction and gratitude at the Lab's presence in northern New Mexico. However, the rise of socio-economic tensions among community members crystallized around the benefits of the Lab, and a few comments reflect sentiments of

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[52] In White Rock—a small town next to Los Alamos founded in the 1949 by the AEC to house construction workers for Los Alamos.

[53] Fransisco Leroy Pacheco, Interview by Carlos Vásquez, Albuquerque, NM, 3 December 1993, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CDs 20-24.

discrimination due to a form of educational "aristocracy."[54] The drawbacks, nonetheless, were eclipsed by the substantial advantages. The massive employment opportunities at Los Alamos slowly instituted a form of dependence between the Lab and the local populations. Several interviewees enumerated all their relatives and members of their communities who had been employed there at one time or another, a situation which prompted some of them to wonder, "if it was not for Los Alamos, where would we all be? In what kind of shape would we be?"[55] This dependence, the result of previous economic desperation, also shows in the mesmerizing effect that Los Alamos, as a symbol of success, had over some of them.

2. Sandia and the transformation of Albuquerque[56]

a. The Z division

Job opportunities were not limited to the region of Los Alamos in the postwar decades. Some of the interviewees mentioned above talked about relatives who were hired at another brand new nuclear facility in the state, in Albuquerque. Before the end of the War, the attention of the Manhattan Project's leaders had already turned to the "Duke City." Albuquerque was first used to deliver material for the Trinity test and then, in March 1945, a new use was found for the city to conduct Project A (for Alberta) which consisted in making sure that the bomb would be a practical airborne military weapon. The closest large airport to Los Alamos was Kirtland Field—formerly Oxnard Field. Moreover, the brand new military base would be advantageous to meet transportation needs, store material, and house personnel. A group from Los Alamos was created in July 1945, to handle future weapons-development engineering and bomb assembly under the leadership of Dr. Jerrold Zacharias from the MIT Radiation Laboratory. Zacharias' group, named the Z Division after him and the ancestor of the Sandia Laboratories, was then moved to Albuquerque that September. That

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[54] Reporter Joe Alex Morris comments in his 1948 article on Los Alamos, "Although this has nothing to do with income, the Tech personnel are the aristocracy and the oldest residents of the town and, more important, it is their work alone that perpetuates the subsidized community. They are likely to get certain favors and likely to live on Snob Hill, because you can always hire a bookkeeper, but sometimes a nuclear physicist is hard to find." Joe Alex Morris, "The Cities of America: Los Alamos," *The Saturday Evening Post*, Indianapolis, IN, 11 December 1948, Ralph Carlisle Smith Papers on Los Alamos 1924-1957, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS149BC, Box 1, Folders 28, 29, 30.

[55] Ruben Waldo Salazar, Interview by Peggy Coyne, Chamita, NM, 21 February 1996, "Impact Los Alamos Project."

[56] For more information on this subject, see "History," *Sandia National Laboratory*, Albuquerque, NM; Livermore, CA: Sandia Corporation for the United States Department of Energy's National Nuclear Security Administration, http://www.sandia.gov/about/history/.

same month, Oxnard Field in Albuquerque was assigned to the MED. Sandia is therefore a direct descendant of the Manhattan Project.

In the aftermath of the Japanese bombings, military leaders, such as General Nichols, worried that the stockpiling was not going fast enough. Nichols proposed using outside contractors to build most bomb components and transferring the final assembly work to a special technical military unit in the Manhattan District. Los Alamos would thus be relieved of its production responsibilities and would be able to focus on the development of new types of bombs. The Z Division would be perfectly adequate for that job. To build a stockpile of the Fat Man model, the division would use the designs produced by the X (explosive) and G (gadget) Divisions, develop models, conduct surveillance tests, and then would be in charge of the development and testing of these new models. Engineers also hoped to improve safety standards when loading nuclear weapons on aircraft, upon takeoff, and in flight.[57] Further testing was therefore necessary to determine the general reliability and airborne viability of the Fat Man model. Sandia Base would need a testing range. In September 1945, representatives of the Z Division made an aerial survey of the practice bombing range previously used by aircraft from Kirtland and selected Range S-1, approximately 25 miles (40 kilometers) southwest of Albuquerque.

Part of the range, located west of Los Lunas and east of the Rio Puerco, rested on land belonging to the Isleta Indian Pueblo. Arrangements were made by Glenn Fowler, head of Sandia's testing group, with an official of the tribe for permission to use this area. Through this transaction, more Native American land was integrated in the weapons production complex.[58] In mid-1946, General Groves organized a special Army battalion and sent it to Sandia Base to be trained and represent the military for surveillance, field tests, and weapons assembly. This group of 63 junior Army officers, top West Point graduates, almost all of them from the Corps of Engineers, became known as the "Sandia Pioneers," thus perpetuating the association between atomic science and America's history of exploration. Since the General believed "that nobody over thirty-five would have a mind flexible enough to understand nuclear physics," most group members were well under thirty.[59] At the same time, military

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[57] The night before the bombing of Nagasaki, two B29s had crashed and burned on takeoff. Necah S. Furman, *Sandia National Laboratories: The Postwar Decade*, Albuquerque, NM: University of New Mexico Press, 1990, 127.

[58] I write "more Native land" because the San Ildefonso Pueblo have proclaimed their right to the land on which LANL sits on the grounds that it belonged to their tribe and that they have sacred sites on the mesa.

[59] David A. Taylor, "Sandia Pioneers: Nuclear bomb a challenge for young scientists," New Mexico, Vol. 83, No. 9, September 2005, 60, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray

personnel stationed at Tinian were transferred to the Walker AFB in Roswell, conveniently close to Kirtland, so that pilots and B29s would be available to provide air support for testing operations. At a rate of two tests per week in 1946, all bomb instrumentation completed in Los Alamos was sent to Sandia for final checkout; the unit would be loaded in a B-29 aircraft at Kirtland, and the Z Division convoy would proceed to the Los Lunas Range for testing.[60] Finally, in the fall of 1947, the AEC transferred all remaining activities of weapons assembly from LASL to Sandia, enabling the original weapons laboratory to focus on nuclear physics research, fulfilling the wishes of the Lab leaders since the end of the War. Thus, Albuquerque's Sandia Laboratories, 75 miles (121 kilometers) south of Los Alamos, became the world's first assembly line to produce nuclear weapons. The links between Sandia, Los Alamos, the Air Forces Bases, and the Army formed the skeleton of a well-oiled mechanism that generated immense economic activity in the state.

b. The Sandia Corporation

Two years later, the Regents Committee on AEC projects stated that Sandia's work of weapons production, stockpiling, and surveillance, especially in peacetime, was not appropriate for University management and requested a transfer to corporate management. In January 1949, Paul J. Larsen, Director of the Sandia Branch since 1947, agreed to the idea of a transfer and proposed to the AEC that the Laboratory be operated as a New Mexico state corporation to be known as Sandia Laboratory, Incorporated.[61] The AEC, however, favored an impartial manager to run the branch, so the Western Electric Company, Incorporated, and the Bell Telephone Laboratories (BTL) accepted operation of Sandia. The two companies belonged to the American Telephone and Telegraph industrial complex (AT & T), which came out as a suitable candidate for the contract in part because of "its history of complex government relations and contributions to defense efforts."[62] The transfer was completed in November with George A. Landry named first president of the corporation. At that point, the military-scientific complex also became an industrial complex. The transition was a

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Angélico Chávez History Library Vertical Files, Sandia National Laboratories 1. The intensification of tests in 1946 was due to operation Crossroads in the Pacific. At that occasion, Senator Carl Hatch, a member of President Truman's Evaluation Commission, chalked "Made in New Mexico" on the side of the bomb's canvas security cover "to make sure that New Mexico personnel received just recognition for their substantial technical contribution." Furman, *Sandia National Laboratories,* 192.

[60] Furman, *Sandia National Laboratories,* 141; 151.

[61] Alexander, *History of Sandia Corporation,* 23 and Furman, *Sandia National Laboratories,* 334.

[62] BTL would be responsible for research and development (R & D) of both pure and applied science while Western Electric, as one of the nation's largest manufacturing companies, would handle the manufacturing. Furman, *Sandia National Laboratories,* 340. Since 1993, the Sandia Corporation has been a subsidiary of the Lockheed Martin Corporation, the U.S.'s biggest defense contractor.

complicated move because of the growing demand for weapons in the 1950s, resulting from the persistant deterioration of global politics, which intensified production and added the task of storing the stockpile. In 1956, a Vice Presidency of Research and Development Technical Services was created to handle the work connected to storage in the foothills of the Manzano Mountains, just east of the Sandia Base. This part of the base was first called Site Able and renamed Manzano Base in 1952 because it was operated by the Air Force. It was one of the six original National Stockpile Sites. Manzano and Sandia Base merged with Kirtland AFB in 1971. Thus, Nuclear weapons production in New Mexico went from design and conception all the way to storage.

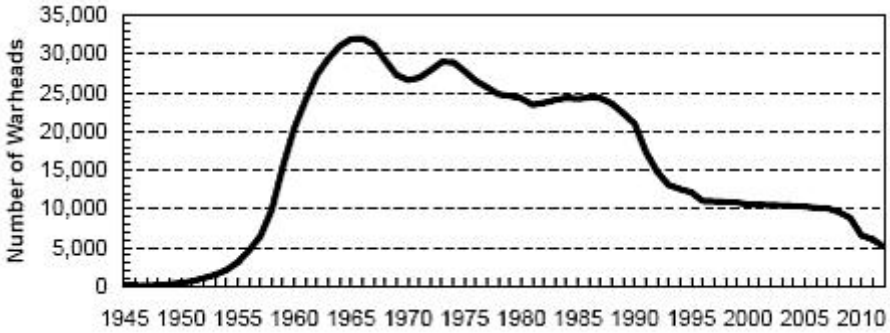

Fig. 27: History of U.S. Nuclear Weapons Stockpile, 1945-2012. Source: Hans M. Kristensen, "Estimates of the U.S. Nuclear Weapons Stockpile, 2007 and 2012," *FAS.org*, Washington, DC: Federation of American Scientists, 2 May 2007, http://fas.org/blogs/security/2007/05/estimates_of_us_nuclear_weapon/, accessed June 26, 2014.

The rapid growth in demand for Sandia products and services caused many difficulties, and recruitment issues in particular. At its beginning, the force counted only 370 people, but after the announcement in April 1948, that Sandia would become an independent branch of LASL, personnel grew to 470. By the fall of that year, the figure had exceeded one thousand employees.[63] The recruitment campaign led by the head of Personnel brought in new employees at the rate of 25 per week in 1948. The Washington AEC office helped advertise job queries across the country in order to locate the talent necessary to work at an atomic weapons factory. The personnel makeup was no easy task because talents and qualifications of all kinds were needed, and, again, the Laboratory had to "sell" New Mexico to potential recruits. As the Lab's role expanded, additional personnel in cross sections of industry were needed. In 1950, Sandia "started a college recruitment program supplemented by national newspaper and magazine advertising."[64] In parallel, expansion also manifested in the Lab's growing physical presence: between the formation of the corporation in 1949 and 1963, the

[63] Alexander, *History of Sandia Corporation*, 17.
[64] Furman, *Sandia National Laboratories*, 460.

land occupied by the Lab at Sandia Base grew from 458,000 to 1,651,000 square feet (503,224 square meters).[65]

Despite having its headquarters on a military reservation, Sandia was under civilian control represented by the Santa Fe Operations Office, which became the Albuquerque Operations Office (ALO) of the AEC in 1956. This intricate status was coupled with the corporation's confused identity due to its diversified activities: should it be a manufacturing organization, an R & D institution, or a field test branch? Research at the Lab, for example, would focus on issues such as the height at which an atomic bomb should explode to maximize damage, loading systems to board weapons on aircrafts, the shape of bombs and their casing, ballistic systems, and guided missiles. Gradually, research activities gained ground through organizational changes that decreased its production role while augmenting R & D and testing activities. Consequently, Western Electric's influence was diminished, but BTL's expanded. The intricacy of this distribution of ownership and control between the industry, the government, and the Army of the "Albuquerque complex" reflected the organization of the nation's military-industrial complex.

What role was the state of New Mexico required and able to play in this machinery? It was to participate in providing the means of production and local support for national policies. The state furnished land for the base to expand but also labor. Personnel needs at the managing offices in Albuquerque and at the corporation meant there were jobs available at all technical levels both for scientist transfers and for local skilled and unskilled workers.[66] The diagram below not only represents the proportion of Sandia employees holding college degrees in the first ten years but also the rest of the employed population, such as technicians and blue-collar workers. The majority of workers who were hired locally were technicians,

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[65] Alexander, *History of Sandia Corporation*, 34. However, while the Sandia Corporation continued to spread, it did not own any of the land because its headquarters were situated on a military reservation, making all buildings a government property. This situation had an unexpected effect when residents of the Sandia Base went to register to vote for the national election of 1952 in Bernalillo County. The authorities informed them that, because the land they lived on had been ceded by the state of New Mexico to the Federal Government, they were not considered as residents of New Mexico and were not entitled to vote. Another issue was to determine how the state would be able collect state income taxes from these residents who were considered to be living in an area which was not part of New Mexico. An amendment to the Atomic Energy Act solved the jurisdiction problem. Furman, *Sandia National Laboratories*, 465.

[66] Moreover, the State saw the corporation as an economic asset to create partnerships with public and private institutions or to make deals to multiply the number of jobs over the years. More recently for instance, in 2003, Governor Bill Richardson announced a new partnership between SNL and an Albuquerque investment fund to create up to 2,000 new jobs in New Mexico over four years. Aaron Baca, "Sandia Deal To Make Jobs," *Albuquerque Journal*, Albuquerque, NM, 2 May 2003, D-3, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Sandia National Laboratories 1.

security guards, secretaries, clerks, construction workers, janitors, and handymen. While less gratifying than jobs which were reserved to the cream of physicists, those jobs offered New Mexicans a way out of poverty in the state's rural areas. Furhtermore, the Zia Company also participated in the development of the base since Los Alamos contractor Robert McKee handled the construction of a complex of fourteen permanent buildings at Sandia.[67]

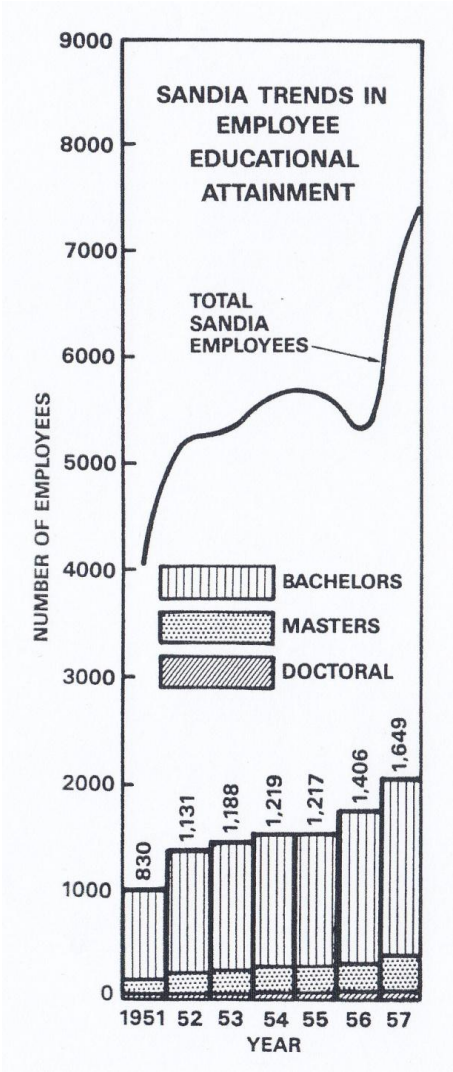

Fig. 28: Sandia Trends in Employee Educational Attainment, 1951-1957. Source: Necah S. Furman, *Sandia National Laboratories: The Postwar Decade*, Albuquerque, NM: University of New Mexico Press, 1990, 457.

c. Sandia's benefits and effects

In return for its investment in land and manpower, the state received the economic benefits of Sandia's purchasing activities. Jobs, dollars, and people fed into the creation and prosperity of other businesses and higher education institutions that also partook in the nuclear economy. The corporation bought the components and materials it needed throughout

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[67] Furman, *Sandia National Laboratories*, 224.

the country,—it had suppliers in 41 states—but many of these purchases were made locally. In 1951, orders placed with New Mexico businesses totaled $3,476,821; it was Sandia's first multimillion-dollar purchasing year.[68]

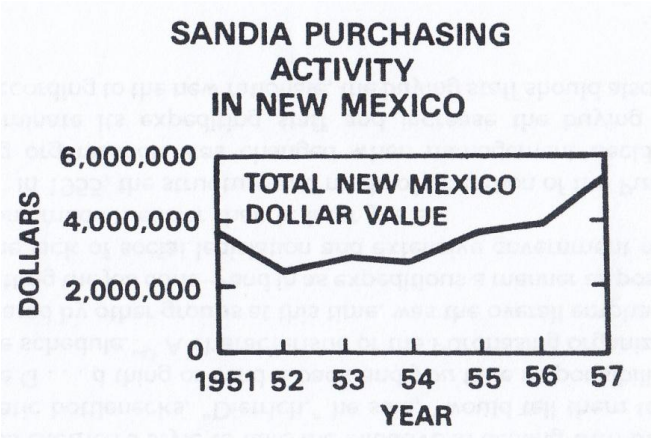

Fig. 29: Sandia Purchasing Activity in New Mexico 1951-1957. Source: Necah S. Furman, *Sandia National Laboratories: The Postwar Decade*, Albuquerque, NM: University of New Mexico Press, 1990, 469.

In 1958, an article about Sandia's success read, "at the close of World War II residents of Albuquerque wouldn't have given a plugged nickel for the future of Sandia Base. Thirty military personnel with a handful of civilians had the job of cutting up junked aircraft for the scrap heap."[69] By 1958, however, the Sandia Laboratories on the civilian side, and the Armed Forces Special Weapons Project on the military side, which was the main "customer for the AEC's ordnance products," pumped an annual payroll of $75 million into the New Mexican economy. The "wonderful things […] being done" at Sandia with electronics, for example, to develop transducers, transistors, power supplies, printed circuits, and miniaturized components, fueled the optimism for the future of New Mexico's economy. Reporter Fremont Kutnewsy wrote,

> Electronics will play a major part in shaping New Mexico's industrial future, and research at Sandia is hastening the day when private industrial development will take its place alongside government contracts as an important factor in the State's economy. Aside from Albuquerque's boom, the important thing about Sandia and its mother-project, Los Alamos, is that they have given to New Mexico a ground-floor position in the industrial structure of the Atomic Age. Whatever happens to the weapons program, Sandia's $60 million laboratory and highly trained technical and

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[68] *Ibid*., 468.
[69] Fremont Kutnewsky, "Research at Sandia," *New Mexico Magazine*, Santa Fe, NM, July 1958, 49.

> scientific personnel would be the foundation of a new and ever-increasing economy for this industry-hungry state.[70]

As a matter of fact, both the economic and demographic growth in the late 1940s and 1950s was exceptional in Albuquerque. One could note that while the rural population growth in the state was only of 11,134 between 1940 and 1950, the growth of the urban population was of 149,369.[71] People arrived in waves from other states but also from the other New Mexican counties with the hope to get hired at the Sandia Corporation or Kirtland Base. Their impact on the city was such that Ted Bartimus called nuclear research "Albuquerque's golden goose."[72] The military-atomic industry replaced the railroad as the city's main source of employment, since the latter had declined during the War with the development of other transportation means for both passengers and freight. Railroad-businesses, factories, and warehouses closed down, employment dropped, and the new industry came to be seen as a savior. By 1957, about 30% of Albuquerque's labor force worked either at Kirtland or Sandia, and the median family income in Bernalillo doubled in a decade from $3,260 to $6,252.[73] Yet, while the city's population of about 50,000 in 1945 quadrupled in fifteen years, the percentage of Spanish-Americans dropped from 35% to 20% because of an influx of Anglo-American "atomic immigrants" coming from all over the country.[74] Historian and Albuquerque specialist Marc Simmons who analyzed the city's "latest cycle of migration" explained that urban immigration did not only concern highly-qualified atomic immigrants but also "unskilled and displaced poor, many of them Hispano rural folk who abandoned their subsistence farms in droves to seek employment in Albuquerque's burgeoning job market." Nonetheless, the exodus of Hispanic jobseekers from rural to urban areas did not prevent their declining within the total municipal population "in the face of a mounting inflow of Anglos."[75]

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[70] *Ibid*., 72.
[71] Bittman, "Dependency and the Economy of New Mexico," 39.
[72] Bartimus, *Trinity's Children*, 66.
[73] Wood, "The Transformation of Albuquerque," 190.
[74] *Ibid*., 89; 98; 96.
[75] Simmons, *Albuquerque, a Narrative History*, 370. The example of Rudolfo Anaya's family can be cited here. Rudolfo Alfonso Anaya is a celebrated New Mexican Chicano author whose acclaimed first novel, *Bless Me, Ultima* (1972), is set in the New Mexican communities where he grew up. Anaya was born in 1937 in Pastura. His mother, Rafaelita Mares was from Puerto de Luna, a Catholic farming community, and his father Martin Anaya was raised by nomadic herders (*vaqueros*) on the New Mexican *llano* or eastern plains country. The family moved from Pastura to Santa Rosa, another small rural town after his birth. In 1952, when jobs started disappearing in the small rural communities, they moved to Albuquerque to find work. They settled in the Hispanic neighborhood called Barelas barrio south of downtown. From "Anaya, Rudolfo Alfonso,"

	1940	1950	1960
Albuquerque population	35,449	145,673	201,189
Engineers	-	886	2,600
College Graduates (Men), 1950/Holding BA Degrees, 1960	-	3,305	43,376
New Homeowners (Moved into house between 1959-1960)	-	-	75,374
Long-time Homeowners (had always lived in their house)	-	-	12,037

Fig. 30: Albuquerque Statistics from 1940 to 1960. Source: Layne Rochelle Karafantis, "Weapons Labs and City Growth: Livermore and Albuquerque, 1945-1975," Master's Thesis, University of Nevada, Department of History, 2012, 99; 103; 118.

The atomic transplants from other states were recruited on the basis of their education level, as a result they generally were a young, sophisticated and affluent population, and constituted the elite at Sandia. These newcomers learned to make New Mexico their provisory home. They learned to live next to a poorer, less educated population, and they often thrived in their careers at the Laboratories. During the 1950s, Albuquerque reportedly had more Ph.D.s per capita than any other city in the United States.[76] As shown in the above graph, Sandia employed 1,649 people with degrees in 1957: all these people—white-collar, upper-middle class, highly educated and well-paid—and their families came to settle in the heights of the East Mesa, which became known as the Albuquerque Heights or the "science suburbs" on the outskirts of the city.

As early as during the war years, the influx of residents had posed a challenge because of shortages in residential housing. However, the postwar growth encouraged developers and city boosters to build frenetically, the number of building permits skyrocketed with the expansion of Sandia. In 1947, the city created a Building Department to help process all demands. Three years later, "an estimated 362 residential business builders and subcontractors operated" in the city; "they employed almost 6,000 skilled and unskilled workers with payrolls exceeding $20 million per year."[77] Therefore, massive construction contributed to the general economic boom generated by the presence of the labs. More and more developers and city planners bought massive acreages of empty land to continue the city's enlargement and make it more attractive to aspiring homeowners. Albuquerque's phenomenal demographic growth enabled the city to achieve a metropolitan status and become a major urban center in the southwest, but the uncontrolled growth was also characterized by an aggressive market for prospectors and drew new boundaries within the city. The urban landscape became

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Encyclopedia of World Biography, Advameg, Inc., 2015, http://www.notablebiographies.com/supp/Supplement-A-Bu-and-Obituaries/Anaya-Rudolfo-Alfonso.html, accessed February 19, 2015.

[76] Nash, "New Mexico since 1940," in *Contemporary New Mexico*, 13. The same has also been said of Los Alamos, the "physicists' Hollywood" where the title doctor is not even used.

[77] Karafantis, "Weapons Labs and City Growth," 103.

increasingly polarized between the popular, working-class, mostly Spanish-speaking neighborhoods of the South Valley and the East Heights.[78]

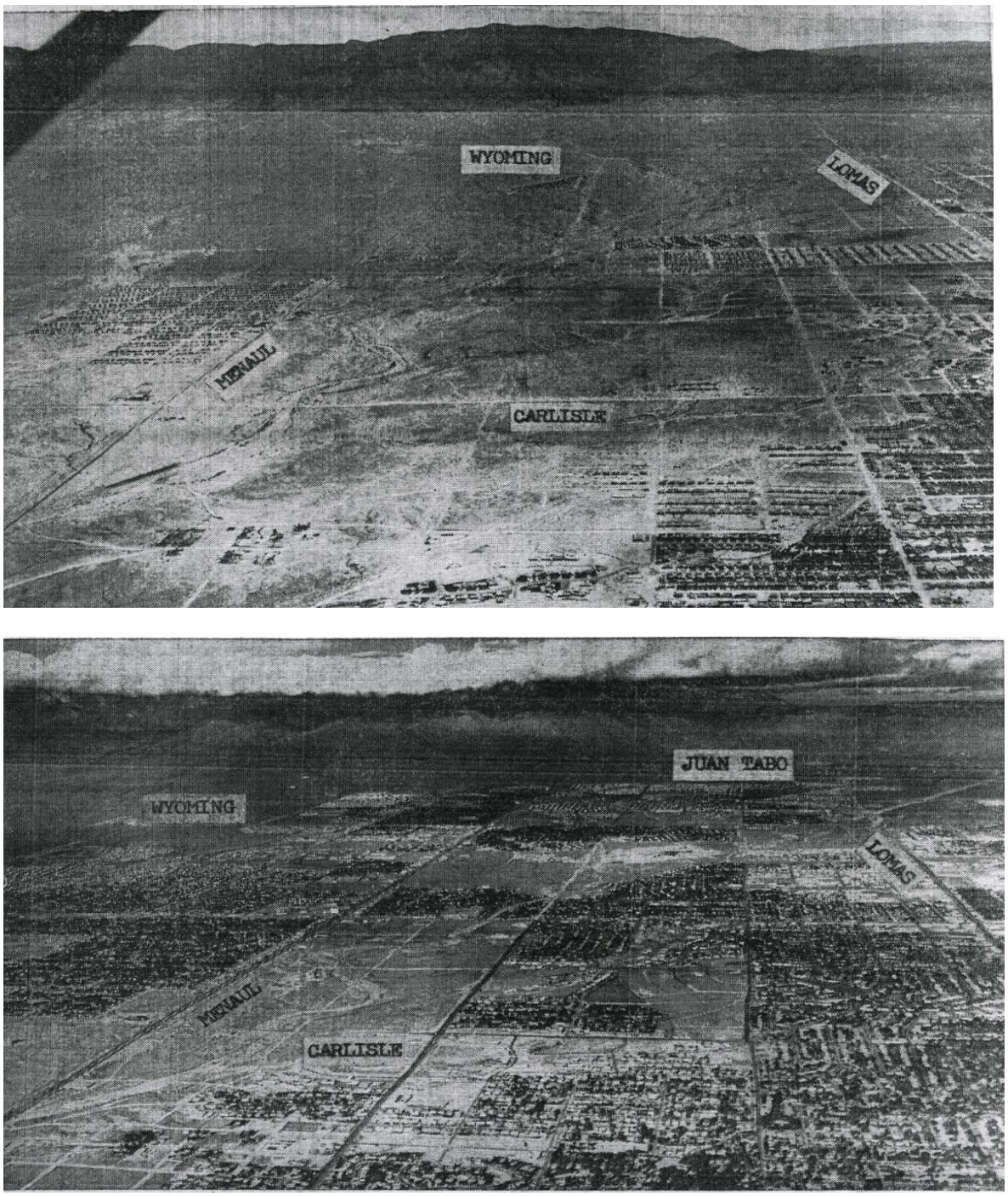

Fig. 31: The Northeast Heights in 1950 and in 1960. Source: "Photos Show Growth of NE," *Albuquerque Tribune* in Layne Rochelle Karafantis, "Weapons Labs and City Growth: Livermore and Albuquerque, 1945-1975," Master's Thesis, University of Nevada, Department of History, 2012,145.

[78] Simmons, *Albuquerque, a Narrative History,* 371. The polarization also manifested in politics with a Republican stronghold in the Heights and the predomination of democratic voters in the valley.

The arbitrary re-definition of the Duke City in the twenty years that followed the War's end foreshadowed some of the socio-economic difficulties that the state would be confronted with once the first signs of backlash from its military, scientific, and industrial complex began to show.

3. Rockets and yellowcake rush

a. Rockets at Alamogordo

New Mexico's Laboratories quickly became more powerful and increasingly impacted their environment. They became the backbone of New Mexico's economic new deal, but additional installations further rooted the nuclear industry in the state's postwar identity. To the south of the state, the steady development of White Sands Proving Grounds (WSPG) similarly boosted some of its surrounding communities. In December 1945, journalist Hart S. Horn romantically described the village of Organ, just west of the military reservation, which was then set at the eastern foot of the Organ Mountains, as "the original sleeping beauty of southern New Mexico," whose "prosperity graph has had more ups and downs than its mountain peaks." He added, "although Organ is still a bit doubtful about its reality, a great army camp has sprung up across the Pass on the wide mesas known to local flower-lovers as the poppy fields."[79] When asked why the site had been chosen by the War Department to pursue their scientific military investigations, Colonel Harold Turner, first commander of WSPG, emphasized the geography and the topography of the area: the Organ and San Andres Mountains to the west and the Sacramentos to the east protect the proving ground. Turner also "prophesied that this state will be proud of the work accomplished within its borders."[80]

WSPG became indeed the pride and major asset of Alamogordo,[81] its closest town. The M. R. Prestige Lumber Company, with a payroll of about three hundred, was the biggest industry in the area in the pre-war years. Immediately after the close of the War, the name, like Los Alamos, became associated with the atomic bomb which had been tested on the Alamogordo Bombing Range. The town "cashed in on the resultant publicity" as tourists started stopping there to request "to have the atomic bomb crater pointed out to them or ask

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[79] Hart S. Horn, "Bonanzas and Buzz Bombs," *New Mexico Magazine*, Santa Fe, NM, December 1945, 10.
[80] *Ibid*., 39.
[81] Alamogordo means the "fat cottonwoods" in Spanish. Charles B. Eddy had founded the town after buying the Alamo Canyon Ranch and water rights from Oliver Lee in 1898. He had decided to establish a division point on his railroad and the terminus of a branch line that would tap the logging areas of the Sacramentos.

directions for reaching the crater."[82] The connection between Los Alamos and White Sands continued when weapons research turned to long-range rockets to carry weapons to any potential enemy from American bases. The two facilities worked hand in hand to create and test these weapons of the future. From its early times, the Alamogordo Army Air Field had been informally considered as a guided-missile development site, but it was officially selected in 1944 for that purpose. During the liberation of Europe, the American Army had captured 100 German V-2 rockets. In May 1945, the first components were secretly shipped to New Mexico and the first captured V-2 was tested at White Sands on April 16, 1946.[83] So, after gaining fame from its association with the atomic bomb, Alamogordo soon became known for being the town where you could hear rockets being fired. In 1948, a local café "erected a neon-lighted replica of a jet propelled rocket as an advertising sign." The *Alamogordo News* quoted a Navy officer from WSPG saying that as many as ten thousand people were employed at a California proving ground, but this number would be "peanuts when the White Sands will come into its own."[84] Optimism and hope for future prosperity was general. The only two difficulties were shortages of water and housing. Soon, wells were drilled, investigations for new springs in the mountains were conducted, and plans were made to finance pipe lines. One solution to the housing problem was the hotels in the little town; with its proximity to the Mescalero Indian Reservation and the Billy the Kid Country, tourism had long been an important branch of the local economy.

The site of White Sands itself became a boomtown mixing permanent and temporary units. By 1954, the desert outpost had become "the principal Ordnance Corps installation for the execution of all technical and engineering responsibilities associated with testing guided missiles and rockets."[85] The site had it all: a school, a 500-seat Theater, an enlisted men's service club, bowling, baseball, tennis, handball, ping-pong, a library, a chapel, a swimming

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[82] George Fitzpatrick, "Alamogordo… City of the Rockets," *New Mexico Magazine,* Santa Fe, NM, January 1948, 17.

[83] New Mexico's history with rockets predates World War II. Dr. Robert Goddard, financed by a fellowship granted by the Daniel and Florence Guggenheim Foundation, worked on rockets at Eden Valley near Roswell in 1934. The techniques and fuels he used were close to the German models. The early rocket launches in 1946 were not immediately successful and were even dangerous for onlookers, but the tests proved that all the knowledge they would provide would be capital in future conflicts. Orren Beaty reported that "The first time one of the rockets was flight tested, part of one fin came off, and the missile spun into the ground five miles away, the unexpected fuel blowing a huge crater, 30 feet deep, in the desert soil. One of the latest launchings frightened spectators more than any previous malfunction, as the rocket climbing about four times its length into the air, spun to the east, then wobbled back to the west, in the direction of newspaper writers, Army, Navy and civilian observers." Orren Beaty, "Proving Ground for Rockets," *New Mexico Magazine*, March 1947, 54.

[84] Fitzpatrick, "Alamogordo… City of the Rockets," 18.

[85] George Fitzpatrick, "Hush-hush n°2," *New Mexico Magazine,* Santa Fe, NM, March 1954, 11-13.

pool, and an auto hobby shop. However, the housing was so inadequate that many civilians and military families commuted every day from Las Cruces or El Paso. As a result, Las Cruces, 28 miles (45 kilometers) west of the installation, was the second city to collect substantial benefits from its presence. A 1954 report "placed the annual payroll of Las Cruces residents at WSPG at $10,000 a day," and the total payroll for the post, both civilian and military, was upward of a million dollars a month.[86] In parallel, the site also represented opportunities for local students such as the White Sands Student Trainee Program, a joint educational venture between A&M College,[87] and WSPG. In 1952, President of A&M Dr. John W. Branson and Brigadier General G. C. Eddy, commanding general of WSPG, met to discuss the possibility of a program. White Sands needed trained engineers and technicians for its advanced research in rocket development while the college, "its enrollment lagging because of the Korean War, had facilities for more technical students than it was able to obtain."[88] The money they made helped the students pay their way through college. This instance illustrates the wider trend in most New Mexico education institutions where the regional scientific and economic boom introduced changes.

The University of New Mexico redirected some of its focus to physics and science and opened a branch in Los Alamos. The most telling example, however, is probably the New Mexico School of Mines (NMSM) in Socorro. In 1889, when Socorro was a mining boom town, the Territorial Legislature decided to found a School of Mines to train young mining engineers. Socorro was chosen because of the silver and lead deposits in the nearby Magdalena Mountains which would allow young mining engineers to train near the eventual site of their work. NMSM opened in 1893 with a focus on chemistry and metallurgy. With the return of veterans after World War II, the school's enrollment jumped, and its president, E. J. Workman, started changing its character. As a physicist, Workman had worked on weapons development during the War and hence when he assumed the presidency, he brought a new group to the school: the Terminal Effects Research and Analysis group (TERA), which worked on weapons testing and analysis. The group attracted defense research and thus the school's emphasis shifted to scientific research. In 1951, the college's name became the New

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[86] *Ibid*., 47.
[87] A&M College was renamed New Mexico State University (NMSU) in 1960. The letters stand for Agriculture and Mechanic Arts. NMSU was founded in 1888 as Las Cruces College; it was the first degree-granting institution in the Territory.
[88] Joseph H. Forsyth, "They Track the Rocket Missiles," *New Mexico Magazine,* Santa Fe, NM, April 1955, 15.

Mexico Institute of Mining and Technology, or New Mexico Tech.[89] The various programs at White Sands, such as the Apollo or the space shuttle programs, and contracts with universities helped New Mexico Tech and New Mexico State become major research institutions.[90]

These instances of cooperation and partnerships between the military and scientific facilities and academic institutions reveal that the nuclear complex was not only scientific, military, and industrial, but also academic and that the positive repercussions of the new industry for the state of New Mexico were increased tenfold by the connections between the affiliates of this multi-faceted complex. At each site, be it in Los Alamos, in the Albuquerque Heights, or in Alamogordo, atomic immigrants came to settle and conquered entire neighborhoods, participating in the scientific conquest and in the development of the nuclear economy.

b. Grants: from carrots to uranium

Nowhere is the analogy between the scientific conquest and westward immigration better illustrated than in Grants, formerly the "uranium capital of the world." At the same time as Los Alamos, Albuquerque, Alamogordo, and Las Cruces grew demographically and economically under the influence of their new atomic weapons facilities or of their proximity to military reservations and weapons test-fields, the region of Grants in the northwestern part of the state underwent comparable transformation as it was integrated in the weapons production chain. With the discovery of uranium ore in the vicinity, the nuclear industry in New Mexico became a cradle-to-grave economy because it started with the mining of raw material and ended with the management and storage of aging nuclear weapons. The discovery also triggered a uranium rush in the finest western tradition.

Scientists had discovered that uranium emanated invisible rays in 1896 and two years later, Pierre and Marie Curie learned how to separate radium from uranium. Radium quickly gained a lot of interest as it was believed to cure cancer and other ailments. Uranium carnotite was found to contain radium and the hunt for the rare metal reached the Colorado Plateau, but in the early 1920s, the Katanga mines in the Belgium Congo opened, killing the American West's radium industry until the uranium rush of the 1950s. The little town of Grants, 78 miles (125 kilometers) west of Albuquerque, was founded in 1882 when the Santa Fe railroad

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[89] Kathy Hedges, "A Brief History of New Mexico Tech," *New Mexico Tech*, Socorro, NM: New Mexico Institute of Mining and Technology, http://www.nmt.edu/fast-facts/298-a-brief-history-of-nmt, accessed June 14, 2014.
[90] Szasz, *Larger Than Life*, 81.

reached the area and set up a station. It was chiefly supported by lumbering, mining and ranching until 1940 when "some Arizona vegetable growers discovered that the volcanic soil of the Bluewater Valley just west of Grants was ideal for raising beans, peas and carrots."[91] Thanks to the carrot industry, the town doubled its size between 1940 and 1950; it then proclaimed itself the "Carrot Capital of the world."[92] In 1950, a Navajo Indian named Paddy Martinez found a piece of Todilto Limestone containing the yellow mineral at Haystack Butte on the lands of the Santa Fe Railroad. After this discovery, Grants became the "uranium capital of the world" and a magnet for prospectors and mining companies. Journalist Wayne Winters wrote in 1951:

> Uranium has come to Grants! And just in the nick of time, too, for this 68-year-old northwestern New Mexico town was starting to feel the pinch, following the petering-out of some of its industries. […] The local populace, most of whom had known for months that some uranium had been found, but who has been informed by supposedly-reliable sources that it was impossible to extract the ore from this particular limestone, became jubilant.[93]

The deposits were mostly found on Santa Fe Railroad lands but also on the private lands of a few ranchers who held mineral rights to their finds and on public lands where individual prospectors competed to stake their claims.[94] A rich deposit was found on Mount Taylor, north of the pumice mine. The news was particularly good there because the New Mexico Timber Company had closed down its plant there in 1951. The mill had been an important source of employment on Mount Taylor and in the Zuni Mountains—some 75 heads of families had lost their jobs. The pumice mine there was no longer working on a large scale either. So like in other areas of the state hit by poverty and unemployment, the arrival of a promising industry was viewed as a miracle "just in the nick of time."

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[91] Wayne Winters, "Uranium Boom at Grants," *New Mexico Magazine,* Santa Fe, NM, March 1951, 14.
[92] It is rarely mentioned because the uranium boom completely eclipsed this moment in Grants' mining history, but a discovery during the War had already connected the town with defense efforts. In 1940, two irreplaceable non-metallic minerals were found in Grants: pumice and fluorspar. This discovery added Grants to the list of other important "mining and industrial centers of the state that [were] busy with essential war-time production: Hobbs with its heavy oil production; Carlsbad with America's lucky store of potash; Gallup, Dawson and Madrid with ample reserves of coal; the Silver City area pouring out copper, zinc and lead." Fluorspar was used in the steel industry and pumice (a variety of lava) was used by the Army in the form of soap and cleaning compounds. Fremont Kutnewsky, "War Mines at Grants," *New Mexico Magazine,* Santa Fe, NM, February 1943, 11.
[93] Winters, "Uranium Boom at Grants," *New Mexico Magazine,* 13.
[94] *Ibid*., 14.

With the escalation of weapons production, uranium became one of the most important materials in the country, and in the world. In consequence, fortunes could be made in the region of Grants. The Atomic Energy Act of 1946 had changed the government's policy on uranium production—which had been exclusively government production at MED facilities during the War. The Act designed a system, called a monopsony in economists' terms, in which the Federal Government would be the only legal buyer for processed uranium and which guaranteed prices to encourage private businesses to prospect and mine the ore. For private producers, it seemed to be a win-win situation because it guaranteed a market for them while maintaining the government's exclusive supply chain. The yellowcake rush thus attracted all kinds of prospectors over the next decades, including young couples who all "came to Grants for the same reason: to make money."[95] Prospecting handbooks excited the hopes of these prospectors to "strike it rich" without making major investment of capital, time, or knowledge because even the novice could prospect for uranium without excessive expense and training. These prospectors were not much different from the fur trappers, Forty-Niners, or cowboys of the previous generations. According to journalist Kevin Fernlund, "viewing the activities that occurred on the Colorado Plateau at mid-century in terms of the Old West provided the nation with a familiar, if mythic, counterpoint to the frightening realities of a world on the brink of nuclear devastation."[96] Although the uranium rush was not exactly another example of rugged American individualism in that it was a government-promoted, supported, and controlled mineral rush, it was nonetheless a conquering move.

In the wake of Martinez's discovery, the Anaconda Copper Mining Company found a large deposit on the Laguna Pueblo reservation east of Grants. The company had to reach an agreement with the tribe before it could begin mining. According to Michael A. Amundson, author of *Yellowcake Towns: Uranium Mining Communities in the American West*, "the question of whether the Lagunas would comply constituted a classic pattern in Native American history. Until a precious commodity was discovered on the lands, the government considered most native lands worthless. But when uranium was discovered, the country's national defense was suddenly at stake."[97] Thus, the company appealed to the patriotism and loyalty of the Indians, and, in late 1951, Anaconda signed a contract with the AEC to build a uranium-processing mill at Bluewater in 1953 to process ores from the Jackpile mine on

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[95] Toby Smith, "Grants – Boomtown!" *New Mexico Magazine,* September 1979, 54.
[96] Fernlund, "Mining the Atom," *New Mexico Magazine,* 350.
[97] Michael A. Amundson, *Yellowcake Towns: Uranium Mining Communities in the American West*, Mining in the American West, Boulder, CO: University Press of Colorado, 2002, 79.

Laguna land. "Uranium Discovery Makes Laguna Indians Modern 'Rags to Riches' Story" was the title of an article in July 1957, which recounted how the tribe—with an estimated 3,600 members—went from an income of less than $1,000 in 1953 to nearly "$3 million salted away and a yearly income of more than $1 million, tax free." As a result of the royalties from production of uranium at the Jackpile mine on the reservation, "homes are being modernized… the villages have electricity … and TV antennas dot the rooftops. […] Trucks, automobiles, TV and radio sets, washing machines and electric stoves are becoming more common at the pueblo now. A few years ago there was no electricity and only horses and wagons."[98] As stated in the lease, the Anaconda Company also employed Laguna men and trained them in the use of heavy equipment. The uranium industry seemed to benefit all.

Then, in March 1955, Lewis Lothman from Houston found another substantial deposit near Ambrosia Lake and four other yellowcake-processing mills were built there—the Homestake mill, the Shiprock mill (1954), the Kerr-McGee mill (1957-1958), and the Phillips Petroleum mill. The Kerr-McGee, Phillips, American Metal, and Homestake companies all signed contracts with the AEC in 1957. They worked with smaller companies to dig mines and build the mills at Ambrosia Lake, employing over four hundred people. The stream of people coming to Grants transformed the community of farmers into a uranium boomtown. The number of residents rose from 2,251 in 1950 to 6,500 in 1957, and 10,274 in 1960. The uranium boom was everywhere including in the local culture: in 1956, the town held a festival in which a local miner was named Uranium Prospector of the Year; a beauty pageant elected a Miss Atomic Energy in 1955, whose prize was a truckload of uranium ore; and a "Uranium Café" opened for business on the mythical Route 66 that crossed the town.[99] Grants's uranium story was the clearest representation of the mechanism of reciprocity between the state of New Mexico and the government. Yet, as the Cold War continued and the value and status of American uranium fluctuated, it revealed a relation of one-sided dependence.

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[98] Bob Tucker, "Uranium Discovery Makes Laguna Indians Modern 'Rags to Riches' Story," 14 July 1957, Governor John Dempsey Papers, 1936-1958, Santa Fe, NM: New Mexico State Records Center and Archive, Collection 1959-046, Box 13191, G403, Folder 271, AEC Commission Subcommittee on Raw Materials Statements, Reports, 85th Congress 1957. As often, consumerism is presented as proof of modernity and improvement in traditional communities. Progress is measured in what comforts people were able to acquire.
[99] Amundson, *Yellowcake Towns*, 87; 88; 92; 93.

Fig. 32 a: Miss Atomic Energy receiving her prize. Source: Michael A. Amundson, *Yellowcake Towns: Uranium Mining Communities in the American West*, Mining in the American West, Boulder, CO: University Press of Colorado, 2002, 82.

Fig. 32 b. Uranium Café. Source: "Route 66, Uranium Café, Grants, New Mexico," *Houzz*, Houzz Inc., 2015, http://www.houzz.com/photos/11422684/Route-66-Uranium-Cafe-Grants-New-Mexico-modern-artwork, accessed February 19, 2015.

The Manhattan Project revolutionized New Mexico and propelled it from its pre-industrial past into the future: a nuclear age. These events were perceived as godsend by local people and businesses that were able to benefit from the opportunities produced by the nuclear economy. Nuclear science helped diversify the New Mexican economy and enabled the region to catch up on modernity in terms of employment, wages, education, and infrastructures. New Mexicans significantly benefited from these early times of increased employment opportunities; they swarmed to the new economic hubs. These movements meant they could avoid migration to other states to find work. By the 1960s, the state of New Mexico had a radically new face. Its militarized makeover included four air force bases, the largest continental testing range in the nation, and the world's first atomic weapons laboratory and assembly line. New Mexico's identity in the nation became associated with atomic "firsts." The state was also the host of the world's first atomic blast and then the first burial site for low-and-medium-level nuclear wastes over fifty years later. This observation led historian Ferenc Szasz to write that "the story of modern New Mexico has ever been intertwined with the emergence of atomic America."[100] The simultaneity of the two emergences—modern New Mexico and atomic America—created dependence; America needed the production of more nuclear devices to wage the Cold War and New Mexico needed America to continue fueling its economy with more contracts.

[100] Szasz, *Larger Than Life*, 122.

CHAPTER 2: A FEDERAL SPONSOR

1. The risks of dependence

a. The "Federal Landscape" as a starting point

According to the "Nash thesis,"[1] the postwar nuclear boom in New Mexico was accompanied by the region's emancipation from the previous system of economic dependence on Eastern states that he defines as a colonial economy. The principal agent of this emancipation, not only in New Mexico but in the whole West, was the Federal Government. Nash presents the pioneer scientific industries that developed in Western states as one of the main engines of their growing independence which, with the help of impressive federal sponsoring, allowed them to free themselves from their colonial economic bonds. Federal intervention had already somewhat lessened the dependence on eastern markets during the 1930s through the application of New Deal policies, but it became pivotal during and after the War years, making the Federal Government the dominant force in reshaping the West in the twentieth century.[2] During the New Deal era,[3] federal intervention concentrated on land management, soil restoration (with the Taylor Grazing Act), and on alleviating the effects of poverty through the WPA, the CCCs, and the Social Security Act of 1935,[4] whereas after the War, federal intervention did not alleviate a suffering economy but rather boosted the potential of new economies by becoming their major source of capital and demand.

The War remodeled the American West through diversification and intensification processes. Federal interventionism enabled the launching of the reconstruction of economies

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[1] See Part 2, Chapter 1, Internal colonialism. The essence of Nash's argument can be found in the following quotation: "the Federal Government promoted the restructuring of a natural resource-based colonial economy into a technologically oriented and service economy stimulated by massive federal expenditures." It "was the instrument that unleashed the entrepreneurial energies of millions of people who engineered the transformation in the course of the next half century." Nash also explains how the War created "a symbiosis between the military establishment and entrepreneurs on local, state, and national levels." Nash, *Federal Landscape*, 52-53.

[2] The Federal Government had already been the dominant force in administrating the West during the nineteenth century: see Earl S. Pomeroy and American Historical Association, *The Territories and the United States, 1861-1890; Studies in Colonial Administration*, Philadelphia, PA: University of Pennsylvania Press, 1947. According to Howard R. Lamar, "Earl Pomeroy has been acknowledged as the father of a 'federal school' of historians who stress the role of the national government in the administration and development of the American West." Howard R. Lamar, "Earl Pomeroy, Historian's Historian," *Pacific Historical Review*, Five Historians of the American West, University of California Press, Vol. 56, No. 4, November 1987, 546.

[3] See Andrew J. Diamond, Romain Huret, Vincent Michelot, and Jean-Christian Vinel, *Les États-Unis en crise et en guerre: Les années Roosevelt (1932-1945)*, Paris, France: Éditions Fahrenheit, 2013, and Steve Fraser and Gary Gerstle, eds., *The Rise and Fall of the New Deal Order 1930-1980*, Princeton, NJ: Princeton University Press, 1989.

[4] Responding to the impact of the Great Depression, in 1935, the U.S. established legislation for a permanent national old-age (over 60) pension system through employer and employee contributions; the benefits were financed by a payroll tax on both employers and employees. The Railroad Retirement Act of 1934 covered railroad employees separately. The social security system was later extended to include other groups.

that had had havoc wreaked upon them by the Depression, and, in combination with war industries, allowed the region to recover at an impressive rate. After the end of the War and because of demobilization of soldiers, there were fears that depression might reappear; hence the Employment Act of 1946[5] gave to the Federal Government responsibility for maintaining maximum employment. Westerners counted on the capital infused in their economy by the government to boost their development and finally gain autonomy. In New Mexico during the 1940s, for example, "federal spending and construction of facilities […] fueled urban growth in the state to such an extent that Albuquerque became known locally as 'Little Washington.'"[6] Local populations thus saw in these industries the means for achieving work in the form of federal jobs.[7]

The Federal Government was indeed at the center of a new economic system, a system of partnerships between people in the private and public sectors (partly described in Part 3, Chapter 1), including government and military officials, corporate executives, contractors and suppliers, legislators, research organizations, university scientists, and workers in defense plants. The partnership system became known as the military-industrial complex and began working hand in hand with the new science-technology and academic complex. For instance, the creation of the National Science Foundation in 1950 by Congress to distribute funds to encourage scientific pursuit replaced private institutions by the Federal Government as the major sponsor of scientific research in the country.[8] The borders between each branch became more difficult to discern. One consequence of the mix was that local private companies of all sizes depended on the government for funds, while the government depended on private businesses for the technology and innovation, which were the major battlefields of the Cold War.

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[5] The Employment Act was signed into a law on February 20, 1946. It was part of President Harry Truman's liberal domestic reform program called the Fair Deal and was stimulated by two elements: the concern that a peacetime economy would not be able to achieve full employment and the influence of Keynesian ideas on the necessity of government stimulus to push the economy toward full employment. The Act recognized government responsibility in promoting maximum employment, production, and purchasing power. (Definition from *Encyclopedia Britannica*, Encyclopedia Britannica, Inc., 2015, http://www.britannica.com/).

[6] Wheeler, et al., "The Rise of the Regional City," 6.

[7] Their reliance on federal aid demonstrates a paradox between the western myth of rugged individualism and very high federal involvement throughout the development of the region. Patricia Limerick points out the paradox between the association of the American West with "the future, one of independence and self-reliance" and "the phenomenon of dependence—on the Federal Government, on the changeability of nature, on outside investment" that enabled the West to pull ahead. She refers to the New Deal policies, commenting that, "Parading their independence and accepting federal money, Westerners in the 1930s kept faith with the frontier legacy." Limerick, *Legacy of Conquest*, 88-89.

[8] Nash, "New Mexico since 1940," in *Contemporary New Mexico*, 12.

Locally, the direct effect of technology and innovation was to trigger a wave of economic growth in accordance with the Schumpeterian interpretation of Kondratieff cycles which imparts a central role to technology in the rhythm of economic cycles. In the Schumpeterian view, each new wave of economic prosperity is caused by the apparition and production of new industries directly resulting from technological innovations.[9] In New Mexico, the atomic bomb triggered one of these waves and the flow of federal money served to sustain the mechanism with a classic multiplier effect. The War propelled government action into the technological, scientific, and engineering fields; a combination that became a beacon for economic self-sufficiency. Meanwhile, federal policies inspired by "big government" tended to favor big businesses and corporations that had their headquarters in the East—New Mexico's Uranium industry and the creation of the Sandia Corporation adequately illustrate this tendency. Gerald Nash thus analyzes the short-term influence of the postwar military-industrial and scientific complex on the West and identifies the development of this complex as the reason for the increase in federal money, for the acceleration of "the flow of population westward, including valuable skilled scientific and professional talent," and for the creation of "a wide range of new jobs." In his thesis, the "federal landscape" reinvigorated Depression-struck economies, provided Western states with a longed-for autonomy, and transformed the region into a pacesetting society.[10] I use Nash's "federal landscape" as the starting point of this chapter because it bridges the arguments I developed in the previous chapter and those I will develop here, which will be a departure from his thesis.

Although the "federal landscape" suitably supports the better side of the Devil's bargain, which was the topic of the previous chapter on the economic benefits of the nuclear industry, the purpose of this dissertation is to address the long-term impacts of the nuclear complex and, consequently, those of the Federal Government as well. My argumentation will

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[9] See Joseph A. Schumpeter, *The Theory of Economic Development; an Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle, Harvard Economic Studies*, Trans. Redvers Opie, Cambridge, MA: Harvard University Press, 1934. And also Mohammed Saad, *Development through Technology Transfer: Creating New Organisational and Cultural Understanding*, Portland, OR: Intellect Books, 2000. Saad writes, "For Schumpeter, innovation was the main driving force of change giving rise to the growth and decline of economies. In his concern about the ways economic systems respond to perturbations, Schumpeter adopted an evolutionary model in which technological change and the efficacy of the entrepreneur as an innovative agent played the most significant role."

[10] Nash, *Federal Landscape*, 97-98. One might also add that the southWestern states' climate in the Sunbelt attracted atomic immigrants to the new jobs. However, Nash identifies a shift in the early 1970s. During this era, "increasing concerns about the environment challenged policies advocating uncontrolled growth. The Federal Government struggled to develop a balance between economic benefits, on the one hand, and the costs of greater environmental protection, on the other. [...] Greater sensitivity to the environment was also accompanied by a greater awareness of the economic deprivation of minorities." (110).

therefore differ from Nash's take on the newfound autonomy of Western states after World War II, especially in the case of New Mexico, for, despite the state's unequivocally formidable economic growth, the overwhelming part played by the Federal Government and big corporations did not fully translate into substantial independence. Although the War and federal funding revolutionized the state, I will argue that the arrival of atomic science was yet another cycle of conquest[11] which transferred New Mexico's dependence from eastern markets to the government and to the military-industrial and scientific complex. Before, the resources of the West would have been useless (in capitalist terms) without eastern markets, whereas now the weapons produced by the complex would be useless without the demand of its main buyer (the U.S. government) and would even cease to be produced without federal investment. Therefore, economic self-sufficiency was not achieved, and instead, the state had to deal with the consequences this risky new dependence.

In that regard, Richard White's reasoning on the effect of World War II on the West is convincing. White agrees with Nash on the first point: he presents the Great Depression and the War as the events that set the Western economy free from eastern markets and capital. He contends that "the rise of the West to a position of power within the United States has paralleled the rise of the United States to world power." I will further add that, in the case of New Mexico, the state's gain in power was conditioned by the status of the U.S. as a world's superpower as nuclear weapons production was the link between New Mexico's growth and American supremacy. The Federal Government did act as a springboard for the region's rise to a higher position, but "to many Westerners it seemed that the West had merely switched masters. That liberation from eastern capital meant only that the Federal Government exerted an even greater power over the destiny of the region." Federal intervention—along with military intervention, which I explored in Part 2—is thus one of White's "familiar channels" through which postwar changes flowed. The Western states had felt this federal presence more than any other part of the U.S. because they had been molded by federal soldiers, agents, and administrators. White links the West's economic situation in the 1990s to foundations he dates back to the wake of the Civil War, and insists on the persistent lack of autonomy in the region; he writes, "An extractive economy in a world market; an economy plagued with excessive competition and a shortage of capital; an economy dependent on

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[11] I borrow the expression from Edward H. Spicer, *Cycles of Conquest: The Impact of Spain, Mexico, and the United States on the Indians of the Southwest, 1533-1960*, Tucson: University of Arizona Press, 1992.

government aid, outside capital, and outside expertise: these qualities still mark large sections of the West. […] Outsiders controlled their economic fate."[12]

White's "familiar channels" argument appropriately introduces the other side of New Mexico's Faustian bargain with nuclear science. World War II and federal intervention revolutionized the West while, at the same time, reviving Western myths, perpetuating traditional uses of the West, and prolonging some of its struggles. In order to define this period in New Mexican history, one has to take into account the ambivalent nature of these developments which, paradoxically, associate dramatic changes and continuity. In other words, New Mexico's postwar economic growth was spectacular to the point of being interpreted as the emergence of a novel economic model based on an independence that would eradicate previous difficulties, when, in fact, similar issues remained and new ones arose. The Federal Government did set the rhythm of New Mexico's transformation. Science and technology did trigger a new wave of economic growth. However, these changes did not break the patterns of dependence that have continuously plagued the state's economy and its populations.

Patricia Limerick addresses postwar federal interventionism in the West through the theme of continuity as well. For instance, she bridges federal strategies for nuclear weapons or radioactive waste programs involving the West and the traditional uses of the region that she calls the legacy of the conquest. She insists on one of the uses of this "empty" land as "a potential dumping ground, a remote place to which to transplant people whose presence annoyed, angered or obstructed the majority." With this sentence, she refers to the Indian removals or the Mormons escaping persecutions.[13] Since the West had been customarily seen as a place where to "dump" things or people, "Why not apply the same strategy to toxic substances?" Limerick asks.[14] She observes a form of continuity in the identity that myths and policies have bestowed on the West. In the twentieth century, the region's struggles and status were almost unchanged. The continuity Limerick identifies corresponds to the legacy of the

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[12] All quotes above are from White, "*It's Your Misfortune and None of My Own,"* 496; 461-462; 236; 267. Patricia Limerick also notes the long-term consequences of federal involvement in the economy that resulted in "dependence, resentment, and deficit." These consequences "have become major issues in American history and in contemporary politics, and the American West was the arena in which an expanded role for the Federal Government first took hold." Limerick, *Legacy of Conquest*, 28.

[13] One could also add health-seekers, the ailing people of the industrial age, the Japanese internment camps, including one in Santa Fe, and the Brisbee copper miners on strike. (See Part 1, Chapter 3, The Pajarito Plateau, introductive paragraph)

[14] Limerick, *Legacy of Conquest*, 163.

Frontier that also includes America's reliance on the West to build up its nuclear power, just like it had relied on the West to build up its industrial power.

One purpose of this dissertation is to exemplify Limerick's thesis by showing that the atomic West is another cycle of conquest; an extension of the frontier legacy. The network of military and scientific facilities in the West could have been dismantled after the War (as we have seen at Los Alamos), but the government pursued the funding and development of these installations because the militarized West had become too valuable. Ever higher levels of government funding during the Cold War were proof of how far the national government was willing to go to enhance but also to protect its atomic complex, the source of its supremacy. This situation increased federal control over Western states which already rested on its great landholdings in the region, on the weakness of western political parties and on the region's past as an internal colony.[15]

b. The yellowcake example

Undoubtedly, the most telling example of the dependence between New Mexico and the Federal Government, uranium mining, is also an illustration of how corporate and government agents interacted within the atomic complex. As pre-World War II extracting industries had been symptomatic of the state's colonial economy, uranium extraction between 1950 and 1990 reflected how outside forces also controlled its new industries. During the Cold War, uranium became one of the most important resources in the world as it came to rule the power of nations and the fate of populations. Until 1970, Uncle Sam was the only legal buyer for uranium in the country. By the time the system changed, the uranium industry in northwestern New Mexico was barely surviving. The federally subsidized market for uranium created the first boom phase in the history of Grants, dubbed the "uranium capital of the world." A second boom occurred when the market opened to other buyers in the 1970s. Between and after these two boom phases, Grants experienced bust phases of layoffs, high unemployment, and drop in property value and income. In the bust of the 1980s, unemployment reached 30%; the population dropped from 20,000 to 10,000 after it had been projected to grow to 100,000; the people who left town sold their houses for a fraction of their cost, and the town's businesses closed. According to Michael Amundson, "the history of the yellowcake communities is also a study in the intricacies of economic colonialism."[16] This type of

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[15] White, "*It's Your Misfortune and None of My Own,"* 353.
[16] For a definition, see Introduction, Concepts analysis.

colonialism, which combines corporate and government interests, represents the tie between local and global economies as exists in many other examples throughout the world where local businesses and workers pay the price of dependence to gain access larger remote markets. Amundson comments, "throughout the history of uranium production, outside forces controlled the fate of the yellowcake towns. The most obvious agent was the Federal Government."[17]

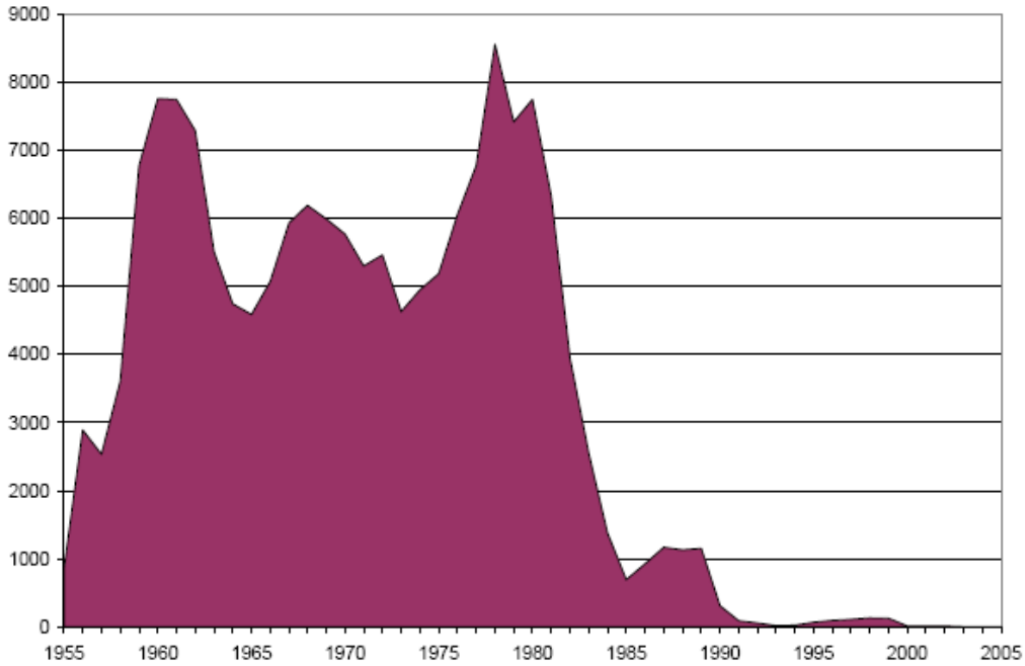

Fig. 33: New Mexico Uranium Production 1955-2005. Unit: short tons U.S. Ore. Source: Thomas Michael Power, "An Economic Evaluation of a Renewed Uranium Mining Boom in New Mexico," Santa Fe, NM: New Mexico Environmental Law Center, October 2008, http://nmelc.ehclients.com/images/pdf/NMUraniumEconomics.pdf, accessed April 19, 2015, 9.

The first boom between 1946 and 1958 was characterized by the monopsony between private producers and the Federal Government established by the Atomic Energy Act of 1946. Realizing that a domestic program for uranium production would be capital for building a stockpile of atomic bombs, the AEC made it a top priority to support prospectors. The commission even issued a booklet entitled "Prospecting for Uranium" in 1949 to describe the different types of ore deposits and the major uranium-bearing minerals, and explain how to prospect using a Geiger counter, selling procedures, laws, and regulations on mining claims.[18]

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[17] Amundson, *Yellowcake Towns*, xvii; 175.

[18] This booklet was the first in a long series as many magazines in the 1950s took over and chose uranium prospecting for their covers, presenting it as a hobby with headlines such as "How to prospect for uranium," "From rags to riches with uranium," "Build a low cost uranium detector," "build your own Geiger counter," "The uranium hunters," "Uranium, where it is and how to find it," "Finding fortunes in uranium," "How to be a successful uranium prospectors," or "Uranium for the amateur and hobbyist." The covers are available at http://national-radiation-instrument-catalog.com/new_page_14.htm, accessed February 20, 2015.

The special trade conditions offered the government immense control over the market and, consequently, over the economic well-being of the uranium boomtowns. The AEC's demand was so high at first that contracts were not signed with the prospectors who found the deposits but with big companies such as the Vanadium Corporation of America, the Anaconda Copper Company, the Phillips Petroleum Company and the Kerr-McGee Oil Industries who bought out the small prospectors. Not only did the AEC maintain a monopsony on purchasing uranium ore, but it also held a monopoly on providing enrichment services. Private companies that were licensed to build power plants therefore had to lease their fuel from the AEC monopoly.

Grants came to live at the rhythm of the uranium industry especially since funds for city projects, such as building new schools, came from two main sources of income: property taxes from the uranium companies and federal loans. A local branch of the New Mexico State University was established in 1968 in cooperation with the Grants Municipal Schools and offered a program in underground uranium mining training. Thus, "Grants *voluntarily* linked itself to both the uranium industry and the Federal Government in a type of *corporate and governmental colonialism*."[19] This quote underlines the willingness of the community to embrace the system, despite dependence issues, and the continuity between the region's colonial past and the new economic situation. However, unguarded reliance on the Federal Government and on a single industry was not without risks. The transition out of the monopsony toward a system of allocation, protectionism, and subsistence between 1962 and 1970 turned out to be problematic because private buyers could not provide enough demand to compensate for the AEC's withdrawal from the market it had created. The main problem was that, while supply kept increasing, demand stagnated; ore prices and sales were no longer guaranteed. The stockpile of uranium atomic weapons was sufficient; weapons research refocused on hydrogen and later on missiles; and a growing pressure to ban atmospheric tests impacted the needs for uranium. Therefore, the AEC's purpose was no longer to accelerate the industry's development but to save it from collapse "by making it easier for private companies to own and operate nuclear power materials and protecting U.S. producers from foreign competition."[20] Energy companies, having replaced small prospectors, began drilling

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[19] Amundson, *Yellowcake Towns*, 93. Italics added by Lucie Genay.
[20] *Ibid*., 108. The Private Ownership of Special Nuclear Materials Act of 1964 made it legal for uranium companies to sell yellowcake directly to nuclear power plant customers because it permitted private ownership of fissionable materials. The Act also introduced protectionist measures to make sure the domestic market would not be flooded by foreign producers.

deeper to find more ore, but the power plants' demand was still not high enough to absorb the production.

Ten years later, after this first bust phase, uranium prices started to increase again and "peak production was attained in 1978, with a record yearly production of 9,371 tons of uranium, that was shipped to mills and buying stations."[21] The oil crisis of the 1970s stimulated demands for alternative energy, and many power plants had reached the end of the long preparation process and were ready to begin operations. On March 18, 1975, a report of the Committee on Nuclear Energy for the state of New Mexico read "New Mexico currently supplies more than 40% of the uranium necessary for the U.S. nuclear power industry. […] Because New Mexico will be called upon to continue to supply research, development, and materials for this valuable energy resource, the state should *reevaluate* its position relative to the needs of the nation."[22] The word "reevaluate" is particularly interesting because it refers exactly to the state's role throughout the Cold War as it constantly reevaluated its activities according to the government's and the nation's needs. Grants' population kept on growing and for organizational purposes, a new county was created out of the western part of Valencia County in 1981. The chosen name of Cibola County, in reference to Coronado's Seven Cities of Cibola, was a nod in the direction of the bounteous uranium industry.

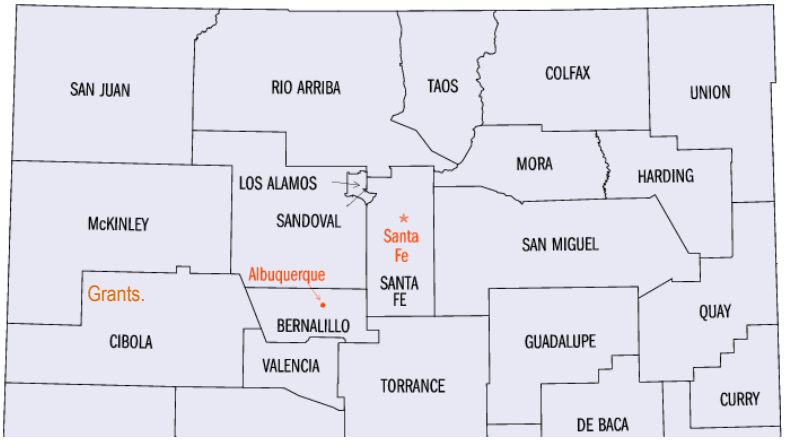

Fig. 34: New Mexico northern counties. Source: "New Mexico County Selection Map," State & County Quickfacts, *United States Census Bureau,* Washington, DC: United States Department of Commerce, http://quickfacts,census.gov/qfd/maps/new_mexico_map.html, accessed February 22, 2015.

Because of the growing demand, the Joint Committee on Atomic Energy then considered stopping the ban on foreign uranium importations. They "provided for the gradual

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[21] Virginia T. McLemore and New Mexico Bureau of Geology and Min, Res., Socorro, NM, "Uranium Resources in New Mexico," *Society of Mining, metallurgy & exploration Annual Meeting*, Denver, CO, 25 February-28 February 2007.

[22] Glenn A. Whan, Chairman, "The State of New Mexico: Governor's Energy Task Force," Committee on Nuclear Energy, Santa Fe, NM: Executive Office of the Governor, 18 March 1975, 1.

elimination by the end of 1983 of restrictions on its enrichment of foreign-source uranium for domestic use."[23] The industry suffered from the gradual opening to foreign producers and growing environmental and safety concerns that began to have an impact on nuclear energy activities. In the wake of the Three Mile Island accident of March 1979,[24] the Nuclear Regulatory Commission required energy companies to put plans for new power plants on hold. The companies who abandoned their plans put their yellowcake back on the market at bargain prices.[25] In 1984, Secretary of Energy Donald Hodel, who had been assigned a comprehensive review of the domestic uranium mining and milling industry by Congress in January 1983, concluded that the industry was no longer viable. Importations of foreign uranium were no longer limited and, without the government's protectionism, domestic producers could not survive the collapse of the market. Kerr-McGee at the head of the Quivira[26] Mining Company was the last major uranium employer to close its mines and mill at Ambrosia Lake on January 16, 1985.

In 1987, Western Nuclear Incorporate, a uranium mill tailing site in Jeffrey City, Wyoming, filed suit against DOE in federal court "alleging that DOE's failure to impose restrictions on the enrichment of foreign uranium for use in domestic facilities constituted a violation of" the Atomic Energy Act of 1954 which provided "that DOE 'shall' restrict its favor. The court ruled in favor of DOE, which had argued that "the domestic uranium industry has not been 'viable' since 1983, and that the imposition of restrictions on DOE's enrichment of foreign uranium would not assure viability."[27] This decision marked the end of the

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[23] Clark F. Huffman, et al., "Petitioners v. Western Nuclear, Inc., et al. 486 U. 663 (108 S.Ct. 2087, 100 L.Ed.2d 693), No. 87-645," Cornell University Law School, Legal Information Institute, Argued April 27, 1988, decided June 15, 1988, http://www.law.cornell.edu/supremecourt/text/486/663, accessed August, 18 2014.

[24] On March 28, 1979, an accident occurred at the Three Mile Island nuclear power station in the Susquehanna River near Harrisburg, Pennsylvania. An automatic valve mistakenly closed in the reactor and shut off the coolant water supply that enabled to transfer heat. A series of technological and human errors ensued, resulting in a large accumulation of hydrogen gas in the reactor. Little radioactive gas was released in the atmosphere before the water circulation was restored, but the accident had a profound impact on the nuclear industry and on the American public, whose fear grew and fueled the anti-nuclear movement.

[25] Michael A. Amundson, "Home on the Range No More: The Boom and Bust of a Wyoming Uranium Mining Town, 1957-1988," *Western Historical Quaterly*, Vol. 26, Fairbanks, AK: Western History Association, Winter 1995, 498-499.

[26] The name Quivira is a reference to the Spanish conquest and the myths of opulent Native communities. El Turco, a Pawnee captive first told the story of a legendary Indian province lying far to the east of the New Mexico pueblos on the Buffalo Plains to Hernando de Alvarado and Francisco Vázques de Coronado in 1540. The Spaniards reached the site the following year but did not find any gold or silver because the Turk had told that story to lure the conquistadors away from the pueblos. Nonetheless, the legend endured and attracted other expeditions including those of Francisco Leyva de Bonilla, Antonio Gutiérrez de Humaña, and Juan de Oñate (from "Quivira," *Texas State Historical Association*, Texas Historical Association and University of North Texas, https://tshaonline.org/handbook/online/articles/bpq02, accessed February 20, 2015).

[27] Huffman, et al., Petitioners v. Western Nuclear, Inc.

domestic uranium industry. Jeffrey City has become a ghost town. Grants, however, managed to recover somewhat from its boom and bust uranium history thanks in part to tourism, a uranium mining museum, and the construction of three state prisons. Nevertheless, the area still looks much depressed.

Since the substantial increase in uranium prices between 2004 and 2008, uranium mining companies have shown a renewed interest in New Mexico's deposits in the Grants mineral belt. A report prepared for the New Mexico Environmental Law Center in 2008 reads "now uranium mining companies and other business interests are promoting renewed uranium mining as a potential source of thirty billion dollars and almost 250,000 jobs for New Mexico and the Grants area." The report states that these claims are a "gross exaggeration," that "New Mexico knows from experience with copper and uranium that metal mining is economically unstable," and that "important environmental and social costs must be considered when evaluating the commercial economic benefits of renewed uranium mining."[28] The environmental and social impact of uranium mining will be discussed in the last part of this dissertation, including the catastrophic Church Rock uranium spill of 1979. The debate on the industry's revival in the Grants area is ongoing and proves that, despite its economic development in the past century, New Mexico is still faced with the same economic dilemmas. The story of the Grants area is evidence of the risks involved in a region's relying completely on one extractive industry, no matter how much government help and capital are invested in it. In this case, the Federal Government's sponsoring contributed to the creation of a neocolonial exploitation of resources and people who became dependent, conquered, and still suffer from the consequences of this exploitation.

2. Effects of global politics and peaceful ventures

a. The Cold War as a *sine qua non*

The example of uranium illustrates how crucial a role the government played in reshaping New Mexico's economy, but also how dependent on their federal sponsor some sectors of the nuclear industry became. The exceptional circumstances of World War II and later those of the Cold War were a *sine qua non* for the development of New Mexico's federally-sponsored economy. The funds were determined by national security needs, and those needs were contingent on the circumstances created by the Cold War. By extension, the

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[28] Thomas Michael Power, "An Economic Evaluation of a Renewed Uranium Mining Boom in New Mexico," Santa Fe, NM: New Mexico Environmental Law Center, October 2008, 1-2, http://nmelc.ehclients.com/images/pdf/NMUraniumEconomics.pdf, accessed April 19, 2015.

direct economic relation between the viability of New Mexico's nuclear installations and national defense expenditures put a great part of the state's economy under the influence of global politics, which determined the level of government spending. This interaction was a particularity of the Cold War and its effect on the West.

While the country had never maintained a large standing military establishment in peacetime, the Cold War was different in that R & D installations could not be demobilized after the conflict but had to be maintained. As a traditional recipient of Army facilities such as forts, bases, and Navy shipyards, the West had a history of economic relations with defense industries, but, this time, the nature of the war pledged more permanent benefits for the areas around the facilities. The nuclear era's bombs and test series ensured work from one end of New Mexico's nuclear chain to the other: Grants mined and processed uranium; LANL participated in the test preparations and designed new weapons; SNL produced and assembled the weapons, and White Sands pursued rocket and missile R & D. In consequence, all these installations and the myriad of small firms involved in the defense effort by serving the government's prime contractors thrived thanks to the nation's defense budget and were tributaries of events happening far beyond their borders. Money influxes and contract numbers fluctuated with changes in global politics. The budgets of the Laboratories, for instance, had to be revised several times because of the superpowers' conflict. In Sandia, the budget for fiscal year 1951, which was submitted in May 1950 based on assumptions current at that time, had to be revised upward several times because of the outbreak of hostilities in Korea.[29] In Los Alamos, the Zia Company's financial situation wholly depended on the AEC since the Commission reimbursed all the company's bills and salaries to its employees. Calculation of "the Zia budget" was based on an estimate of the cost of operating the town and the technical areas. By the mid-1950s, Los Alamos represented a $250 million federal investment.

After a first booming stage in the arms race in the 1950s when programs and contracts poured in to prepare the Greenhouse and Tea-Pot test series[30] to produce the Hydrogen bomb

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[29] Alexander, *History of Sandia Corporation*, 36.

[30] Operation Greenhouse was the fourth postwar atmospheric test series at Enewetak Atoll in the Pacific in April and May 1951. The operation consisted of four tower shots with a yield between 45.5 and 225 kilotons. Greenhouse was part of the process to develop thermonuclear weapons as two of the tests involved thermonuclear experiments (GEORGE, for instance, which had the strongest yield). Operation Teapot was the fifth postwar test series conducted at the NTS between February 18 and May 15, 1955. The operation consisted of ten tower shots, three airdrops, and one crater shot. The objective was to establish military tactics for ground forces on a nuclear battlefield and improve the weapons used for bomber and missile delivery, and for tactical

and the first missiles, the state's over-dependence on military money revealed itself when the first test ban negotiations were under way between nuclear powers and research was redirected to ground war in Vietnam. The test moratorium between 1958 and 1961 exposed the possibility that the weapons laboratory might have to face serious budget cuts and could possibly close down. Concerns arose in the U.S. about the economic impact that disarmament might have on regions which heavily relied on defense industries and federal funding. In December 1965, the United States Arms Control and Disarmament Agency commissioned Krischner Associates, Management and Economic Consultants, with a regional economic study entitled "Adjustments to Reduced National Defense Expenditures in New Mexico" in order to "enhance the ability of the Federal Government, in collaboration with state and local governments and with industry and labor, to deal with the economic consequences of arms control and disarmament."[31] In their overview of the state's economy, the consultants write:

> Non-defense 'basic' or 'export' activity in the state consists principally of the declining extractive industries, non-defense federal activity, a relatively small amount of manufacturing for export, contract construction largely financed with federal funds, and sales to out-of-state tourists. *By far the largest basic industry in the state is federal activity, especially that portion which represents defense expenditures.* Nearly one-half of all employment and income derived from basic activity in the state is estimated to be due either to direct employment of civilian and military personnel in defense establishments or Federal Government purchases of goods and services related to the defense effort.[32]

One of the issues raised by the study was a lack of alternative to the defense industry, for which the authors blamed the discrepancy between the high sophistication of this industry and New Mexico's "traditionally underdeveloped economy."[33] As a result, the whole state ran the same risk as in the Grants area of relying heavily on one economic sector without a so-called "plan B." The defense sector in New Mexico—DOD, AEC and the National

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battlefield situations. About 8,700 DOD personnel participated in the operations. From Walker, et al., "U.S. Nuclear Testing From Project Trinity To The Plowshare Program," *Trinity Atomic Web Site*, 1995-2005, http://www.abomb1.org/atmosphr/ustests.html, accessed February 25, 2015.

[31] Krischner Associates, Management and Economic Consultants, "Adjustments to Reduced National Defense Expenditures in New Mexico: A Regional Economic Study for the United States Arms Control and Disarmament Agency," Contract No. ACDA/E-58 Summary Report, Albuquerque, NM, December 1965, 1.

[32] *Ibid*., 2-4.

[33] The report reads, "The imposition of a highly sophisticated defense industry upon New Mexico's traditionally underdeveloped economy has not created an environment that has resulted in substantial expansion of existing or development of additional non-defense basic industries in the state." *Ibid*., 7.

Aeronautics and Space Administration (NASA)—represented 57,000 employees and 20% of total employment in the state. A decrease in defense spending would necessarily result in layoffs, and the affected people—military and civilian personnel—would most likely desert the state as they were transferred or assigned to a job elsewhere. The authors insist, "there would be an even more substantial shrinkage of the economy because not even savings and unemployment compensation benefits would be entering the local economy." The state government revenues would not be overly affected because it did not rely on the local economy, but the municipal and county governments would be affected because they did.

The solution put forward in the study was an economic adjustment by developing alternative basic export activity of sufficient magnitude to offset reductions of defense-related activity, by stimulating the private sector in the state's economy, by expanding existing federal non-defense, and converting existing facilities to non-weapon purposes. However, "a lack of concerted effort to meet possible adjustment problems indicates that the effects of reduced defense expenditures as outlined earlier could be felt in full measure unless there were changes in attitudes and increased planning." This conclusion was reached thanks to a series of interviews conducted in 1964 with leading state and local officials, business executives, labor leaders, economic development directors, university officials, and military commanders. The survey showed varying degrees of concern depending on each group of individuals. The authors note, "Absentee corporate officials often felt that their New Mexico operations were not central to their success. Officials of large corporations have devoted considerable attention to switching to non-defense activities in the event of defense cutbacks, but the New Mexico segments of their operations are not central to their plans." In other words, corporations were also prepared to desert the state altogether in the event of a decrease in government contracts. The Manhattan Project had brought nuclear science to New Mexico, revolutionizing its economy in two decades, but, evidently, the new industries would vanish just as fast, letting the region go back to its initial underdeveloped state. The study notes in the end "that decision makers in New Mexico at a distance from the center of federal policy-making, are largely unaware of the various forces affecting national security and arms control policies," and hence its last recommendation was an increase in public understanding of the interplay between reductions in defense spending and the U.S. policy.[34]

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[34] *Ibid*., 10; 12.

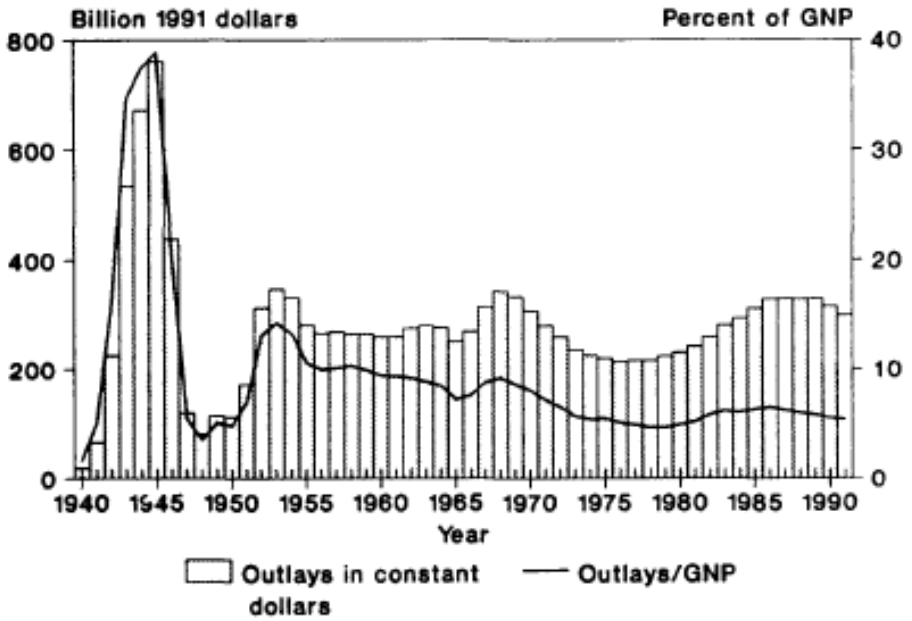

Fig. 35: National Defense Spending, 1940-1991. Source: United States Congress, Office of Technology Assessment, "After the Cold War: Living With Lower Defense Spending," OTA-ITE-524, Washington, DC: United States Government Printing Office, February 1992, https://www.princeton.edu/~ota/disk1/1992/9202/9202.pdf, accessed April 19, 2015, 4.

By 1960, New Mexican officials had come to realize how dependent the state had become on the local military-industrial and scientific complex. In Albuquerque, "without question the millions of dollars expended annually by the Sandia Corporation, the Atomic Energy Commission, Sandia Base, Manzano Base, and Kirtland Air Force Base enliven the whole scope of commerce in Albuquerque, as well as the entire state of New Mexico." Of the AEC's $900 million budget, one sixth was spent in New Mexico where the agency had three Offices—two in Albuquerque and one in Los Alamos. The AEC directly employed over 600 people in these offices, and its contractor employment in both cities was about 15,000, with an annual total payroll of approximately $152 million. The Sandia Corporation had become the primary employer in Albuquerque and had indirectly created thousands of jobs in construction, real estate, and other services.[35] Senator and Chairman of the Joint Committee on Atomic Energy Clinton P. Anderson commented that,

> Under a genuine disarmament, the present weapons development role of the (New Mexico) laboratories (Sandia and Los Alamos Scientific Laboratory) would disappear. However, these laboratories represent a considerable national interest, in terms of facilities, plant, organization, and above all, pools of highly skilled and highly dedicated scientific, engineering and administrative manpower. 'To permit this investment to be

[35] "Atomic Research and Development," *New Mexico Magazine*, Santa Fe, NM, October 1960, 8.

> dispersed and not utilized would be a waste of magnitude that we could not, in the national interest, afford. It is therefore exceedingly unlikely that our government would ever contemplate such as waste. […] In short, the laboratories we have built for weapons can, and must be shifted to peaceful work once the great demand for weapons is over."

Anderson believed that the Sandia Corporation could expand in the event of a decrease in demand for weapons by redirecting research toward "the peaceful atom and the conquest of space." Moreover, the journalist comments that all efforts "of forward-looking citizens" were being made to guarantee that "any adjustment of military spending in the Albuquerque area" would "evolve without affecting the overall economy," so that "if and when a cut in military spending should ever come, Albuquerque will be prepared to carry on without the enormous payroll, and switch over to a completely civilian economy."[36]

Yet, the build-up continued for many more years. The arms race went on after the U.S. arsenal peaked in 1987 with 13,002 nuclear warheads. Excavation projects and underground tests replaced the atmospheric series after the Nuclear Test-Ban Treaty[37] of 1963, and the work on missiles continued after the escalation of tensions in the wake of the Cuban Missile Crisis of 1962. New Mexico's defense-related facilities and research centers carried on with their operations. Nonetheless, as part of attempts to diversify the state's economy, efforts were made over the same period to redirect research on nuclear explosives toward peaceful purposes.

b. Operation Plowshare: Gnome and Gasbuggy

New Mexico was chosen for two experiments of the Plowshare program, which was the development of techniques using nuclear explosions for peaceful purposes in the 1960s. Plowshare experiments were the tangible application of the ideals that President Eisenhower expressed in its Atoms for Peace speech.[38] The two tests in New Mexico generated the

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[36] *Ibid*., 11. These "forward-looking citizens" included Senator Anderson but also Dennis Chavez, Chairman of the Appropriations Committee, and Representatives Joseph Montoya and Tom Morris who "have been active in helping Albuquerque and New Mexico continue their roles in the space age."

[37] The Treaty is formally known as the Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space, and Under Water.

[38] This was a speech President Eisenhower delivered to the United Nation on December 8, 1953. He said, "It is not enough to take this weapon out of the hands of the soldiers. It must be put into the hands of those who will know how to strip its military casing and adapt it to the arts of peace. The United States knows that if the fearful trend of atomic military build-up can be reversed, this greatest of destructive forces can be developed into a great boon, for the benefit of all mankind. The United States knows that peaceful power from atomic energy is no dream of the future. That capability, already proved, is here–now–today. […]To the making of these fateful

anticipation of local energy companies but were utter fiascos. One aspect of the operation was to show the "friendly" side of the atom to the public, but the Gnome and Gasbuggy tests in 1961 and 1967 proved that applying nuclear energy to peaceful purposes would be a challenge, and that local populations would be called upon to take nuclear risks for profit. Another purpose of the tests was to diffuse the basic notion behind nuclear energy; that is to say, the use of the bomb's destructive power for the social good of the country through a patriotic mixture of trust in science and in the government. In both cases, there was almost no opposition to the shots except a telegram which was sent to the *Current-Argus journal* from Los Angeles by a chemist named Dr. E. H. Bronner who "charged that the [Gnome] nuclear blast would destroy Carlsbad's mineral deposits."[39]

In 1961, many locals in Carlsbad were eager to see nuclear science erupt in their region if it could bring a decisive economic boost.[40] The plan was to use the explosion to create an underground heat reservoir that would vaporize in the salt bed, and the steam could be transformed into a power source. The area was chosen for its technical and geological features, as well as for the low population density and the fact that the land was under government control. After President Kennedy gave the green light to the project, an article reported locals' reactions such as Roger Jenkins' who said, "'I'm tickled to death. I think it will help our situation.' He said he felt the detonation and subsequent activity would boost the economy of the town even more than it has been helped by pre-Gnome activity." The article also quoted Ed Skinner, resident manager of the Potash Division of the International Minerals and Chemical Corporation, who patriotically declared, "it will give the Russians something to think about."[41]

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decisions, the United States pledges before you–and therefore before the world—its determination to help solve the fearful atomic dilemma—to devote its entire heart and mind to find the way by which the miraculous inventiveness of man shall not be dedicated to his death, but consecrated to his life." Dwight D. Eisenhower, "Atoms for Peace (8 December 1953)," *Voices of Democracy: The U.S. Oratory Project*, Ed. Shawn J. Parry-Giles, College Park, MD: Voices of Democracy, http://voicesofdemocracy.umd.edu/, accessed February 25, 2015.

[39] "Says Gnome To Hurt Area," Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 14, Folder 36, Clippings on Project Gnome, 1953-1985.

[40] Carlsbad was founded by Charles Bishop Eddy, a businessman from New York who became a rancher in the late nineteenth century. Eddy gave his name to the small town, but after the arrival of the railroad in 1891 and the increase of visitors who would come to bathe into its mineral waters, the town changed its name to copy the European health resort of Karlsbad in Czechoslovakia.

[41] Bryan Jeter, "Carlsbad 'Quietly Jubilant'," Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 14, Folder 36 Clippings on Project Gnome, 1953-1985.

The stakes were high because if the test was a success, the economic prospects of a new way to produce electricity were immense. From the time Gnome was announced in August 1958, until the detonation three years later, newspaper articles showed that excitement built up accordingly with the high level of expectations. "The nuclear bomb, a symbol of destruction, may prove to be a boon for the Carlsbad area in the near future," wrote Mike Hill in the *Carlsbad Current-Argus* in 1959. It was expected that the project "could be responsible for the location of an electrical power production plant" for Southeastern New Mexico, and that it could be "used as a production center for producing and recovering valuable isotopes."[42] On the other hand, however, there were the risks of a nuclear blast: farmers were afraid of fallout for their fields of cotton, alfalfa, maize, barley, castor beans, and pasture grass; miners were afraid it might damage their potash mines, and tourism professionals feared for their famous caverns. The AEC had a panel of expert-scientists study these various issues, and the panel concluded that the explosion would be fully contained in the salt beds. Visitors could even come and witness the explosion. 300 people including officials and newsmen from ten nations came to witness the test. President Kennedy even invited Russia. The AEC also "signed contracts with the seven mining companies in the Carlsbad potash basin to provide reimbursement for loss in production as result of mines being shut down" during the project and "provide for payment by the AEC for services supplied by the potash firms during the pre-and post-shot mine surveys."[43]

The test on December 10 produced a cavity about 75 feet (23 meters) high and 150 feet (46 meters) in diameter. U.S. Representative Thomas G. Morris of New Mexico addressed the audience after the detonation to emphasize the historic significance of the moment, saying, "As Alamogordo became the symbol of the beginnings of the A-bomb, so will Carlsbad symbolize to all mankind the beginning of peaceful uses of nuclear explosives."[44] One unexpected consequence of the test that worried witnesses was the radioactive steam which emerged from the elevator shaft, but experts again assured there was no danger. Gnome was deemed a success even though its main aim—to produce electricity—was eventually not

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[42]Mike Hill, "Atom Bomb May Be Boon For Carlsbad," *Current-Argus*, Carlsbad, NM, 25 January 1959, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 14, Folder 36, Clippings on Project Gnome, 1953-1985.
[43] "AEC Contracts With Mines To Pay For Lost Production," 7 December 1961, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 14, Folder 36, Clippings on Project Gnome, 1953-1985.
[44] "Teller Calls Test Miracle of Ages," 10 December 1961, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 14, Folder 36, Clippings on Project Gnome, 1953-1985.

attained. In the end, the most valuable information that resulted from the experiment was the geological and seismological data.[45] The second test that had been planned at the same location was cancelled. In 1968, once the AEC had finished all their experiments, contaminated materials and debris were shipped to the Nevada Test Site (NTS) for storage or reentered in the shaft which was sealed thereafter, and the site was returned to the Bureau of Land Management.[46]

Six years later, Gasbuggy was presented as the first joint Federal Government-private industry experiment. El Paso Natural Gas was the AEC's industrial partner for the project which was meant to stimulate natural gas production from low-permeability formations by using a nuclear explosion. It was anticipated that "the explosion [would] vaporize the rock around it and create a subterranean chamber deep below the surface. Then the roof of the chamber [was] expected to fall in, creating a 'chimney' or area of broken rock. This would be a large area into which gas would flow through explosion-created fractures."[47] The blast was to take place in the San Juan Basin, on the property of El Paso Natural Gas, 55 miles (88 kilometers) east of Farmington, and just west of the Jicarilla Apache Reservation whose tribe approved the test because most of their income was derived from oil and gas. A road was built through the Jicarilla Reservation to the project site; visitor sites were established; the detonation countdown was broadcast, and Project Gasbuggy booklets were made available to the public. The conclusion was not brilliant for this test either, since the gas flow was only slightly increased and had become radioactive. By that time, the public had begun to fear the effects of radioactivity because of fallout concerns at the NTS[48] and about the consequences

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[45] According to the authors of *Plowshare* in the Understanding the Atom Series, "The New Mexico site was interesting to seismologists because it lies close to the geological boundary between the Rocky Mountains and the Great Plains. The difference in travel times of the seismic waves moving in different directions to points at comparable distances from the site was found to be too great to be explained by variations in thickness of the earth's crust. It was therefore attributed to variations in the upper mantle of the earth, which lies deeper than the crust. This new information has contributed significantly to understanding the geological structure of the United States and probably will result in a reinterpretation of the properties of the earth's crust and mantle east of the Rocky Mountains. The seismic wave variations revealed by GNOME indicate that with similar coverage of detonations in other regions a clearer understanding of the earth's structure can be obtained." Carl R. Gerber, Richard Hamburger, and E. W. Seabrook Hull, *Plowshare,* Understanding the Atom series, Oak Ridge, TN: U.S. Atomic Energy Commission, Division of Technical Information Extension, 1966, 32.

[46] Szasz, *Larger Than Life*, 165.

[47] United States Atomic Energy Commission Press Release, Nevada Operation Office, NV-67-9, Las Vegas, NV, 31 January 1967, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 14, Folder 40, U,S, Atomic Energy Commission Press Releases for Project Gasbuggy, 1967-1968.

[48] During the atmospheric testing era (1951-1962), the U.S. conducted 100 above-ground nuclear tests at the NTS. Over this period, effects were observed on livestock and increases in cancer rates (leukemia, thyroid diseases) were reported downwind from the NTS in communities in Utah, Nevada, and Arizona. The affected persons became known as downwinders. They, or their families, were eventually compensated for their health

of strontium-90[49] absorption; they were not willing to take the risk of using that gas, no matter how low the level of radioactivity was.[50] Cleanup of the site was organized in 1978 by the El Paso Company and, similar to Gnome, the contaminated debris was reinserted into the cavity or sent to the NTS. Both blasts were disappointments and greatly impacted the environment as the release of radionuclides contaminated both air and soil to varying degrees despite the cleanups.

The two tests are good illustrations of the negotiations the government and big corporations conducted with locals, such as the Carlsbad mining companies, to obtain their support, and use the land as they wished, promising economic benefits for the area. Following these failed experiments, federal spending in New Mexico doubled again in the 1970s with the arrival of new programs such as the space shuttle, laser weaponry, and continued research on nuclear energy sources.[51] With each program and each new stage of the state's federally-sponsored economic development, jobs were created, more people came into the state, and the area attracted attention. All these operations infused hope in local communities in need for employment prospects and federal attention, but federal funding redrew the economic map of New Mexico, revealing huge disparities from one area to the next with an inverse correlation between federal spending and welfare. Not only did the new economic landscape depend on the changes entailed by each episode in the confrontation between the nuclear colossi, but it also presented new relief in terms of opportunities for the population, exposing job seekers to harsher competition and increasing the value of positions offered in the nuclear industry. Consequently, the local elites, city boosters, businessmen, and politicians have strived to attract more and more funds to ensure economic growth and employment. Like the atomic bomb itself, the defense needs have lit up isolated New Mexico, and the state has actively sought to remain in the light of science ever since by pursuing investment and promoting its resources.

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issues related to exposure to radioactive particles, after years of legal battle, with the Radiation Exposure Compensation Act (RECA).

[49] Strontium-90 (Sr-90) is a by-product of the fission of uranium and plutonium in nuclear reactors and in nuclear weapons. Sr-90 is found in waste from nuclear reactors. It can also contaminate reactor parts and fluids. Large amounts of Sr-90 were produced during atmospheric nuclear weapons tests conducted in the 1950s and 1960s and dispersed worldwide. Sr-90 emits a beta particle with no gamma radiation as it decays to yttrium-90 (also a beta-emitter). Sr-90 has a half-life of 29.1 years. It behaves chemically much like calcium, and therefore tends to concentrate in the bones and teeth. Thus, Sr-90 is referred to as a "bone seeker." Internal exposure to Sr-90 is linked to bone cancer, cancer of the soft tissue near the bone, and leukemia. Definition from "Radiation Protection," *United States Environmental Protection Agency*, Washington, DC: United States Environment Protection Agency, http://www.epa.gov/radiation/radionuclides/strontium.html, accessed February 25, 2015.

[50] Szasz, *Larger Than Life*, 170.

[51] Welsh, "The Land of Extremes," in *Contemporary New Mexico*, 77.

3. Boosterism and politics

a. Promoting a Mecca for technology and science

Many Westerners in the vicinity of the nuclear facilities saw the potentials revealed by the nuclear complex and federal investment as a renaissance for their region. This change of attitude contrasted with the previous vision that Westerners had of the Federal Government before the New Deal when local and national public office holders were seen as corrupted, incompetent, and tyrannical. However, while denouncing these faults, Westerners have also always asked for more federal expenditures.[52] Western politicians in Congress traditionally exchanged their votes on national controversies for support on issues that mattered most to them, such as land and resource policies. The Roosevelt administration greatly changed the image of the Federal Government in the West. The New Deal made it "a direct dispenser of relief, a creator of jobs, and a source of capital," what can be referred to as "big government."[53] Getting accustomed to federal help, Westerners accepted the expansion of its role in their postwar economies. Businessmen and politicians became aware of the immense role that the government played in keeping the state on the sharp edge of science and technology but also in providing contracts and jobs. So, they used their power to push for more programs and nuclear exploitation of resources, despite the risks involved in having the economy under the control of outside investors. Various interest groups learned how to use global politics and events such as Sputnik or the missile gap to pressure the administration in power for more funds in their particular field whether it was business, education, or science.[54] Local elites and other individuals began to rely on federal money and programs to boost their profit or grasp new occupational opportunities. In Grants, for instance, as we have seen, "local boosters often pushed for uranium development […] and later complained when they found themselves isolated and with very little influence on the global market."[55]

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[52] See Patricia Limerick quoted above, footnote n°7.
[53] White, "*It's Your Misfortune and None of My Own,"* 177; 355; 472.
[54] Ronald E. Powaski, *March to Armageddon: The United States and the Nuclear Arms Race, 1939 to the Present*, New York, NY: Oxford University Press, 1987, 72. The launch of Sputnik (the first satellite launched by man) by the Soviet Union on October 4, 1957, inaugurated the space age and launched the competition with the U.S. on space research. Around the same time, U.S. government officials believed that the country was behind the Soviet Union in research on ballistic missile technology after the testing of intercontinental ballistic missile (ICBM) in August 1957 by the Soviets. According to intelligence agencies, the Soviet Union possessed superior missile capability in comparison to the U.S. and was likely to improve both its quality and quantity. As it turned out, the gap never existed (or at least, not in favor of the Soviet Union), but the anxiety it created was an incentive toward reinforcing America's nuclear deterrent. Proponents of the defense industry in New Mexico used this fear to ask for more funding and underline the importance of the state's facilities.
[55] Amundson, *Yellowcake Towns*, xvii.

In other parts of the state, the nuclear industry was also used as a tool to promote the area and to attract more people, investors, businesses, and scientific projects. Albuquerque boosters used the introduction of the Sandia Laboratory to portray the Duke City as a diverse metropolis, welcoming industry and growth. The new population of white-collar, upper-and-middle-class families and individuals in the so-called science suburbs of the Northeast Heights depicted Albuquerque as a dynamic, modern city characterized by scientific research, higher education, and a strong federal presence. Historian Robert T. Wood explains that "growth of government activity had led to overlapping of city, county, state and federal functions, and the several layers of government had become progressively more intertwined."[56] The government even intervened in real estate by granting federal mortgages to families who arrived to work at Sandia. By 1980, one inhabitant in five had been born in Albuquerque and 40% of the population had resided there less than five years.[57] The resulting growth from this general advertising of Albuquerque as a Mecca for technology, science, and weapons was tremendous but also uncontrolled. In order to cope with the growth, the city leaders had to ask for the help of city planners, acquire more land, and improve the roads.

During the 1960s, businessmen and city-boosters grew aware of their vulnerability in the face of federal cutbacks and reacted by organizing cooperation groups or associations; the first of these was the Albuquerque Industrial Development Service. The object of the cooperation was to broaden the local industry base; to this end, the industrial development committee of the Albuquerque Chamber of Commerce published an industrial recruiting brochure emphasizing the city's attractive features in April 1960. Many other business organizations continued to develop over the decade when a slowdown in demographic growth affected both businesses and the median income.[58] According to historian Marc Simmons, "Albuquerqueans were content to let technocrats and urban planners chart the destiny of their city." Simmons describes these individuals as people who "think almost wholly in economic terms, equating unbridled expansion with automatic prosperity and seldom paying more than lip service to such humanistic considerations as municipal beautification and historic preservation."[59] In the last decades of the twentieth century, tensions grew because of the emergence of divergent visions inspired by anti-nuclear and environmental activism or groups advocating a return to traditional occupations focused on reasonable exploitation of resources

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[56] Wood, "The Transformation of Albuquerque," 534.
[57] Simmons, *Albuquerque, a Narrative History,* 377.
[58] Wood, "The Transformation of Albuquerque," 297-298.
[59] Simmons, *Albuquerque, a Narrative History,* 374.

and on the land. Such visions collided with that of local boosters. The best example of this issue is the Waste Isolation Pilot Plant, which opened in 1999 after twenty years of conflict and negotiations. Here again, boosters of the industry in Carlsbad worked to promote the opening of the Pilot Plant project, which they hoped would provide hundreds of jobs for their community. To do justice to the subject, the issue will be addressed in the last part of this dissertation on the state's most recent controversies.

b. The local politics of being dependent on federal funds

In parallel to these boosters' efforts many New Mexican politicians from the late 1940s to the present have supported the industry, sometimes in the face controversy. Congressmen have argued in favor of more federal spending on nuclear and weapons programs to keep the machine going in New Mexico. One example was Congressman Dennis Chavez, who wielded his influence throughout his career to attract public investment to his state. Chavez became Senator in 1935 and first used his power to bring relief programs such as the CCC and National Youth Administration to New Mexico. According to historian Maria E. Montoya, he "came to wield immense power within the U.S. Senate" during World War II and the Cold War. She attributed to him both the arrival of additional postwar federal facilities—WSMR, SNL, and Kirtland AFB—and the increase in funding. In 1960, when he served as chair of the Senate Defense Appropriations Committee, he recommended a budget one billion dollars higher than the already exceptionally high budget recommended by President Eisenhower. Montoya wrote that Chavez thus showed his intent on fighting the Cold War as well as his "pragmatism since he sought to funnel much of that spending to his own state's constituents" and added that "New Mexico's residents were one of the great beneficiaries of this increased federal spending during the Cold War years, when thousands of New Mexicans went to work for the Federal Government in a myriad of jobs brought to the state by Chavez's deft political skill in the Senate."[60]

Another example was Senator Clinton P. Anderson, mentioned above, expressing his strong belief in New Mexico's nuclear complex as a national asset. As Chairman of the Joint Committee on Atomic Energy from 1955 to 1961, Anderson aggressively promoted military nuclear development, increased production of fission bombs, the Super, greater production of fissionable material, and opening of more uranium mines. He passed the 1957 Price-Anderson

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[60] Maria E. Montoya, "Dennis Chavez and the Making of Modern New Mexico," in Marta Weigle, Frances Levine, and Louise Stiver, eds., *Telling New Mexico: A New History*, Santa Fe, NM: Museum of New Mexico Press, 2009, 342.

Nuclear Industries Indemnity Act which limited the liability of the nuclear industry in the event of a nuclear incident, while ensuring the availability of funds to provide compensation to the public no matter who might be liable. He was also a strong proponent of the Space Program. Finally, a more recent example was Senator Pete Domenici who was elected in 1972 and served until 2008. He was a supporter of nuclear energy and actively engaged in the promotion of the Labs; he published several books including *A Brighter Tomorrow: Fulfilling the Promise of Nuclear Energy*. He writes, "My ultimate goal is that in the year 2045, one hundred years after the detonation of the first atomic bomb and the birth of the nuclear age, the world will evaluate the role played by nuclear technologies and conclude that their overall impact was strongly positive."[61] During his term, he increased funding for nuclear laboratories and introduced programs to improve the testing of nuclear weapons without use of physical, underground testing.

The state government was also expected to make the most of the nuclear industry's economic opportunities as shown by a study of the Committee of Nuclear Energy for the Governor in March 1975, which was undertaken "to provide state policy organization with the information needed for formulating a rational government position" and to encourage the state to expand nuclear activities, since the committee concluded that "the economic benefits to the state that would result from a greater participation in the uranium fuel cycle […] for nuclear power plants in the U.S. and abroad are so great that they must be exploited." Among the benefits, the opportunity to "train and provide employment for its citizens in an expanded nuclear industry" was underlined. The study's major recommendations were to "launch a vigorous program to support increased uranium exploration and production, both in recognition of national need and for economic benefit to the state" and to "aggressively encourage either private industry or the Federal Government to construct a centrifuge uranium enrichment facility in New Mexico in the early 1980's."[62] Government studies therefore clearly advised the heads of New Mexico to support both private and public actors in the uranium industry because of the social benefits they would get in return.

The same study also recommended that others be conducted and include a survey of attitudes toward an expansion of nuclear energy activities in the state. In January 1977, the Bureau of Business and Economic Research of the University of New Mexico conducted such

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[61] Pete V. Domenici, *A Brighter Tomorrow: Fulfilling the Promise of Nuclear Energy*, Lanham, MD: Rowman & Littlefield Publishers, Inc., 2004, 3.
[62] Whan, "The State of New Mexico: Governor's Energy Task Force," 1-2.

a survey "to determine the attitudes of New Mexicans toward expanding different parts of the nuclear power industry in the state"—parts such as producing power from nuclear reactors, reprocessing some of the spent fuel, and storing or disposing reactor waste materials.[63] The survey was conducted by telephone with almost 2,800 people in the state and revealed the following results:

Question	Results	
1. What is your feeling about locating more of the nuclear fuel industry in New Mexico?	Strongly approve	10.8%
	Approve	45.9%
	Don't care	1.9%
	Disapprove	9.2%
	Strongly disapprove	5.3%
	Insufficient information to form an opinion	26.9%
2. How do you feel about storing waste materials from the nuclear power industry in New Mexico?	Strongly approve	1.7%
	Approve	23.6%
	Don't care	1.5%
	Disapprove	23.6%
	Strongly disapprove	20.7
	Insufficient information to form an opinion	29%
3. How do you feel about installing uranium conversion, enrichment, and fabrication plants in New Mexico?	Strongly approve	6.7%
	Approve	46.5%
	Don't care	1.6%
	Disapprove	8.2%
	Strongly disapprove	4.4%
	Insufficient information to form an opinion	32.3%
4. How do you feel about the United States using more nuclear power for energy in the future?	Strongly approve	15%
	Approve	54%
	Don't care	1.2%
	Disapprove	8.4%
	Strongly disapprove	4%
	Insufficient information to form an opinion	17.3%
5. Do you feel that the possible benefits to be gained from the nuclear fuel industry in New Mexico are greater than the possible safety and environmental problems?	Yes	48.5%
	No	20.4%
	Unsure	31.1%

Fig. 36: Attitudes of New Mexicans toward expanding the nuclear power industry in the state. Source: New Mexico Energy Institute, "Attitudes of New Mexico Residents toward the Nuclear Fuel Industry," NMEI Report No. 76-513A, Albuquerque, NM: University of New Mexico, January 1977, 3-6.

These results were introduced with the following sentence: "The main finding of the survey was that New Mexicans favor establishing more of the nuclear fuel industry in the

[63] New Mexico Energy Institute, "Attitudes of New Mexico Residents toward the Nuclear Fuel Industry," NMEI Report No. 76-513A, Albuquerque, NM: University of New Mexico, January 1977, 2.

state."[64] However, if we consider the percentages of the last four possible answers ("don't care, disapprove, strongly disapprove, and insufficient information"), this conclusion is not so clear for questions about New Mexico: 43.3% disapproved or did not have an opinion about locating more of the nuclear fuel industry in the state; 74.8% disapproved or did not have an opinion about storing waste materials from the nuclear power industry; 46.8% disapproved or did not have an opinion about installing uranium conversion, enrichment, and fabrication plants, and 51.5% were unsure or believed the benefits to be gained from the nuclear fuel industry in New Mexico were not greater than the possible safety and environmental problems. Another finding of the survey was that "the proportion of persons saying they had insufficient information to answer question declined almost uniformly with education level," and that "there was also a tendency for persons with higher educational attainment to be somewhat more opposed to additional nuclear industry installations in New Mexico."[65] In plainer terms, considering that many highly-educated people in the state were scientists-immigrants who came to work at the Laboratories, while native New Mexicans were more liable to fall under the category of the less highly-educated, it would mean that locals were generally less informed and approved more readily the expansion of the nuclear industry than educated immigrants. This touches on the fundamental subject of the link between knowledge and the acceptance of risks. This subject will be at the heart of the last chapter of our look at New Mexico's Faustian bargain with science, since secrecy is the last key component in the mechanism.

To sum up the government's role in New Mexico's economy after World War II, New Mexicans switched from reliance on land and dependence on eastern markets, to dependence on the American government. The role that the Federal Government played in the modernization, industrialization, and urbanization of the state through the medium of an expanding nuclear industry, weapons program, and military installations is immense. Dependence was even greater because the Federal Government's decision-making and budget-setting depended on several variables during the Cold War including Soviet developments in military and space research and, later, global disarmament negotiations. Through her analysis of Chavez's political career and of the state's history with the Federal Government, Maria Montoya sees a form of continuity that supports my argumentation; she notes, "During the nineteenth century, New Mexico maintained a colonial relationship with

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[64] *Ibid*., 3.
[65] *Ibid*., 7.

the rest of the United States because of its dependence on eastern and foreign investment. Still, New Mexico in many ways remained in that same colonial stance throughout the late twentieth century."[66]

Now, in the twenty-first century, the state's over-dependence on federal money remains an issue which confirms that its "colonial stance" continues to contribute to its vulnerability. Outside forces still impact the region to a great extent because of its federally-funded economy. In October 2013, a two-week governmental shutdown,[67] which lasted from October 1st through the 16th, exposed this fact glaringly when LANL and SNL were on the verge of closing their doors, and New Mexico was among the states hit hardest by the crisis. At Kirtland AFB, 1,074 civilian employees were placed on furlough and 422 at Holloman AFB. In the case of the Labs, which are run by independent contractors but with public funds mostly from DOE and National Nuclear Safety Administration (NNSA), they had "carry-over funding left from previous years' budgets to keep working for at least a short period of time." Nonetheless, both Labs announced their shutdown for October 18 and 21. Their closing down concerned close to 20,000 employees. The Federal Bureau of Land Management freeze also impacted the oil and gas industry "due to large amount of federally owned land"—roughly 35% of the state's total acreage. At New Mexico's eleven national parks and monuments, workers had to be furloughed as well. In 2012, roughly 24% of the state's nonagricultural workers were employed by federal, state, or local governments.[68] The shutdown highlighted New Mexico's dependence on government jobs. This fact which aroused the awareness of local journalists who pointed out that over one-third of the state's gross domestic product comes from federal spending. Some have addressed the question of "how to make New Mexico less vulnerable to Federal Government shutdowns."[69] Their answers focus on

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[66] Montoya, "Dennis Chavez and the Making of Modern New Mexico," in *Telling New Mexico*, 342.

[67] The (partial) shutdown occurred because of the controversial Patient Protection and Affordable Care Act (PPACA), known as Obamacare. Right wing representatives in the Republican-led House of Representatives "attached a provision to a spending bill that required eliminating funding for the implementation of the PPACA in order to fund the rest of the U.S. Federal Government." The bill was sent to the Democratic-led Senate which stripped out the provision before sending it back to the House. This created a funding impasse in Congress because it had not passed a law to appropriate any funds past September 30, 2013. From Ian McCullough, Armchair Political Analyst, "Why did the U.S. Government Shut Down In October 2013?" *Forbes.com*, New York, NY: Forbes.com LLC, 10 March 2013, http://www.forbes.com/sites/quora/2013/10/03/why-did-the-u-s-government-shut-down-in-october-2013/, accessed February 17, 2015.

[68] Dan Boyd and T. S. Last, "Impact of shutdown wide-ranging in New Mexico," *Albuquerque Journal*, Albuquerque, NM, 2 October 2013, http://www.abqjournal.com/273084/news/impacts-in-new-mexico-wideranging.html, accessed February 17, 2015.

[69] Rob Nikolewski, "How to make NM less vulnerable to federal gov't shutdowns," *New Mexico Watchdog.org*, Alexandria, VA: Franklin Center for Government & Public Integrity, 15 October 2013,

diversifying New Mexico's economy, supporting local entrepreneurship, and improving performance in education. These current challenges are partly inherited from the mechanisms that were at work throughout the Cold War in New Mexico.

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http://watchdog.org/19608/nm-how-to-make-nm-less-vulnerable-to-federal-govt-shutdowns-2/, accessed February 17, 2015.

CHAPTER 3: CLOAKED IN SECRECY

1. The obsession with secrecy

The last chapter of this part is devoted to the third paramount constituent of New Mexico's Faustian bargain with science which made the development of the nuclear industry so rapid and effective. This last element was secrecy. The complex interactions between corporate interests, government funding, and a pervasive use of secrecy cemented the military-industrial complex in the state from the earliest stages of its construction. These complex relations remain to this day. LANL, for instance, is funded by DOE and NNSA, is managed by the University of California, and has a set of relations with each branch of the U.S. military, as well as corporations and industrial suppliers and subcontractors. Secrecy is a parameter that further allows the use of the phrase "Faustian bargain" as it was the reason for the concealment of some of the most damaging impacts of the Manhattan Project. Secrets and speculations were also at the heart of the Cold War. The veil of secrecy modeled the general public's zeal to believe in the miraculous prospects of atomic research and in the necessity for the escalation of armaments. It also increased the motivation and commitment of all participating individuals at the Labs, research centers, and testing sites either by clouding the downsides of their work or by infusing them with the new philosophy of nuclearism—i.e., the faith in nuclear weapons to maintain national security. Psychiatrist Robert Lifton and professor of international law Richard Falk defined the term in 1982, stressing the irony behind the ideology, as a "psychological, political, and military dependence on nuclear weapons, [and] the embrace of the weapons as a solution to a wide variety of human dilemmas, most ironically that of 'security.'"[1] In addition, President of the Nuclear Age Peace Foundation David Krieger's definition encompasses weapons and energy, describing nuclearism as "the belief that nuclear weapons and nuclear power are essential forms of progress that in the right hands will protect the peace and further the human condition."[2]

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[1] Robert J. Lifton and Richard Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, New York, NY: Basic Books, 1982, ix.

[2] David Krieger, "Nuclearism and Its Insecurities," in Majid Tehranian, ed., *Worlds Apart: Human Security and Global Governance*, New York, NY: I.B.Tauris & Co, 1999, 109. Krieger also identifies the dangers of nuclearism because the "right hands" have generally been identified as "one's own country" and "to further the human condition" has been perceived as a "benefit to oneself, one's country, or one's corporation." He lists the three key elements of the ideology: "1. The belief that nuclear weapons keep the peace and are a necessary evil. 2. The belief that nuclear power is a safe, reliable, and inexpensive source of energy, and that the nuclear power industry is an absolute good. 3. The belief that, despite the expansion of the nuclear power industry, the diversion of nuclear materials from the nuclear fuel cycle to military uses can be prevented."

These beliefs served the ambitions of the young AEC and supported the conviction that the country was under the threat of impending nuclear war.

The control of information on nuclear matters by the government and the military shaped the way the nuclear complex developed and still functions today. The obsession for secrets began during World War II and the Cold War only furthered its growth. The early nuclear age was particular because of the fascination atomic science produced during the 1950s. The magnificence of atomic explosions combined with the awe inspired by their destructive potential to create this fascination. Meanwhile, the horrors of Hiroshima and Nagasaki were swiftly obliterated from the American perception of atomic power. The aftermath of the Japanese bombings was almost immediately replaced by the horrific prospects of an atomic war. Wartime compartmentalization had worked on the American public as well since it allowed people to separate sentiments of union around national security based on nuclear power and the inhuman images of the bombings. The Gallup Poll of mid-August 1945 revealed that 85% of Americans approved of the bombings.[3] The photo magazine *Life* edited by Henry Luce devoted most of its August 1945, issue to the bomb, showing pictures of Hiroshima and Nagasaki and the famous mushroom cloud that was to become a symbol for the atomic era. This magazine was, in many respects, the public's first encounter with the bomb. The press soon became the vehicle for atomic fears and newsmen often speculated on an apocalyptic future. The effect on the population was cogent as surveys of 1946-7194 showed that 64% of those polled thought that atomic bombs' being dropped on the United States was a real danger.[4] In that atmosphere, a struggle took place for the manipulation of these fears and centered on the issue of secrecy. The struggle opposed the newborn AEC and the Los Alamos Scientists, a few of whom adopted stances radically opposed to wartime compartmentalization and secrecy.

a. The atomic scientists' movement against secrecy

In Los Alamos secrecy was pushed to its paroxysm from the beginning, but after the bombings, Los Alamos was also the place where the first anti-nuclear movement was created and secrecy was the primary point of contention on which the first activists argued. This early movement was led by scientists of the Manhattan Project who believed that secrecy would be

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[3] David W. Moore, "Majority Supports Use of Atomic Bomb on Japan in WWII," *Gallup.com*, Washington, DC: Gallup, 5 August 2005, http://www.gallup.com/poll/17677/majority-supports-use-atomic-bomb-japan-wwii.aspx, accessed September 15, 2014.

[4] Paul S. Boyer, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age*, 2nd ed., Chapel Hill, NC: University of North Carolina Press, 1994, 22.

responsible for the escalation of arsenals. Vannevar Bush, James B. Conant, Arthur Compton, Enrico Fermi, Ernest Lawrence, and Robert Oppenheimer all became critical of nuclear-related decisions. On the Hill, they organized in a group called the Association of Los Alamos Scientists (ALAS) who held its first meeting on August 30, 1945. In November, they put out the *Los Alamos Newsletter*, and in his speech to ALAS on November 2, Oppenheimer declared that "secrecy strikes at the very root of what science is and what it is for."[5] To defend their ideas, the Los Alamos Scientists began giving public speeches, first in the vicinity, in Santa Fe and Taos, explaining the principles of atomic fission and setting off the importance of international control of atomic weapons to avoid an escalation of armament. They proposed the creation of an "international atomic development authority, entrusted with the research, development and exploitation of the peaceful applications of atomic energy, with the elimination from national armaments of atomic weapons."[6]

A few scientists had already envisioned the arms race even before the end of the War. James Franck from the Met Lab, who authored the Franck report, is an example. Niels Bohr was also a fierce advocate for an open world without secrecy to avoid a postwar arms race.[7] Bohr had met with Roosevelt and Churchill in the spring and summer of 1944 to convince them of the importance of international control and of the need to banish secrecy, but he had failed to persuade them that the American atomic monopoly would not last. By 1946, many other scientists across the country were persuaded that it fell upon them to warn and advise on atomic matters. The coalition between the various site groups expanded in the Federation of American Scientists (FAS). Other prominent leaders included Leo Szilard, who had been instrumental in launching the project in the first place, Harold Urey and Eugene Rabinowitch,

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[5] J. Robert Oppenheimer, "Speech to the Association of Los Alamos Scientists (2 November 1945)," *Atomicarchive.com*, San Diego, CA: AJ Software & Multimedia, 1998-2015, http://www.atomicarchive.com/Docs/ManhattanProject/OppyFarewell.shtml, accessed August 31, 2014.

[6] Isidor I. Rabi, "Commentary," in George Westinghouse, ed., *Science and Civilization*, Vol. 1 "The Future of Atomic Energy," New York, NY: McGraw-Hill Book Company, Inc., 1946, http://archive.org/stream/scienceandcivili029147mbp/scienceandcivili029147mbp_djvu.txt, accessed August 31, 2014.

[7] Bohr anticipated that the Soviet Union already knew about the American atomic project; he believed that hiding the bomb from them would be perceived as a threat. This threat would entice the Soviets to build their own atomic weapon. These atomic scientists foresaw a nuclear arms race between the two countries resulting from atomic secrets. During the War, when Bohr had arrived on the Hill, his first question to Oppenheimer was "is it big enough?" or, in other words, would the bomb be so powerful that it would make war obsolete. Bird, et. Al., *American Prometheus*, 270.

editors of the *Bulletin of Atomic Scientists*, Bernard T. Feld, a regular contributor to the *Bulletin*, and Philip Morrison who became active in ALAS and in FAS.[8]

The movement was successful in getting the public's attention at first because these men had come out of the War as heroes who had toiled in the shadows of their secret laboratories, harvesting the power of infinitesimal particles to lead their country to victory. They used this influence to infuse a fear of the bomb in the people's minds, hoping to transform the fear into a catalyst for a movement out of secrecy and compartmentalization toward international cooperation. Despite these manipulations, many scientists genuinely believed in the cataclysmic scenario they described. As long as the public was afraid, they had an audience. But the strategy backfired. Opponents to the movement described these men as frightened and producing fear in others for nothing. Others accused them of feeling guilty about the bombings and trying to redeem themselves. Instead of producing rational cooperation between nuclear powers, their use of fear produced hatred, blind terror, and a thirst for American superiority. The scientists' movement died out at the turn of the 1940s and 1950s, its ideas obliterated by the ideology of massive retaliation. The public became so alarmed by Soviet atomic bombs that building bigger weapons to defend themselves against a nuclear threat prevailed over international cooperation. Moreover, the decline in these associations' memberships was also due to young scientists refocusing their task on work inside the laboratories rather than in politics.

The story that best personifies the rise and fall of the movement is that of Oppenheimer who became a fervent advocate for international control and opposed the development of the Super in the early 1950s. His views and former communist connections at the height of McCarthyism cost him his clearance after his trial in 1954, and he disappeared from politics. His demise was in the news everywhere including in New Mexico where the message to the Laboratory's employees, according to Jon Hunner, seemed to be, "if you disagree with official policy, your work at the lab could be terminated and your career ruined."[9] Secrecy gave immense power to the AEC over all atomic matters and all who partook in the nuclear

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[8] Alice Kimball Smith, "Scientists and public issues," *Bulletin of the Atomic Scientists*, Chicago, IL: Educational Foundation for Nuclear Science, Inc., Vol. 38, No. 10, December 1982, 38-45.

[9] Hunner, *J. Robert Oppenheimer*, 205. Oppenheimer's connections to the Communist Party were linked to his first interest in politics during the Civil War in Spain in 1936 when he contributed financially to the Republican cause. Although he never joined the party, he had several left wing friends including Haakon Chevalier, who later asked him to pass scientific information to a Soviet diplomat. His fiancée in the 1930s, Gene Tatlock, was a member of the party and introduced him to her political circle. Kitty Harrison, who became his wife in 1940, was also a former party member. When Oppenheimer was chosen as director of the Los Alamos Laboratory, his communist affiliations were already controversial.

complex. Following the first upsurge against its policies, it took until the 1960s for anti-nuclear activism to be rekindled in the United States when it gained momentum with the rise of the environmental movement.[10]

b. The town where secrets were born

Meanwhile, Los Alamos became the epitome of atomic secrets inspiring even more fascination because of its mysteries. The community built in secrecy has carefully maintained an aura of mystery to this day for the pleasure of tourists and visitors. Oppenheimer's first vision of Los Alamos as a scientific Shangri-La emphasized the myth of a place as a fogged mountain where scientists manipulated the forces of the universe.[11] The mysteries of the town intrigued the media as well as the general public from the moment the story of the atomic community came out. In virtually all accounts of the early years of the Lab, anecdotes on secrecy have been relished by the public. And the power of attraction has not lessened since 1945 as the community remains a popular subject for fiction. The most recent example is the television series *Manhattan*, a drama shot in Santa Fe and which premiered in July 2014, focusing on the lives of scientists on the Hill in 1944. Secrets play a major role in the plot as they intensify the tension between characters, especially husbands and wives, and compartmentalization is recurrently addressed through the rivalry between the "thin man group" and the implosion group.[12]

Because of this secrecy, colleagues did share more than spouses, but even colleagues found it hard to communicate. Compartmentalization forbade all communication between different branches of the Project and guaranteed that information would always be directed upward in the hierarchy. Scientists would either share new developments with superiors or give orders to inferiors. Scientists were allowed to communicate their whereabouts to their families for the first time on August 6, and "one Los Alamos civilian was reported to have sent 90 telegrams when the restriction was lifted."[13] The attribution of housing according to the scientists' rank with rent based on salary helped keep groups of the same clearance level together. For all matters from dinners to recreation, status was determinant. Sometimes race,

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[10] Scientists also resumed their involvement with the Pugwash Conferences on Science and World Affairs starting in 1957 in Pugwash, Novia Scotia. This series of international meetings brought together prominent figures, such as Albert Einstein and Frédéric Joliot-Curie to discuss nuclear weapons and world security.
[11] This is a reference to James Hilton's novel *Lost Horizon* in which an Englishman finds paradise in the Tibetan valley of Shangri-La. The term has been used to refer to a remote, utopian land.
[12] The "thin man group" worked on the uranium gun-type weapon, and the implosion group worked on a mechanism to use plutonium.
[13] Fitzpatrick, "The Secret of Los Alamos," *New Mexico Magazine*, 10.

sex, and age could also be a factor for determining certain schedules. The only address residents had was P.O. Box 1663; their letters were opened and fragments could be censored; their calls could be listened to, and they were not allowed to go beyond the perimeter formed by Albuquerque, Las Vegas, Taos, and Cuba, NM. The lexicon of Los Alamos reflected the overwhelming role of secrecy as everything was codenamed; atoms were "tops," bombs were "boats," an atomic bomb was a "topic boat," plutonium was "product," and uranium fission was "urchin fashion." Memos notified the crews when this code would change. Proper names followed the same rule: Oppenheimer was James Oberhelm; Edward Teller was Ed Tilden; Enrico Fermi was Eugene Farmer; Niels Bohr was Nicholas Baker, and Arthy Holly Compton was Mr Holly.[14]

Secrecy made the little community sensational for newsmen. The drastic restrictions on communications and the strict rules and regulations governing the community were the main focus of the first articles on the secret city. George Fitzpatrick, reporter for the *New Mexican Magazine* wrote in September 1945 that, "even though many Santa Feans and many relatives of Santa Feans worked there, the oath of secrecy was kept, and New Mexicans generally accepted the fact that 'Los Alamos' was a taboo subject." He added, "the place just did not exist, even though convoys of trucks made frequent trips through Santa Fe and government buses brought workers into Santa Fe daily for brief leaves or shopping trips."[15] Famed scientists were rarely recognized on the streets of Santa Fe except maybe Einstein who was rumored to have been spotted there. Rumors such as these were common topics as they provided comic relief. The rumors circulating in Santa Fe about the Project during the War were in fact as extravagant as the Project was colossal. They included research concerning gas warfare, rockets, jet propulsion, spaceships or 'death rays' of an indeterminate type, windshield wipers for submarines, a camp for pregnant WACs, and even a "Republican internment camp" during the 1944 presidential election campaign.[16] Ruben Montoya, a local worker, recalled the hearsay that circulated about Los Alamos; he reported, "They said they were making submarines and they would float them down the Rio Grande."[17] Oppenheimer asked Charlotte Serber, the scientific librarian, to go to Santa Fe and start the rumor about the Lab building an electric rocket because he was afraid that one of these murmurs might get

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[14] Hales, *Atomic Spaces*, 246.
[15] Szasz, et al., "New Mexican Response to the End of the Second World War," *New Mexico Historical Review*, 21-22. Front-page story in the *Santa Fe New Mexican* by William McNughty.
[16] *Ibid*.
[17] Ruben Montoya, Interview by Carlos Vásquez, Santa Fe, NM, 9 August 1994, "Impact Los Alamos Project."

closer to the truth.[18] People wondered, for example, if the gates were meant to keep people inside or to keep them out. The Manhattan District's Counter-Intelligence Corps (CIC) was in charge keeping the top secret project classified. Although they managed to protect the secret from the press until the end, the CIC had to deal with difficulties such as a Cleveland reporter who, after spending a vacation near Los Alamos, had hurried home to write an excited story entitled "The Forbidden City" in which he wrote, "The Mr. Big of the city is a college professor, R. J. Robert Oppenheimer, called the 'Second Einstein'… widespread belief is that he is developing ordnance and explosives… others… will tell you tremendous explosions have been heard."[19] The CIC hurried to hush him.

One may point out here that wartime secrecy was another indicator of the way the indigenous population was perceived. In view of the precautions that were taken to make sure that Santa Feans would not get close to guessing the truth about what the District was doing on the Hill, the Project leadership was surprisingly unconcerned with the local workers who spent the most of their days amidst the community. Ellis Fisher wondered at this differential treatment; she writes,

> Curious, wasn't it, that our project had to be kept secret from the Caucasian population of Santa Fe and yet the Indians and Spanish-Americans were bused daily to the project? A secret community was being infiltrated daily, and no one was concerned. Was it because these people could be trusted more than the white population? I don't think so. Was it because they were considered too unimportant to be a security threat? Was it because we hadn't thought about them as people, as individuals? We needed their service to take our coal, clean our houses, collect our garbage, and twist wires in the tech area. Wasn't it ironic that an Indian chieftain was ladling out soup and serving steak in our cafeteria?[20]

Fisher's comment underscores the virtual invisibility of the indigenous peoples throughout the process of the scientific conquest. Their presence mattered in terms of cheap, close-by, and discreet manpower but rarely mattered in terms of threat—whether of a security leak or objection to the Lab's activities—because they lacked agency and, more precisely, knowledge. Furthermore, as I have argued in previous chapters, these populations had seemingly everything to gain from the arrival of the new industry.

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[18] Serber, "Laibor Pains," in *Standing By and Making Do*, 57.
[19] Betty Shouse and Marjorie Miller, "Open City," *New Mexico Magazine*, Santa Fe, NM, January 1958, 21-22.
[20] Fisher, *Los Alamos Experience*, 91.

Because of the lack of information available so soon after the explosion, reporters such as George Fitzpatrick had to complete their article with descriptions of the exceptional landscape around Los Alamos, its ironic volcanic past, and biographies of the most notorious participants in the project. Simply sending a reporter through the gates to tell the public about the life beyond the fence was handled as breaking news when the District opened its sites to groups of reporters and visitors. It used these visits to orchestrate propaganda during the transition period between the bombings and the takeover by the AEC.[21] Since the official story of the making of the atomic bomb had been written by MED officials, reporters and their readership were forced to direct their enthrallment with the Western atomic boomtown toward the most mundane updates on postwar city growth such as the new recreational facilities, schools, and shopping centers.[22] Journalists Betty Shouse and Marjorie Miller wrote in their 1958 article "Open City" that "visitors to 'the Hill' may be more aware of the town itself than the laboratory." They mention, as a symbol of transition toward normalcy for the town, the drive-in that was moved into the pass office at the entrance of the city; commenting, "Now the familiar words 'meet me at the gate' merely mean 'let's go have a cup of coffee and a hamburger.'"[23]

c. The secrecy/security paradox

Constraints of secrecy and security set aside the 1950s-population of Los Alamos which was paradoxically content with living in a gated town that protected the peculiar composition of the white elite community. The system of segregated housing, which guaranteed that the best residential areas were assigned to scientists and engineers with the highest degrees, concentrated the elite toward the center of the community and kept the non-Anglos working class on the outskirts. This stratification drew an urban landscape based on education and ethnic discrimination. The fences separating the town from the poorer region outside further emphasized this pattern. A poll in September 1954 showed that 81% wanted to keep the outer

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[21] The event was later reiterated for the tenth anniversary of Trinity when LASL orchestrated a tour of the technical areas, which had been insofar rigidly restricted to cleared personnel, for reporters, staff, and employees' families. On July 17 and 18, 1955, the Open House enabled visitors to discover the nucleus of the laboratories, view top-secret experiments and attend a science fair. General Groves also organized tours of the Trinity site with Trinitite as souvenirs for visitors. In order to reassure reporters that radioactivity in the crater was safe, the General ordered Patrick Stout, an Army counterintelligence agent, to descend into it to be photographed. Although Stout was seemingly unscathed, he was probably exposed to a dose of about a thousand roentgens. He died of leukemia in 1967. Clarfield, *Nuclear America*, 204.

[22] See Part 2, Chapter 1, From army camp to dream town: the transformation of Los Alamos, A beautiful, useful, and appealing town.

[23] Shouse, et al., "Open City," *New Mexico Magazine*, 40.

fences closed.[24] "Safety" and "privacy" were the two reasons for keeping the gates and guards invoked by residents in a survey in 1955. Urban studies and planning specialist Carl Abbott analyzed these terms; he writes, "Since the only invaders in the mid-1950s were likely to be handfuls of tourists and local New Mexicans, it is hard not to read these terms as code words for class and ethnic prejudice—attitudes as deeply embedded in the country's sci-tech elite as among any other Americans of the 1950s."[25] Nonetheless, the AEC opened the gates and removed the guards on February 18, 1957, despite the residents' protests.

The polls prior to the opening of the gates revealed one of the town's paradoxes which lies in its residents' relation to security and safety; they considered Los Alamos a safe place because of the fences and the Army, but, at the same time, the Laboratory worked on the most destructive weapons on earth and dumped the most toxic waste in the surrounding canyons. In a 1948 article in *The New Yorker*, the reporter quotes from one of his scientist friends who lives in Los Alamos and said, "It's been so good for the children. They seem much stronger, and they're not as high-strung as they were in the city. Those mountains are soothing. They're permanent. Nothing could ever disturb those mountains—except maybe our bombs."[26] This paradox between a "soothing" environment for children and the Lab's dangerous work stemmed from an ignorance of these dangers maintained through secrecy.[27] An ignorance shared by the vast majority of the American population in the postwar decades and that was carefully maintained to protect the atomic complex from investigation by the media and the public in general. However, incidents did happen and some of them were serious enough to produce anguish among Los Alamoseans. Two of the gravest incidents on the Hill happened in 1946. The first casualty was Lewis Slotin, who was chasing the dragon on May 21, 1946.

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[24] Hunner, *Inventing Los Alamos*, 188.
[25] Carl Abbott, "Building the atomic cities: Richland, Los Alamos, and the American Planning Language," in Bruce William Hevly and John M. Findlay, eds., *The Atomic West*, Seattle: Center for the Study of the Pacific Northwest in association with the University of Washington Press, 1998, 106.
[26] Lang, "A Reporter in New Mexico," *The New Yorker*, 68.
[27] These dangers included the threat of an attack against the town. A mock evacuation was held in 1952, and then Los Alamos was chosen for Operation Alert maneuvers in 1956, which staged a mock atomic attack in cities around the country to test preparedness against hydrogen bombs. As part of the operation, third, fourth and fifth graders in the Hill's elementary schools received comic books on civil defense. In the 1950s, Los Alamos was particularly involved in the campaigns of the Federal Civil Defense Administration including the famous cartoon character Bert the Turtle of "Duck and Cover." Meetings in northern New Mexico took place to talk about hypothetical atomic attacks on the area because preparing civilians for a nuclear war was deemed of paramount importance in Los Alamos. The Los Alamos City Council created a Civil Defense and Disaster Corps in 1951. That same year, the Office of Civil Defense published *Survival under Atomic Attack* and the *Los Alamos Herald* announced a new policy for schools in case of an atomic attack, which consisted in closing blinds, putting on clothes, lying flat on the ground, and shielding one's eyes. As historian Gerard DeGroot ironically pointed out, "baby boomers grew up believing that a wooden desk would protect them from a 10-megaton blast." DeGroot, *The Bomb*, 281.

To chase the dragon was an experiment to measure criticality by pushing two hemispheres of plutonium into close proximity with a pair of screwdrivers. When reaching the moment of criticality precisely, the scientist was supposed to pull the hemispheres apart to avoid a massive radiation release. Slotin's screwdriver slipped and instead of ducking, he separated the hemispheres with his bare hands. He saved his colleagues' lives but died nine days later. He was buried in a lead-lined casket. After the accident, remote control of critical assembly equipment was established at Los Alamos. The second victim on September 15 was Harry Daghlian, who died of acute radiation syndrome. The newspapers only mentioned severe burns due to an industrial accident. Cecil Kelly, a LASL plutonium technician, 38 years old, was the third victim in December 1958. As he was stirring a vat of radioactive waste with an automatic paddle, he absorbed 12,000 rems and died on the next day.[28]

Explosions at site S were so regular that people would grow accustomed to them and comment on how big they were. Children would even incorporate words such as "contaminated" in their games. In a town that was praised by parents for the safe environment it offered to raise children, a few incidents shockingly clashed with that image. Children would play with unexploded devices such as bazookas, ordnance, and duds that they found lying on the ground on Barranca Mesa—now an upscale housing area. Dimas Chavez, whose father moved from Thoreau in central New Mexico to Los Alamos to work for Zia in August of 1943, recalled how, in 1946, he and his friends played with an old undetonated bazooka shell, tossing it around, banging on it, and dropping it from the first floor's balcony of the Sundt house they lived in into the garbage can. Sometime later, twelve-year-old Leroy Chavez and Don Marchi, who was only five at the time, mimicked them. When they dropped the shell, it detonated.[29] The shrapnel ripped open young Leroy's abdomen. Similarly, Vicky Mullholland lost a leg while playing with a mortar shell. In 1949, the police also found four boys sailing their boat in radioactive waters beyond the fences—breaching into restricted fenced areas was a famous game among youngsters.[30] Bill Jette remembered how fun growing up at Los Alamos was because "there was all sort of mischief to get into." He explained that the first rule was to never go beyond the fence, but he said, "I don't think I was there a week

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[28] Niklaus, et al., *How safe is New Mexico's atomic city?,* 52.
[29] Dimas Chavez, Interview by Cindy Kelly, Washington, DC, 13 February 2013, Atomic Heritage Foundation and Los Alamos Historical Society, "Voices of the Manhattan Project."
[30] Hunner, *Inventing Los Alamos*, 144.

before I went through that fence, along with my newfound friends.... We went under most of the time; the holes were big enough. And we'd play in the canyons, just explore."[31]

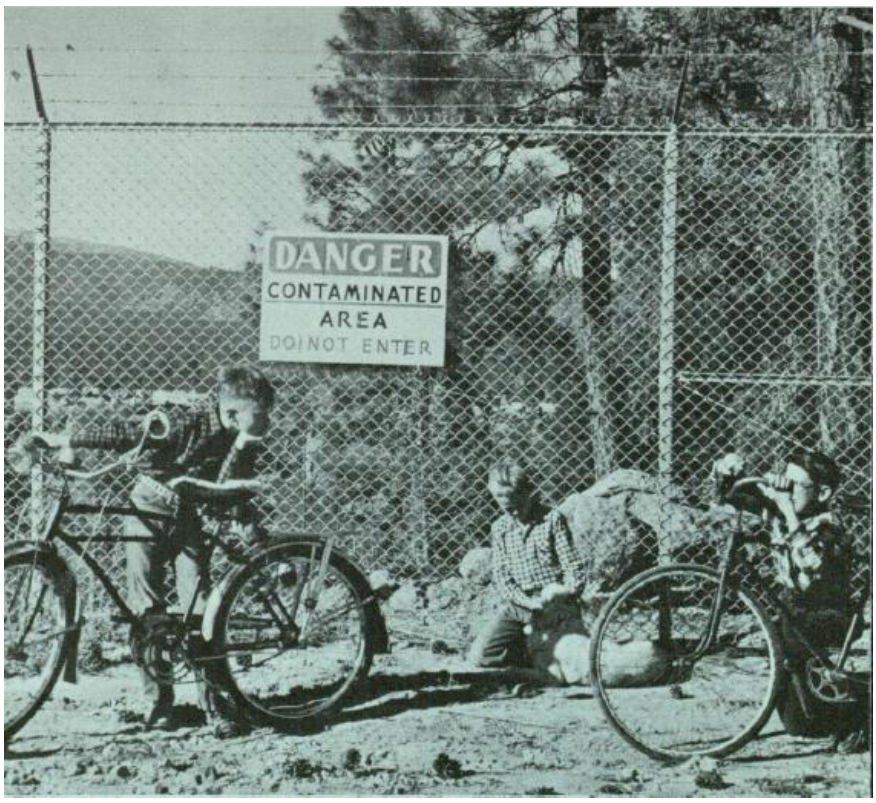

Fig. 37: Children playing in front of a DANGER, Contaminated Area sign. Source: Joe Alex Morris, "The Cities of America: Los Alamos," *The Saturday Evening Post,* Indianapolis, IN, 11 December 1948, Ralph Carlisle Smith Papers on Los Alamos 1924-1957, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS149BC, Box 1, Folders 28, 29, 30. Caption: The Cities of America. Smith Papers. "Residents get used to signs like this one, and presently are no more alarmed by them than you would be by signs saying, 'Keep off the grass.'"

Beginning in the 1960s, with the rise of anti-nuclear opinions, some of the children raised in Los Alamos encountered negative remarks when they went out of the community and said where they came from. Still today, a certain stigma remains about Los Alamos children who are jokingly said to glow in the dark.[32] Thus, the town combined the dangers of littered ordnances, dumped wastes, and threat of an enemy's nuclear attack. Yet, at the same time, the population thought of their community as a safe and healthy environment to live in. Secrecy greatly contributed to the endurance of the Los Alamos myth, that of a dream-like

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[31] Interview of Bill Jette in Mason, *Children of Los Alamos,* 60.

[32] Based on her interviews, Katrina Mason reports that the Los Alamos "children" avoided telling people where they were from in the 1960s when they were off to college or working outside the region. She comments on the various reactions that nuclearism caused among young Los Alamosans, "Many, especially those who have lived in the town most of their lives, view the Lab primarily as an employer and believe they were lucky to live in a town with such steady employment. Some would rather not be working on weapons; others take pride in their role in keeping the nation militarily strong. Still others—especially those who returned to university towns soon after the war ended—speak of having 'purged' themselves through participation in the peace movement or antinuclear demonstrations." Mason, *Children of Los Alamos,* 174.

suburban community built and thriving on secrets. Secrecy also contributed to the stratification of the community and of the work place. Anthropologist Hugh Gusterson, and author of *Nuclear Rites: A Weapons Laboratory at the End of the Cold War,* conducted fieldwork at the Lawrence Livermore National Laboratory to understand the mindset of weapons lab employees and determine how some people came to believe "that the development of nuclear weapons made both superpowers more secure," while others believed that "the stockpiling of nuclear weapons by the superpowers was a terrifying act of lunacy."[33] He analyzes secrecy from its discriminating capacity, writing,

> From Edward Teller's famously frequent retort to critics at public meetings—'If only you knew what I know, but I can't tell you: it's secret'— to the many scientists who told me that antinuclear protestors 'just don't understand,' the scientists' reflex is often to respond to criticism by claiming privilege. In constructing this sense of privileged status, the rituals of secrecy compound the effects of scientific training at elite universities, where scientists learn a robust confidence in scientific knowledge and a disdain for the superstitious views of the laity. Their standing as scientists who understand the secrets of nature is magnified by their status as scientists who know the secrets of state, so that there is a double sense in which protestors 'just don't understand.'[34]

Secrecy at New Mexico's other defense-related facilities has not been as documented since it did not attract as much attention as the town where the atomic bomb was born. However, they were no strangers to secrecy or risk either. George Fitzpatrick devoted his second "Hush-hush" article in March 1954, to White Sands, home of the Nike guided missile and brand new American rockets. The reporter comments, "we quickly discovered that to protect this secret experimentation, security precautions are just as strict at White Sands as at Los Alamos." Fitzpatrick goes on to recount the convoluted path through security procedures that prevented him from even getting "a bird's-eye view" of the launching of a 5,000-miles-an-hour or 8,000-kilometers-an-hour rocket from the post when he visited the site. Imitating the layout of his previous articles on New Mexico's secret research centers, the reporter describes the non-restricted areas of WSPG; he writes, "the post itself, like any boom town, is a conglomeration of temporary and permanent structure. A few are as modern as any city

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[33] Hugh Gusterson, *Nuclear Rites: A Weapons Laboratory at the End of the Cold War*, Berkeley, CA: University of California Press, 1996, 4.
[34] *Ibid*., 88.

facilities. Others continue to give White Sands Proving Ground the look of a desert outpost." He mentions the school, the theater, the men's service club, the library, the chapel, the hobby shop, the Post Exchange, the cafeteria, bowling, tennis, baseball, handball, and ping-pong, and concludes with the fact that, like in Los Alamos, the particular atmosphere of the rocket town found its way into children's games. He comments, "no wonder that the kids down at WSPG like to play with space ships and ray guns instead of playing cops and robbers. No wonder, when they write to Santa Claus, instead of wanting cowboy suits, hey ask for space cadet uniforms!"[35]

Living in New Mexico, surrounded by military installations, was riskier than residents thought it was. In 1986, the story of a "broken arrow" in Albuquerque was reported to the public based on military documents recovered through the Freedom of Information Act.[36] On May 22, 1957, a B-36 bomber preparing to land at Kirtland AFB had accidentally dropped a ten-megaton hydrogen bomb on the city. Standard procedure "called for the manual removal of the locking pin designed to prevent accidental in-flight release of bombs to allow emergency jettisoning of weapons, if necessary, during take-offs and landings." On that day, Lt. Bob Carp was assigned to the job and leaned over the body of the bomb. The reason for the drop is disputed. It has been said that the plane bounced through a pocket of turbulent air, and Carp grabbed for the nearest hand-hold, a lever which triggered the drop; but Carp later asserted there had been a "defectively designed manual release mechanism" that had been accidently pulled and caused the bomb to drop when he pulled the pin. The weapon fell on inhabited land owned by the University of New Mexico, and its explosives—not the nuclear device—detonated, creating a 25 foot-deep (8 meters) crater. Professor of history Les Adler commented on the event and on living in New Mexico,

> Those of us living in the region had long known, and, indeed, were strangely proud of the fact that Albuquerque was likely to be a major enemy military target due to the region's role in the production, testing and storage of atomic and hydrogen weaponary. […] For a town without major league credentials in any other fashion, this fact

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[35] Fitzpatrick, "Hush-hush n°2," *New Mexico Magazine*, 11-12; 47. The children's taste for space ships and ray guns was also due to an incident near the town of Roswell to the east where, in 1947, an extraterrestrial-spacecraft supposedly crashed. The site of the crash has drawn scores of visitors and aliens have become the town's trademark. A UFO Encounter Festival is held there every year in July.

[36] Enacted on July 4, 1966, and taking effect one year later, the Freedom of Information Act (FOIA) provides that any person has a right, enforceable in court, to obtain access to federal agency records, except to the extent that such records (or portions of them) are protected from public disclosure by one of nine exemptions or by one of three special law enforcement record exclusions. (Definition from FOIA.org, http://www.foia.gov/)

> produced a certain cachet, particularly in an age of bomb shelters, civil defense programs and above-ground testing in nearby Nevada."[37]

The pride and "cachet" that Adler mentions were the creation of nuclearism. The whole state took part one way or another in its promotion. Secrecy at Sandia was just as draconian, but it also proved to be a hindrance to the development of a corporate image in the eyes of the local community. The promotion of the new corporation to the local population and the recruiting of staff members were hampered by restrictions on the limited amount of information that could be publicly released. As a result of the limited communication on its operations, Sandia relied on the contacts between executives and local "business, civic, and service organizations to promote community cooperation between Sandia Corporation and the City of Albuquerque."[38] These contacts were facilitated by Sandia officials who were active at the City Commission, the Chamber of Commerce, and the Community Chest to deliver speeches on the role of Sandia in the atomic-energy program, and on their employment needs. Another problem was that many who were accepted and willing to work for the corporation despite lower salaries and housing problems would accept other employment during the long delays induced by security clearances.[39] One may note that despite these inconveniences to recruitment, secrecy also long remained the means to protect the corporation's image from bad publicity on matters that eventually became highly controversial, such as radioactivity.

2. Embracing nuclearism

a. "Better us than someone else"

Secrecy was not solely a matter of global politics and a peculiarity of the town of Los Alamos. It was also closely linked to the controversial aspect of working with nuclear armament. Secrecy allowed a larger field for interpretation of one's work, as no knowledge was available beyond one's specific task. For the people who were employed at one of the nuclear facilities, the new employment meant entering a new culture and a new ideology of nuclearism. The culture of the laboratories provided answers to secrecy, security, and moral issues. Researcher Jennifer Richter notes that the ideals of nuclearism and the pursuit of other applications of nuclear energy enabled the government "to convince the public that atomic

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[37] Les Adler, "Albuquerque's Near Doomsday," *The Albuquerque Tribune*, Albuquerque, NM, 20 January 1994, C, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Atomic Bomb—Dropped over Albuquerque.
[38] Alexander, *History of Sandia Corporation*, 48.
[39] Furman, *Sandia National Laboratories*, 224.

weapons were not a necessary evil, but rather a benefit to humanity in general. In order to alleviate concerns over the destructive power of nuclear weapons, the Federal Government needed to create a constructive narrative to make the pursuit of nuclear technologies acceptable to the public."[40] Some employees found working in the nuclear industry morally challenging because they considered the escalation of nuclear arsenals inherently wrong, or they became increasingly concerned about the environmental impact as the dangers of radioactivity became more widely known. However, others fully embraced nuclearism and felt pride in their contribution to American military and technological supremacy. This was often expressed in the recurring opinion regarding the development of weapons of mass destruction, which consists in saying, "better us than someone else." A poll conducted by the Committee on the Social Aspects of Atomic Energy of the Social Science Research Council in August, 1946, showed that 41% of the sampled population thought the United States should try to keep the bomb a secret and the top three reasons they gave for this opinion were that "other countries would use the bomb" (32%), that "it is in good hands here" (26%), and that "it is a protection for us" (18%).[41]

The advent of nuclearism as early as the late 1940s was also caused by changes in the composition of the staff at LASL. After Operation Crossroad, Oppenheimer's liberal recruits were replaced by Bradbury's conservative staff members. These recruits were more prone to embracing their patriotic duty, and Bradbury was instrumental in helping his staff deal with the moral dilemmas of their work, as he called them in his office to discuss the purpose of the Lab. He told them, "without the slightest shadow of a doubt, we must arm ourselves for a war that we basically know we must not fight until every other diplomatic and political resource is exhausted."[42] In the American collective conscience, the laboratory men were the soldiers of the Cold War, waging another war of the laboratories in the words of President Truman. Outside the fences, the population had no other choice but to trust these soldiers with weapons of genocide.[43] The perception of scientists outside the laboratories was not always favorable

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[40] Jennifer Richter, "New Mexico's Nuclear Enchantment: Local Politics, National Imperatives, and Radioactive Waste Disposal," Doctoral Thesis, University of New Mexico, Department of American Studies, 2013, 26.
[41] Sylvia Eberhart, "How the American People Feel About the Atomic Bomb,"*Bulletin*, 3 June 1947, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 12, Folder 15, Articles on Nuclear Weapons, Fear of and Effects, 1946-1988.
[42] Hunner, *Inventing Los Alamos*, 135.
[43] According to Gerald Clarfield, "At a time when men dreamed of nuclear rockets and aircraft propulsion, when many saw nuclear power as the only sure and ultimate guarantor of our national existence, the glamour of the industry provided its devotees an unusually intense stake in its success." And so "engineers and scientists had an emotional commitment to achieving the success of nuclear power." Clarfield, *Nuclear America*, 279.

to them, despite their short-lived postwar heroism and the crucial significance of their mission. They were soon often portrayed as villains in popular science-fiction.[44] This reputation, combined with the failures of the scientists' movement, discredited the image of atomic scientists and associated them to warmongers.

Tad Bartimus comments on the reputation of Laboratory employees, writing, "The perception on the outside of a weapons lab can be that of a secret hideaway filled with crazed Dr. Strangelove warmongers hankering to see mushroom clouds. That's not the reality. Soul searching goes on inside the Labs: Are we doing the right thing?"[45] As proof of this "soul-searching," Bartimus relies on interviews of LANL employees who had to justify their work, sometimes even to their own families. He thus recounts the ironic story of Allen, Ted, and Hugh Church, the sons of Fermor Church and Peggy Pond, who had worked at the LARS before it was taken by the government. Bartimus interviewed the Churches in the late 1980s. Fermor Church had become an environmentalist with New Mexico Citizens for Clean Air and Water. Peggy Pond Church had strong emotional ties to the Pajarito Plateau, where she had grown up. She showed this attachment in her poetry and in her biography of her friend Edith Warner, *The House at Otowi Bridge*, in 1960. She later said that Los Alamos had become too ugly. As a pacifist, she nourished strong anti-nuclear sentiments alongside her husband. Their three sons, however, got jobs at Sandia, working with nuclear weapons. Ted was first to get a job there. After the Korean War, Allen came to work with him in the power supply group before he became a timing expert for nuclear weapons. Ted said, "Some folks always had a problem with me and what I do—what they think I do. […] Friends have a saying though: 'Better to be in the world than out of it.'" The younger son, Hugh, who studied physics and meteorology at the University of California, joined Sandia in 1957 to work on atmospheric weapons effects; by then, it had already become a 4,000-employee corporation and was deeply involved in the testing at the Nevada Site. He recalled,

> I thought a lot about whether I wanted to work on nuclear weapons program [...]. You wonder why you have to be working with weapons of destruction when there's so much else to do out there. But I believe the deterrence aspect has kept us out of war for

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[44] One example was Pat Frank's novel, *Mr Adam*, published in 1946.
[45] Bartimus, *Trinity's Children,* 81.

> so long. You make every effort to make sure things aren't used in the wrong way. And there's comfort in having somebody even-tempered handling it.[46]

Ted said about his mother that "she was always upset that the three of us ended up together here." He later became a Quaker,[47] but believed his faith could fit with his work because he felt that it was the scientists' and engineers' "responsibility to help the public understand." Allen reported people calling them "crazy people who work with nuclear weapons," but he replied to these accusations, "we're not crazy. I find people here to be very sincere; they take it with a great deal of responsibility. I'd rather be a part of it than leave it to someone else."[48]

b. Nuclearism and patriotism

This ideology of nuclearism closely intersected with the patriotic sentiments which were constantly stirred up and put forward during the Cold War. As we have already seen in the testimony of Carlsbad locals at the time of the Gnome test, many New Mexicans expressed their pride in taking part in the ideological strife against the Soviet Union. The atmosphere of competition in the state, because of its many defense-related facilities, peaked every time a gap was suggested between the two superpowers—such as the launch of Sputnik or the so-called "missile gap" in 1957.[49] This atmosphere revived the original spirit of the Manhattan Project at the Laboratories, and the whole state could be involved. New Mexico's pride was fueled by newspapers articles that praised the state's role in global history thanks to its pioneer research center. The Alamogordo Guided Missile Test Base, for instance, was presented as a source of pride; Major Brown commented, "it is felt that New Mexico will be justly proud for having had this organization operating within the State, whose basic discoveries will be affecting the history of man for many generations to come."[50]

In Albuquerque, the population's effort concentrated on education and more particularly, on scientific education. In 1960, the State School Board passed regulations

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[46] *Ibid*., 84-85.
[47] The Society of Friends (Quakers) is a Christian group whose foundation dates back to the mid-seventeenth century. One of the core teachings of Quakerism is the renunciation of participation in war and pacifism in general.
[48] Scott McCartney, "Two families, one destiny: N.M. sons evicted by war project now are brothers in arms," *Albuquerque Tribune*, June 23, 1988, Center for Southwest Research, University Libraries, University of New Mexico Vertical Files, Los Alamos, NM – Impact of Manhattan Project on Area Communities, Homesteaders on Pajarito Plateau, 1942.
[49] See footnote 54 in Part 3, Chapter 2.
[50] D. M. Brown, Major A. F., "Guided Missile Test Base Is Established At Alamogordo Field," *New Mexico Magazine*, Santa Fe, NM, January 1948, 50.

requiring science teachers to make more science courses effective for the year, and the graduation requirements for the city's high schools were amended to include more mathematics and science courses.[51] Other measures included the development of competitive grading systems in elementary schools, augmenting faculty salaries at the University of New Mexico, and offering bigger prizes at the New Mexico Science Fair. In 1959, the University of New Mexico applied for and received a $227,916 grant from the AEC in order to establish a nuclear engineering laboratory for the purpose of educating undergraduate and graduate students pursuing a science degree with a major in nuclear engineering, similar to the program already offered at Los Alamos.[52] Governor John Burroughs was offered intensive courses in health physics by the AEC "as a step in encouraging the states to assume control of certain radioactive materials under an amendment to the Atomic Energy Act, passed in September 1959."[53]

In northern New Mexico, residents of the Española valley called to their neighbors on the Hill in a "Salute to Los Alamos" and used the pride factor as a bond between the two communities, emphasizing that it united them in their common goal of national security:

> Los Alamos and the Espanola Valley are closely tied by work, business, entertainment, and personal interests. Many who work in Los Alamos, live in the Valley, own property here, and send their children to Valley schools. Los Alamos residents come to Espanola Valley to shop, to attend rodeos, and other celebrations and events. This city of 13,000, 'on the Hill' continues to be one of the most important cities in the World—and Espanola Valley is proud to salute the Laboratory and the thousands of people who are making history in the great atomic research projects of our government.[54]

New Mexicans and their governments embraced their new role in protecting the nation alongside other Westerners, as it provided them with a new weight in national affairs. These

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[51] Wood, "The Transformation of Albuquerque," 228.
[52] Thomas J. Morris, Letter to Secretary William F. Darmitzel, Committee on Atomic Affairs, Office of the Governor, Santa Fe, NM, 23 November 1959, Governor John Burroughs Papers, 1959-1960, Santa Fe, NM: New Mexico State Records Center and Archive, Collection 1959-239, Box 13191, Folder 24, Committee of Atomic Affairs (1959-1960).
William F. Darmitzel, for the Committee on Atomic Affairs, Letter to Dennis Chavez, 20 November 1959, Governor John Burroughs Papers, 1959-1960, Santa Fe, NM: New Mexico State Records Center and Archive, Collection 1959-239, Box 13191, Folder 24, Committee of Atomic Affairs (1959-1960).
[53] "AEC to Offer Health Physics Courses for Representatives of State Governments," Letter from the AEC to Governor John Burroughs, Washington, DC, C-175, 8 September 1960, Governor John Burroughs Papers, 1959-1960, Santa Fe, NM: New Mexico State Records Center and Archive, Collection 1959-239, Box 13191, Folder 24, Committee of Atomic Affairs (1959-1960).
[54] "Salute to Los Alamos," *New Mexico Magazine*, Santa Fe, NM, April 1955, 37.

western states gained in political influence thanks to their relations with the Army and their statuses as leaders in the development of new technologies such as lasers, computers, electricity, and medical equipments. Later, however, pride and patriotism were undermined with the rise of pacifism and anti-nuclear activism. In some families, it was replaced by a need for justification, or by shame. Bill Jette, son of Eric Jette, a metallurgist at Los Alamos during the Manhattan Project explained, "During the 1960s it seems like I spent half my time defending what they did up there... […] One of my sons is a child of the 1960s. He has a problem with what his grandfather did. We don't even discuss it." Atomic workers have struggled to justify their work and the philosophy behind it.[55]

At the beginning of the 1990s, nuclear weapons technology still accounted for over half of the work at LANL, and scientists still faced the same moral dilemmas on nuclearism. Jo Ann Shroyer, author of *Secret mesa: inside Los Alamos National Laboratory* addresses some of these long-standing dilemmas. She disputes the reputation of Los Alamos as "the world's supply of nerds—badly dressed, absent-minded brainiacs who can't manage to wear matching socks" and, rather, describes it as a "complex," "not easily understood" place because of the controversial work—some of it unrelated to weapons— and because "the community is still saturated with the details and purpose of its origin." She considers Los Alamos as "a community that has been both a beneficiary and a victim of its own history and mythology."[56] One of her interviewees, Jas Mercer-Smith with whom she met at the Lab, reiterated the same nuclearism ideology, which had not aged since the 1950s. He compared Lab scientists to fairytale witches, saying, "our job is to scare little children into behaving" and referred to the paradox of his profession, which is "to guarantee peace by making weapons so horrible that no country would ever be foolish enough to provoke their use." After admitting to having felt the adrenaline rush at countdown and the euphoria of a successful shot at the Nevada Test Site, Mercer-Smith added that their vocation was "Much more like art than most science." The new generations of Lab scientists, however, sought to detach themselves from previous practices. Tom Ribe for instance said he viewed the AEC as "almost a criminal agency in terms of what they were doing to the people in the 1950s and '60s," citing soldiers and downwinders.[57] Ribe's comment touches on the most dangerous, ethically and morally

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[55] Interview of Bill Jette in Mason, *Children of Los Alamos*, 62.
[56] Jo Ann Shroyer, *Secret Mesa: Inside Los Alamos National Laboratory*, New York, NY: John Wiley & Sons, 1998, 8-9.
[57] *Ibid*., 17; 30; 33; 151. Jas Mercer-Smith's justification of nuclear weapons work points to another aspect of the nuclearism ideology which is the Roman adage *si vis pacem para bellum* ("if you want peace, prepare for war")

reprehensible secret of the nuclear era which has affected soldiers, downwinders, uranium miners, laboratory workers, and the general public; that is, the dangers of radioactivity. New Mexicans still struggle with the aftermath of the dangerous practices of World War II and the Cold War, many of which were employed without their knowledge.

3. The greatest secret: radioactivity

a. Background

Between the scientists' movement of the 1940s and the height of the anti-nuclear movement in the 1980s, the most strictly-guarded secret was the truth about radioactivity. It is important to devote a section of this thesis to the evolution of how radioactivity has been perceived by the American public since World War II as the testimonies of workers at the Lab are strongly influenced by the amount of information they could have access to as well as how protected they were on their jobs.

Originally the atom was perceived in the light of promising prospects. After the War, the news of the atomic bomb revived these beliefs. John J. O'Neill published *Almighty Atom: The Real Story of Atomic Energy* a few days after the bombings, in which he mentioned ideas such as atomic cars that would not need refueling or bombing the polar ice cap to get a globally warmer climate for the entire planet. David Dietz's alternative to blowing up the polar cap in *Atomic Energy in the Coming Era* was to build artificial suns. Atomic historian Paul Boyer, who retraced the history of the bomb in American culture, called the hypnotic power of these promises on American society the "nuclear utopia." While experts professed that development of new atomic technologies would require a lot of time, their lack of enthusiasm did little to calm that of the press. The AEC was all the more content with keeping public interest in atomic matters high as it was pursuing new projects. David Lilienthal, first chairman of the commission, compared atomic energy to the sun as a way to pacify the fears of those who only saw the destructive potential of the atom. As part of its pro-atomic propaganda, the AEC also sponsored exhibits such as the 1948 *Man and the Atom* in Central Park, and its public-information office cooperated with the U.S. Office of Education, the American Textbook Publishers Institute, and the National Education Association to produce booklets and handbooks promoting atomic energy intended for students. Then came the magical effect that radioactive isotopes could have in the treatment of cancers and other

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by Publis Flavius Vegetius Renatus (385-435 CE) in *Epitoma Rei Militaris* (Epitome of Military Science), or, in other terms, preparing for war as a way of ensuring peace.

diseases. *Operation Atomic Vision,* a high-school study unit published in 1948 by the National Education Association, declared that atomic energy would reduce the likeliness for that year's high school students of dying prematurely of cancer, heart disease, contagious diseases, or any other afflictions of the time.[58]

The purpose of the AEC's campaign was to change the atom's connotation from destruction to health, happiness, and prosperity. The powerful agency was able to do that because it was both responsible for developing and regulating the atomic complex. At the same time as it was in charge of the development of atomic operations and facilities, it was also in charge of protecting Americans from the hazards produced by the atomic complex. It took until the 1974 Energy Reorganization Act, which split the AEC into two agencies—the Department of Energy in charge of promotion and development of nuclear energy and the Nuclear Regulatory Commission in charge of control of civilian use of nuclear materials to protect public health and safety—to remedy this undemocratic situation and restore the principle of checks and balances in nuclear decision-making. So, while the AEC endeavored to soothe the public's fear of the bomb and portray atomic energy as positive, it also sought to allay fears of radiation. Secrecy was the method of choice to ensure that the public could not discuss the hazards of atomic research, weapons testing and stockpiling. In parallel, campaigns in the media downplaying the danger and discrediting those who warned against them stifled all public discussion. The hazardous side to bomb-making also went virtually unnoticed at first because anxiety about Soviet bombs took up all room for concern. Once that changed, however, the AEC presented itself as being in control of what they considered were safe dosages.

The problem was that these dosages never ceased to decrease. Before the War, x-rays had been popular and generally thought to be harmless until Dr Alice Stewart's pioneering study on their effect on fetuses proved otherwise in the 1960s.[59] The radiation-exposure limit after the Trinity blast, for example, was five roentgens, a level which is now considered

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[58] Boyer, *By the Bomb's Early Light,* 114; 120; 296-300.

[59] Stewart studied the effects of abdominal x-rays on pregnant women in the U.K. The results showed a clear connection between childhood leukemia and x-rays in early pregnancy, proving that low-level radiation could be harmful, contrary to what had been claimed insofar. She later went on to study the effects of radiation with statistician George Kneale at Hanford in the 1970s. Her discoveries attracted the enmity of the nuclear and health physics establishments, and of the British and American Governments. "Alice Stewart," *The Guardian,* Guardian News and Media Limited, 28 June 2002, http://www.theguardian.com/news/2002/jun/28/guardianobituaries.nuclear, accessed February 28, 2015. See Gayle Greene, *The Woman Who Knew Too Much: Alice Stewart and the Secrets of Radiation,* Ann Arbor, MI: University of Michigan Press, 1999.

dangerous. Radiation protection standards have not only evolved with hew discoveries on the effects of radiation on biological systems but also with changes in attitudes toward what should be considered acceptable risk.[60] The first formal standard for protecting people was proposed in 1934 by the U.S. Advisory Committee on x-ray and Radium. Ten years later, the radium standard was used to set the first tolerance limit for internal retention of plutonium at a working-lifetime limit of 5 micrograms or 0.3 microcuries. Further animal studies in 1945 led the MED to reducing the plutonium limit to 0.06 microcuries and 0.03 at the Hanford site. In the 1950s, medical studies on the Hibakushas—atomic bomb survivors—resulted in further reductions and radiation-induced genetic changes became a concern as a result of experiments on mammals and fruit flies. Such genetic changes in humans greatly inspired popular culture from the 1954 mutant movie *Them!*, showing mutant ants created by the Trinity blast, to the succeeding Atomic Kid, Amazing Colossal Man and Woman, Godzilla, Hulk, Shrinking Man, Spiderman, and other X-men.

b. Setting standard, sweeping ethics aside

We now know that plutonium lodges itself in the bone marrow and can quickly affect all parts of the human body. From the bones, the isotope will remain hazardous and continue to irradiate and damage surrounding tissue as long as it is radioactive. With a half-life for plutonium of 24,000 years, exposure will entail consequences including an increased likelihood of cancer, cell mutation, and interference with blood components. At the time of the Manhattan Project, however, the effects of radioactivity on biological systems were still widely in the realm of optimistic speculations, and knowledge of how to treat contamination was still limited. The Met Lab program headed by the University of California's most prominent radiologist, Dr. Robert S. Stone, was first put in place to determine a threshold under which radioactivity would not be dangerous for humans. Then, General Groves decided to build a separate military medical program within the District (the Medical Section), which

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[60] The first limits were set at the appearance of observable signs of excessive exposure to radiation, such as skin ulcerations, whereas now the standards are based on the prevention of exposure-related diseases, such as cancers. By 1903, when the limit was set as 10 rad (absorbed radiation dose) per day, animal studies had already shown "that x-rays could produce cancer and kill living tissue and that the organs most vulnerable to radiation damage were the skin, the blood-forming organs, and the reproductive organs." William C. Inkret, John C. Taschner, and Charles B. Meinhold, "A Brief History of Radiation Protection Standards," *Los Alamos Science*, Los Alamos, NM: Los Alamos National Laboratory, No. 23, 1995, 117. In 1941, the National Bureau of Standards published a handbook to give details on the dangers of radiation exposures; it described a wide variety of radiation exposures that were linked to cancer, including handling of radioactive materials, bombardment by proximity to materials, breathing of dust, and ingestion of the elements by mouth or by skin contact. "The Effects of Radiation," Atomic Heritage Foundation: Washington, DC, 2015, http://www.atomicheritage.org/history/effects-radiation, accessed September 24, 2014.

was headed by Stafford Warren and superseded Stone's group. The military staff of this program owed "unconditional allegiance to the military-industrial culture and to Groves" to be sure that the doctors working on "unique occupational hazards" would not hinder the continuation of the Project. There was no medical research program in Los Alamos because the Health-hazard Section run by Dr. Louis H. Hempelmann and associate Dr. James F. Nolan relied on the Met Lab, which handled research in Chicago. In August 1944, a Los Alamos chemist breathed in and swallowed the content of a vial of plutonium that had exploded in his face. The doctors called Chicago, but the Met Lab Health Division could not answer any of their questions. Hempelmann and Oppenheimer pressured Groves to accelerate a medical research program at Los Alamos, but it never came to be. The accident precipitated a confrontation between Stone and Warren who had two completely different mind frames and opinions that illustrated two trends regarding health standards: purposeful ignorance to avoid slowing down the project on the one hand, and research to eliminate hazards altogether on the other. Doctors were terribly embarrassed when patients presented signs of radiation illness because they could not make a clear diagnosis and had no idea of how to treat the symptoms. When a worker was ill with radiation poisoning, the expression "medico-legal complications" was used on the file. Doctors had to tell patients that their disease was not District-related, but that District doctors were best able to treat them.[61]

In order to establish safety standards for atomic workers, soldiers, researchers, and any other personnel working with radioactive material, experiments and tests were conducted after the War. In the late 1940s, the atomic bomb survivors were closely monitored by American medical groups. Colonel Warren, Chief of the Radiological Division of the District, headed the Manhattan Project Atomic Bomb Investigation group in Japan. They recorded witnesses and helped write the U.S. Strategic Bombing Survey of June 30, 1946, a report entitled *The Effects of the Atomic Bombs on Hiroshima and Nagasaki*.[62] These studies enabled American

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[61] Much excessive risk was being taken. At all sites in Los Alamos, the medical teams found dosages far above the allowable maximum with "reported areas of exposure as high as thirty-two times the maximum dosage of radiation; the center of the small fractionating and intubation laboratory read 1,666 microcuries per liter of air – more than sixteen times the maximum allowable dosage." Hales, *Atomic Spaces*, 278; 282; 289.

[62] To read the document, see "The United States Strategic Bombing Survey: The Effects of the Atomic Bombings of Hiroshima and Nagasaki, June 30, 1946," Washington, DC: The United Stets Government Printing Office, *Roger Williams University E-Books*, http://docs.rwu.edu/cgi/viewcontent.cgi?article=1000&context=rwu_ebooks, accessed October 2, 2014. Also see "The Effects of the Atomic Bomb on Hiroshima, Japan," and "The Effects of the Atomic Bomb on Nagasaki, Japan," Physical Damage Division, May and June 1947, available at https://archive.org/search.php?query=subject%3A%22U.S.+Strategic+Bombing+Survey%22&page=4, accessed November 10, 2014.

doctors to gather information on how radiation from an atomic blast affects the human body. Around the same time, at Los Alamos, medical experiments were conducted on individuals, including scientists' children, who were given small doses of radioactive iodine, tritium, and other substances to see how fast they would expel them. Several other studies were conducted on pregnant women, mental patients, and prisoners. A DOE report "estimated that sixteen thousand men, women, and children participated, knowingly and unknowingly, in experiments that put radioactive substances in their food and drink and submitted them to plutonium injections in a few cases."[63]

The first experiments of this kind date back to 1945-1947 and were conducted at the Universities of California, Chicago, and Rochester. In 1973, an inquiry requested by the AEC "was directed to the question of whether informed consent was obtained from patients injected with plutonium either when injected in 1945-1947 or during recent follow-up studies in 1973."[64] This inquiry concluded that, while the subjects or their authorized representatives had been required to sign a consent form in the 1970s studies, "formalized standards for patient consent to experimental procedures did not exist prior to 1946" and

> Security considerations could have interfered with whatever disclosure the investigators in these plutonium studies may have considered at the time. The word plutonium was classified until the end of the war. During wartime, investigators may have regarded any reference to the nature of the studies as a violation of security. Written statements would have constituted an additional breach of security. An atmosphere of secrecy for security reasons continued into the postwar period.[65]

The first policy of formalized patient consent was established in 1947. The 1973 study was spurred by a Berkeley radiologist who had learned that a patient injected in 1945 was still alive although subjects had initially been chosen with a life expectancy under ten years—patients suffering from malignant tumors or other chronic diseases. These experiments became public knowledge in the 1990s, when Energy Secretary Hazel O'Leary made the

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[63] Hunner, *Inventing Los Alamos*, 142.
[64] "Disclosure to patients injected with plutonium," Summary Sheet SECY-75-130, 13 August 1974, 4, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 14, Folder 9, Radiation Poisoning, 1944-1993.
[65] *Ibid*.

decision of disclosing documents on human radiation testing—on retarded children, terminally ill patients, pregnant women, and prisoners.[66]

In the 1950s, the dosage ceiling was high in accordance with the threshold theory that postulated that radiation would have no permanent effects if the exposure remained below a minimal level, meaning that repeated exposure to this minimum threshold was considered as safe. In 1953, the AEC proclaimed that, "Over a period of many years, a human being may safely receive a total amount of radiation which would cause a fatal illness if administered to his whole body within a period of a few minutes" and that "low levels of radiation produce no detectable somatic effect; that is, the body is able to repair the damage virtually as quickly as it occurs. Such low level exposure can be continued indefinitely without any detectable bodily change."[67] Over the same period, soldiers were used as guinea pigs in the Nevada desert to test the psychological effects of nuclear warfare. The Desert Rock exercises took place between 1951 and 1957. These atomic soldiers were sent to check ground zero after each explosion, each time a little more rapidly after the detonation, pilots were also asked to fly through the radioactive mushroom cloud.

Several incidents during the 1950s brought fallout on the forefront of nuclear anxieties. In May 1953, the "Dirty Harry" test on the Yucca Flat at NTS blanketed residents of Saint George, Utah, with as much radiation as nuclear workers were allowed in a year (5 rems). Inhabitants complained of symptoms related to radiation sickness on the day of the test. One year later, the Castle Bravo test was the largest American explosion at Bikini; the ensuing Lucky Dragon incident dealt a massive blow to the practice of atmospheric testing. An estimated 665 Marshallese islanders, who had not been warned about the test, let alone about the fallout cloud heading their way, were unexpectedly exposed to radiation from the thermonuclear blast.[68] The American sailors on Rongerik Island saw the cloud and protected themselves as they had been instructed. The islanders, on the other hand, were not given any

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[66] Edward Markey, Letter to Energy Secretary Hazel O'Leary, 24 August 1994, *National Security Archive*, Washington, DC: George Washington University, http://nsarchive.gwu.edu/radiation/dir/mstreet/commeet/meet6/brief6/tab_l/br6l1h.txt, accessed November 10, 2014.

[67] Anthony Turkevich, "Assuring Public Safety in Continental Weapons Tests," AEC Thirteenth Semiannual Report, *Bulletin of the Atomic Scientists*, Chicago, IL: Educational Foundation for Nuclear Science, Inc., Vol. 9, No. 3, April 1953, 88.

[68] An hour and a half after the detonation, nuclear fallout reached a Japanese fishing vessel, the "Lucky Dragon No. 5," which was around 80 miles east of the test site. Ultimately, one of the 23 crew members died of acute radiation poisoning, while many others faced serious health effects. Adriana Rowberry, "Castle Bravo: the Largest U.S. Nuclear Explosion," *Brookings*, Washington, DC: The Brookings Institution, 27 February 2014, http://www.brookings.edu/blogs/up-front/posts/2014/02/27-castle-bravo-largest-us-nuclear-explosion-rowberry, accessed October 4, 2014.

recommendations. Some of them even played with the white powder, thinking it was snow. Rongerick and Uterick islanders were taken to the hospital. They were all sick with radiation sickness but healed within six weeks. The inhabitants of Rongelaap island, which received even more fallout, became celebrities. Members of Congress serving on the Joint Committee on Atomic Energy were brought to see them. They saw on these victims the same sores, peeling skin, and falling hair that they had seen on rabbits in laboratories. Ten islanders were brought to the U.S. because they presented irregularities on their thyroid glands. Some of them were operated on when the growth was malignant.[69]

In 1956, Dr. Alice Stewart published her work on the damages and abnormalities which x-rays, even in a minute amount, could cause to the fetus of a pregnant woman. Her conclusions greatly challenged the threshold theory. In 1957, the International Commission on Radiological Protection (ICRP) recommended an annual occupational dose limit of five rems per year and a working-lifetime limit of 235. Another concern arose in the early 1960s when elevated rates for leukemia and solid-tumor[70] cancer among atomic-bomb survivors were shown; this "appearance of an increased rate of cancer among the atomic-bomb survivors […] brought into focus the possibility that even low levels of exposure might induce cancer."[71] Nevertheless, a threshold was still difficult to determine and the definition of acceptable risk remained to be changed. The approach to risk was modified at the end of the 1970s and "required that the average incremental risk of death from radiation exposure to workers in radiation industries be no larger than the average incremental risk of death from traumatic injuries in safe industries."[72]

Eventually, in 1977, Los Alamos was subjected to two different regulations in terms of standards. The first one was established by the EPA for public exposure outside the Lab property and was set at 25 millirems per year. The second one was established by the DOE and NRC for public exposure at the Lab boundary and outlying areas; it was set at 170 millirems per year and 500 millirems for members of the public who may live adjacent to the fence line of nuclear installation. Meanwhile, the maximum permissible radiation dose for

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[69] Norman Moss, ed., *Men Who Play God; the Story of the Hydrogen Bomb and How the World Came to Live with It*, New York: Harper, 1968, 87-88.
[70] A solid –tumor is "An abnormal mass of tissue that usually does not contain cysts or liquid areas. Solid tumors may be benign (not cancer), or malignant (cancer). Different types of solid tumors are named for the type of cells that form them. Examples of solid tumors are sarcomas, carcinomas, and lymphomas. Leukemias (cancers of the blood) generally do not form solid tumors." (Definition from the *National Cancer Institute*, Washington, DC: United States Department of Health and Human Services, http://www.cancer.gov/).
[71] Inkret, et al., "A Brief History of Radiation Protection Standards,"120.
[72] *Ibid*., 121.

nuclear workers was considerably higher as it had been set at 5 rems per year since 1957—having already dropped from 36 rems in 1934 and 15 rems in 1950. Supporters of the industry argued that the decrease in standards was due to technological progress that made such reductions more practical rather than to new evidence of biological damage from low levels of radiation.[73] The following decade saw the intensification of the anti-nuclear movement in the American population as a result of revelations and observed long-term damages of radiation on human tissue.[74] By 1993, the National Council on Radiation Protection and Measurements (NCRP) recommended an occupational dose limit of 1.5 rem per year over a working lifetime of 47 years, a limit over three times lower than in 1958. The process of standard setting was long and morally problematic because secrecy prevented public scrutiny and nuclearism influenced scientific findings to match the desires of the supporters of the nuclear industrial complex.

c. Secrecy, safety, and nuclearism in the accounts of New Mexican workers

Many New Mexican Laboratory workers have witnessed these changes in safety regulations, the medical check-ups, the influence of nuclearism ideology and the eventual revelations on how much risk they had been taking on the job first-hand. This section focuses on the way these notions appear in the discourse of former Los Alamos employees in order to demonstrate the impact of secrecy on the local population. In these testimonies, secrecy is either recalled as the unusual trait specific to these jobs along the nuclear chain or as a source of anger and bitterness for those who developed health issues and became concerned with the environmental impact of nuclear facilities.

The endurance of nuclearism over seven decades of the Lab's existence shows that it became completely integrated in the culture of the Laboratories. All, across the spectrum of employees, were more or less influenced by it. Florida Martinez of Truchas, a village 35 miles

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[73] "Radiation Standards Causing Confusion," in Niklaus, et al. *How safe is New Mexico's atomic city?,* 15-17.
[74] Gerald Clarfield's conclusion of his work on "Nuclear America" in 1984 was commensurate to the scandal produced by the news of the long-term impacts of atmospheric testing; he writes, "American officials consistently adopted the most optimistic view of risks possible; they denied reality and common sense; they placed an impossible burden of proof on their critics; they shut their eyes to scientific evidence that they should have considered; they manipulated data to produce results they wanted; they tried to repress investigations that they feared would produce unwelcomed news. The most charitable view would say that they acted in optimistic ignorance of what they were doing. A more critical person would conclude that they were criminally negligent. [...] The most that we can say now, as historians working exclusively from printed records, is that they acted with extreme and willful carelessness, with a monstrous disregard for the possible sufferings of innocent people." Clarfield, *Nuclear America*, 443.

(56 kilometers) from Los Alamos, said for example that working at LANL made her proud because she believed that the Lab was there to protect the nation and help the people. She considered these jobs as valuable and the facilities as nice and safe.[75] Similarly, Delfido Fernandez was convinced that the Lab would never close "because it's a very important place for the nation."[76] Another example is that of Paul Emilio Fresquez of Española. He had a security job at the Lab with a difficult schedule of sixteen-hour shifts—his son would even drive him home lest he should fall asleep behind the wheel—nonetheless, he declared that "national security demands me to be there." He worked as a lieutenant at TA55, the plutonium facility. They would go from room to room and look for security infractions such as documents that would not be locked up for the night. When Fresquez was hired, he was asked to give a written statement about what he thought of the protection of Los Alamos. He stated that he would make every effort to protect his valley and his children, commenting that "The reason we're up there is to protect the lives and the property of the Lab and there are a lot of lives up there and down here we are protecting."[77]

Still, there remained the fact that lower-skilled employees did not have access to the same information as staff members. As a result of this disparity, their sentiments toward their workplace depended primarily on how well they were treated, the benefits they got from working there, and sometimes what they heard or read about the Lab. They worked in an intermediary zone where they knew more than outsiders, but did not have the means to fully understand the signification of their assigned tasks. For the workers who did gain knowledge about the risks involved in their jobs, the threat of unemployment often took on such proportions that many of them resorted to willful ignorance, turning a blind eye to the possibility of health and environmental damage. That is why, despite the shock of learning about operations at the state's nuclear facilities in the media, there was generally little opposition to the nuclear complex, which had become a pillar of the local economy. The impoverished population of northern New Mexico was prepared to accept working hazards

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[75] Florida Martinez, Interview by Carlos Vásquez, Chimayó, NM, 27 October 1991, "Impact Los Alamos Project."

[76] Delfido Fernandez, Interview by Troy Fernandez, Chimayó, NM, 27 February 1994, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 36-37.

[77] Paul Emilio Fresquez, Interview by Kenneth Salazar, La Mesilla, NM, 24 April 1995, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 39-40.

because many of the jobs they had had access to in the past—in the mines and on the railroad—had been just as hazardous. Josefita Velarde recalled a conversation she had with a nurse when she started working in Los Alamos as a nurse's aide in February 1946, asking her whether she knew that the atomic bomb had been made here. The nurse, who was from up-state New York, replied "what? They made it here? I'm leaving!" Yet, Josefita could not remember any of the local people saying that were scared because no matter where they worked, it had always been hazardous for the working class. She also mentioned the tuberculosis and influenza from which people did not recover before the War. The only safe place was the ranch. She strongly believed in the Lab as a life saver. The only reason why people survived, she thought, was the feeling that they had for the land, a real mystical pull. Her father had always felt in exile because he could not live in the region for the lack of jobs. So, Josefita concluded, "Alright, they made the bomb, who cares? It was a job, good paying jobs! The whole state is affected."[78]

Pursuing his appraisal of work at Los Alamos in the 1950s, Robert McKee, head of the Zia Company, addressed the lucrative specificities of the job. Risk-taking was promoted and rewarded on the paychecks of Zia employees who accepted tasks in the Tech Area classified as "hazardous" or "extra-hazardous" by the University of California. An employee could increase his pay by 10% for hazardous jobs or even double it for extra-hazardous jobs. A third of Zia employees worked in the Tech Area. These jobs included cleaning of the precipitrons and cyclotrons[79] under the supervision of California experts with Geiger Counters. To soften the scary connotation of these words, McKee describes the precautions taken by these special workers who would change into special clothes before going in the Tech Area and change again before leaving. Their work clothes would be "laundered after work at a University of California-operated laundry that cleanses the wearing apparel of radioactivity and tests them before they are worn again." The laundering of work clothes and the attitude of workers, who were "apparently […] little impressed by the peril," were "testimonial to the notable safety measures of the University of California." According to McKee, most of these employees were "completely accustomed to" the safety measures, and "those drawing double pay for

[78] Josefita Velarde, Interview by Peter Malmgren, 20 November 1995, "Impact Los Alamos Project."
[79] The precipitron was a monitoring instrument developed during the war for measuring airborne alpha contamination. The cyclotron was a particle accelerator invented by Ernest Lawrence and M. Stanley Livingston in 1932, that accelerates charged atomic or subatomic particles in a constant magnetic field.

extra-hazardous jobs" would "rarely willingly consider a change, nor are they injured by their work."[80]

Years later, some of these former employees described their work conditions in the 1950s. One of them was Genaro Martinez, janitor at Los Alamos for 25 years. He worked in contaminated areas and had to use a respirator all day long. He explained that decontamination was a different classification that would increase their pay by ten cents an hour. Machinists would test tubes or pipes to know if they were "hot;" they would mark them with chalk or tape, and then the janitors would come and wash them until they were "cool." They would use gases and soap to do the cleaning up. For protection, they would be given clothes and rubber gloves. Martinez often tested himself to check contamination levels. He recounted the story of a colleague whose hands had gotten contaminated, and, as a result, had to wear gloves to eat. Worried, Martinez went back to regular cleaning instead of decontamination, but this angered his Anglo supervisor who transferred him to night shifts in the S site—the other two sections for janitors were the tech area and the town. He also remembered that water used to run beneath the buildings of S site and hypothesized that it was probably contaminated. In 1958, he initiated the creation of a union for janitors who were the Lab employees with the lowest pay because the treatment they had from supervisors who were "nasty." They were about three hundred janitors in the company according to him.[81]

The consequences of these "extra-hazardous" tasks only began to show years later when workers were confronted to health issues that could be linked to overexposure to radioactive materials. Ruben Montoya, who had started working for the Lab in the late 1940s, was advised to take a medical retirement in 1972 after he hurt his back on his job in December 1971. He later received a letter from a medical leader telling him he had an enlarged thyroid. When he was doing research in the joining of beryllium with soft metals, the medical team would check his breathing and take x-rays of his chest every three months. The previous letters read "no abnormalities detected." In 1978, however, after a chest x-ray at the Veterans' Hospital, he was told about his enlarged thyroid. In his interview, he described his job working with dangerous materials, saying, "We had uranium all over. We had a hazardous

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[80] McKee, *The Zia Company*, 34-5. McKee added that "Thus far no Zia employee has been either gravely burned or become seriously radioactive, which is a tribute to the safety measures of the University of California, although the university has lost two technicians reportedly because of carelessness in handling the highly radioactive matter which goes into the bomb, but this is something no Zia employee is ever asked to do."
[81] Genaro Martinez, Interview by Peter Malgren, Chimayó, NM, 16 November 1995, "Impact Los Alamos Project."

materials book. We would be working under a hood, we used a respirator. We took all the precautions we could when I recognized we were working with dangerous material. My boss didn't like that because it took too much time. […] I liked what I was doing, but I didn't like what they were doing to me."[82]

The 1970s was a period of instability at the Lab because of increased public awareness regarding the effects of radioactivity. Three lawsuits charged LASL with damages and one of them charged the Lab with damages incurred as a result of working with radioactive materials. It was filed by Ramon Martinez, 57, of Española, who claimed he had been "disabled by a 'neurotic fear of radiation' caused by his work in a LASL uranium foundry." A few months before his planned retirement in February 1976, Martinez underwent surgery to remove a cancerous tumor in his right eye. Robert Salazar, a colleague of Martinez's remembered that the latter had left the Lab in 1956 as a result of being afraid of radioactivity. In his testimony, he talked about spills, poor ventilation, the absence of exhaust fans around furnaces, and respirators that did little to prevent inhalation of vapors and gases. He reported that, "about 10 to 15 times in the course of his employment in the building, radioactive materials including uranium-235 would 'spurt out' from a centrifugal furnace. 'It would throw it just all over the walls, so you have to go and scrape it and pull it out and clean the rest with acetone.'" Salazar also testified that when the men took off their masks after getting out of the furnaces, "you could see the blackness of the oxides all over your face." Alex Lovato, a retired foundry worker who worked with Martinez and Salazar, went blind. Part of his job was to look into the furnaces "where uranium was fabricated with an optical pyrometer." He explained that workers usually wore masks instead of full-face respirators and, as a result, had their eyes exposed and black dust on their faces. The New Mexico Supreme Court ruled in 1979 that the protective articles were ineffective. Martinez was awarded $75,000 for damages stemming from his neurotic fear of radiation.[83]

Other workers, on the other hand, believed that there was a good side to secrecy. Jasper Tucker, who moved to New Mexico from Oklahoma in 1954 and worked at temporary jobs in road construction and as a heavy equipment operator, commented, "It was better not to know

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[82] Ruben Montoya, Interview by Carlos Vásquez, Santa Fe, NM, 9 August 1994, "Impact Los Alamos Project."
[83] "Atomic Mishap Ever Present Danger," in Niklaus, et al., *How safe is New Mexico's atomic city?,* 53-55. The first lawsuit was filed by a Massachusetts woman, the widow of an employee who had died of a tumor of the lymphatic system. The second lawsuit was "brought by Saul Bramer, 57, an employee of TRW Nuclear Systems Inc., a California defense contractor" who was at the lab during the 1971 accidental plutonium release. Bramer filed a claim for damages first against the AEC and then against the ERDA, but the courts ruled against him.

what was going on. You went in, did your work and didn't ask any questions. Because it pays well, you just have to go with it. If you don't, you're out."[84] The prevailing lack of knowledge and understanding of what little information slipped through also encouraged locals to go on with their lives without asking any questions. Jose Benito Montoya mentioned that his parents never got a television because they had heard so much about radiation that they thought television would give them radiation.[85] This anecdote is proof of how little the first generations could grasp on the matters of radiation and radioactivity because of a lack of knowledge and the omnipresence of secrecy. Many workers, like Pedro Martinez, did not believe their job was dangerous. At the time, the safety personnel would give the "ok" for no radiation. Later, they found out that there was much more radiation than they originally thought. Martinez was tested periodically for it. In 1959, he thought Los Alamos had started to realize they needed some standard operating procedures to deal with the dangerous conditions when working with explosives. There were several accidents during his time working there.[86] Local businessman Richard Cook, who delivered construction material to the Lab, explained that radiation was not on anybody's mind and strongly downplayed its dangers; he said,

> Every ten years there would be an accident of some sort, a guy would *get blown up*, but we worked all over that area, there were sites everywhere but never gave a thought to radiation. We weren't told there was any radiation and I think it was completely *blown out* of proportions, really. Environmental issues have been *blown out* of proportion, and everybody is afraid up there that they are going to be blamed for something. If it was so dangerous up there, don't you think that people would move? I am not at all afraid for my kids and grandkids because of the plutonium, etc. I think there is *a certain amount a sacrifice* that has to be made for *progress*. […] I admire them a great deal because they are a smart group of people and to have that concentration of brains and under-utilize it would be a crime. Somebody ought to *take it in hands*. They would say that some places, nuclear dumps were dangerous and we should stay away, but we would drive by them all the time and it never bothered anybody. There is no question that there is contamination, but look at all the advances

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[84] Jasper Tucker, Interview by Dot Waldrip, Dixon, NM, 12 November 1995, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CDs 38-39.
[85] Jose Benito Montoya, Interview by Steve Fox, Pojoaque, NM, 8 August 1994, "Impact Los Alamos Project."
[86] Pedro Martinez, Interview by Peggy Coyne, 15 February 1996, "Impact Los Alamos Project."

> that were made. You look at the good and you put up with a little of the bad. They have been so careful up there now that I don't think there is any possibility of contamination getting out of hand in the future.[87]

Cook's use of the words "blown up" and then "blown out of proportion" is interesting because it draws a parallel between two kinds of excess: the excessive risks that could lead to being "blown up" and the excessive reactions that were proportional to the amount of anxiety-provoking revelations the public was exposed to, especially in the 1980s. The notions of control, to "take it in hands," as well as that of sacrifice are mentioned in several instances in his testimony, showing a full internalization of the discourse of nuclearism. For the sake of "progress," sacrifices must be made. For New Mexicans, "progress" did not necessarily mean scientific or technological progress, but, rather, economic progress out of chronic poverty. Therefore, according to Cook's testimony, locals were content to leave the control of their economic fate in the hands of "a smart group of people."

The following testimonies are precisely referring to some of the "accidents of some sort" that could happen on the job. The first example is that of Ramon Fresquez of San Pedro who worked with explosives. Operators were protected against explosions, but accidents still happened. He mentioned two accidents at S site and six casualties when they were transporting material meant to be burnt. Two more people died in a drilling process that they were doing on one of the charges—the drill heated up and exploded. Fresquez described how he thought his job had impacted the environment; he said, "They would just tell us what to do and where to deliver the material—they wouldn't tell us if a site or material was dangerous for the environment. They became more stringent and more respectful of the environment in the last few years."[88] Another worker, Alfonso Mascarenes, was exposed to radiation from plutonium in an accident at Los Alamos. He had participated in many dangerous experiments, but, that time, he accidently created a "hydrogen bomb" with flames that went up "75 feet [23 meters] high." He and his colleague came out unscathed. Following this accident with lithium hydride, he became aware of the dangers of treating the substance and turning it into lye. He became more active in chemical waste management.[89] Not all employees were as lucky, but mortal accidents were kept a secret. In 1959, for example, "an explosion at the lab took the

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[87] Richard Cook, Interview by Steve Fox, Española, NM, 8 August 1995, "Impact Los Alamos Project." Italics added by Lucie Genay.
[88] Ramon Fresquez, Interview by Kenneth Salazar, San Pedro, NM, 14 March 1995, "Impact Los Alamos Project."
[89] Alfonso Mascarenes, Interview by Dot Waldrip, 14 January 1996, "Impact Los Alamos Project."

lives of four *paisanos*, from Chimayó, Española, and El Guique, but little was heard as to what really took place."[90]

As a result of this secrecy, training was not thorough when it came to sensitive materials. Despite the high concentration of plutonium at TA55, where he worked as a security guard, Paul Emilio Fresquez responded that he felt secure in his work place. Nevertheless, he believed his personnel were not trained as much as they ought to have been on the matter of radiation. The training that they received was minimal, and they did not have enough practice. On environmental issues, he commented, "you're always wondering if they're releasing something into the ground or something like that detrimental to all of us. There's always the question in the back of your mind: are they being legitimate with me? Are they telling the whole truth? It scares you, makes you wonder if they are being upfront with you." Sometimes, he would sit down in a room to have lunch and a crew would come to tell them "hey, no one should be here without a full face mask and a full body suit, this room should be closed." However, like Richard Cook, he considered Los Alamos to be an acceptable risk concluding that "We are blessed in this area. We're the envy of the world."[91] The same unwavering faith in the Lab's research can be found in Larry Dillion's interview. Dillion, of El Rancho, was a seasonal heavy equipment operator at Los Alamos between 1991 and 1993. One of his operator friends, Doug, tore into an old sewer line in 1991. No one knew it was there, but it contained acid and radioactive material which splashed all upon him. His friend had skin bleeding and could no longer go out in the sun, but, as far as Dillion was aware, he was not compensated. This event did not tarnish his opinion of the Lab. Dillion sees Los Alamos as a research center with endless possibilities—to cure diseases and other problems of modern society.[92]

Finally, Charles Montano's testimony is particularly poignant for it addresses some of the main issues that most affected the life of local workers at Los Alamos. Montano's father, who worked for a contractor, used to complain about the incoming Anglos who were given management positions; he would say, "*estos gringos*, they come from God knows where and

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[90] Juan Estevan Arellano, "Oral Hisory Program Examines Impact of Los Alamos National Lab On Paisanos," Land: Different Values, Winter 1993-1994, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Los Alamos, NM—Impact of Manhattan Project on Area Communities, Homesteaders on Pajarito Plateau, 1942.

[91] Paul Emilio Fresquez, Interview by Kenneth Salazar, La Mesilla, NM, 24 April 1995, "Impact Los Alamos Project."

[92] Larry Dillon, Interview by Homer Campbell, 23 April 1995, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CD 35.

they are put in charge." According to Montano, this feeling of injustice developed into "a pain, an anger, a common bonding" among local workers who had the impression that "they were treated like slaves." This experience prompted Montano to pursue an education. He later obtained a Bachelor's Degree in accounting and mathematics from the New Mexico Highlands University in Las Vegas. His roommate, Mike Grallegos, had grown up in Los Alamos, in the Denver Steel area, which was reserved to the poorer members of the community. Grallegos resented his upbringing there; he talked about the racism and the socially devastating effects of the school system on minorities, despite the fact that his parents wanted him to benefit from the excellence of these schools. After going to California, Grallegos returned to work at Los Alamos for what Montano identifies as the three main reasons why they all made that choice: the benefits, the salary, and the location in northern New Mexico—a combination virtually impossible to find elsewhere.

Montano was hired as an accountant in the nuclear Material Safeguards Department where they kept track of nuclear materials. At first, Montano recalled being caught up in the mystique of being a Lab employee, it was just the end of the Manhattan Project era, the last member of that generation started to retire. A new generation came in; the mystique and sense of common purpose faded. The new generation came to advance their individual careers. They didn't have a project or a focus. Politics ruled the day, the bias became more apparent, and he "became aware more and more that, as a minority, no matter what [he] did, it was never enough." On nuclear materials, Montano professed "that the Lab tried to avoid exposing the Lab, not necessarily the workers, to the adverse publicity of having a bad accident." Accidents still happened, but the general public did not hear about it; he noted, "they have a public affairs office that can put a spin on virtually anything and avoid the general public from knowing the extent or the magnitude of the problem, whatever it might be." He described the Lab's policy regarding safety and secrecy as "a corporate culture which does not want public accountability or scrutiny, that will turn on its own workforce and its members that questions the decisions being made by management in an intuitive way."[93]

4. Conclusion to Part 3

Montano's experience of evolving from being caught up in the "mystique" to becoming more aware of the bias and of the lack of public accountability at the Laboratories reflects the

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[93] Charles Montano, Interview by Carlos Vásquez, 16 April 1996, "Impact Los Alamos Project." Six months after Montano arrived at the lab in 1979 his friend, Mike Grallegos, with whom he shared an office, committed suicide at 27.

experience of many New Mexicans who came to understand the downsides of the nuclear bonanza. Some of these workers' testimonies—such as Montano's or Genaro Martinez's who mentioned his Anglo supervisor—address issues that blended secrecy with security but also with discrimination. Since most of the support staff was from the valley, and some dangerous tasks were assigned to them, the correlation between origins—or, rather, the education level that was also related to origins—and exposure to danger is clear. This is one of the components of a colonial labor system in which the local, poorer population is assigned the riskier tasks. Montano's description of the feeling of inferiority by referring to slavery is extreme, but it confirms a sentiment of being conquered and exploited. This sentiment varied depending on the degree of satisfaction that the employees had with their job at Los Alamos and their personal or family experience prior to the arrival of the Lab. The younger generations, however, became more critical as secrecy was lifted on certain dangerous and sometimes unethical practices. The discrimination issue became increasingly problematic as the local youth reached further educational attainment, sometimes motivated by the frustration they or their parents had experienced at having one's options narrowed to maintenance jobs. The social implications of these sentiments will be discussed in a final part devoted to the fallout of the scientific conquest.

In a few years, the nuclear industry brought phenomenal changes to New Mexico which harvested the fruit of a huge economic boost. Sandia, Los Alamos, the military bases, White Sands, and the uranium industry generated unprecedented income in the state, attracted businesses, capital, and degree-holding workers. New Mexico changed economically but also physically as it urbanized and welcomed the new scientific culture with new facilities and attractions. Everything was done to attract more science to New Mexico. New Mexicans greatly benefited from the economic new deal and expressed their enthusiasm, not only at having jobs but also at participating in their country's security. Revenues from the Labs, from military installations, and from uranium enabled communities to modernize and to become more active consumers. The economic growth shadowed the mechanisms of the scientific conquest. It was the immediate gain from the bargain New Mexicans made with nuclear science. By supporting its development, seeking more funds, and advertizing the state's research centers, local boosters, politicians, and businessmen zealously took on the role which was expected of them to promote the military, industrial and scientific complex. Yet, for all this, they paid a might price, often without knowing so.

New Mexico was freed from its dependence on eastern markets. New Mexicans were able to put an end to their migratory lives that forced them to go job-hunting in other states. However, the nuclear economy and its connected jobs depended on other outside actors: on the Federal Government and on other countries which, by their foreign policy, influenced the American government's needs for nuclear research, weapons, rockets, missiles, and uranium. The Faustian bargain was based on this shift in dependence and on the adherence to the ideology of nuclearism. The ideology thrived under the veil of secrecy that concealed the harmful effects of the industry. Thus, despite the postwar economic boom, New Mexico remained an internal colony in the American West, and the cost for this status has increasingly divided local opinions since the end of the Cold War.

PART 4: THE MULTIPLICATION OF FALLOUT

CHAPTER 1: THE ENVIRONMENTAL LEGACY

The building of the atomic complex in the West has oftentimes been compared to earlier periods of expansion such as Frederick Jackson Turner's Frontier or the California Gold Rush.[1] Journalist Kevin Fernlund pointed out the similarities in his article on uranium mining on the Colorado Plateau in 1994, writing, "with a collective memory that tended to recall the political and financial rewards of past expansions, rather than the societal and environmental costs, the nation entered the Atomic Age with little to guide it except a deeply held belief in progress." This comment clearly refers to the concept of a Devil's bargain, i.e., making a deal with its immediate benefits in sight while dismissing the possibility of long-term damages. Fernlund adds that "Westerners accepted virtually without question the need for a military-industrial complex" in part because of the efficacious propaganda orchestrated by the AEC, but principally because the complex was a unique opportunity for some of these forlorn regions; he notes, "With all of its many bases, command centers, proving grounds, training schools, nuclear test sites, bombing ranges, missile fields, arsenals, laboratories, weapons plants, naval yards, and strategic mining sites, the West became, in effect, the front line in the forty-year stand-off between the United States and the Soviet Union."[2] Even once the effects of the complex began to show, Westerners, and more particularly New Mexicans, continued to turn a blind eye to the detriments of what had become their beacon of prosperity.

Although one could challenge the concept of a Devil's bargain on the ground that New Mexicans were not in full knowledge of the health and environmental risks they were taking in supporting the development of the nuclear complex, the fact that opposition was so scarce and slow even after knowledge was made available to a larger crowd justifies the use of the expression. Moreover, supporters of nuclearism and of the nuclear industry who argue that the rewards are worth the risk despite revelations are still numerous to this day. Access to information and the production of information have become a key parameter in nuclear issues. The state of New Mexico now has some of the most extensive weapons research, management, training, and testing infrastructures in the world. The military, industrial, scientific, and academic complex has turned into a dominant force in the state's economy and

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[1] A rush is a rapid influx of fortune seekers. It has mainly been used to refer to minerals, including uranium. The California Gold Rush is the best-known in U.S. history. John Sutter struck gold near the Sacramento River in 1848 as he was having a sawmill built. The Californian goldfields attracted thousands of fortune seekers who lived in lawless and violent mining camps until the deposits were exhausted and the camps became permanent settlements or ghost towns.

[2] Fernlund, "Mining the Atom," *New Mexico Historical Review*, 345-348.

politics. The principal benefit to the state is the thousands of jobs that attract outsiders and New Mexicans alike and that maintain economic dynamism. The price that needed and still needs to be paid is living in close proximity with nuclear weapons, toxic chemicals, radioactive materials and wastes, tests and experiments. Yet, in spite of these sizable disadvantages few are ready or can afford to give up jobs at the nuclear facilities as they are considered among the best in the state. At the same time, the research centers have largely diversified and redirected their activities, focusing more and more on non-weapon science. As the production of warheads began to decrease as a result of international negotiations and treaties, new activities came to fill in the gap in the agenda of the nation's weapon laboratories. However, weapons are still stored in New Mexico. The weapons program still made up 57% of the LANL budget in 2012, and the effects of Cold War practices on the environment are still visible.[3] Starting in the 1960s, cleanup operations of the Manhattan Project facilities became a highly critical issue, especially in a context of mounting public awareness about the health and environmental consequences of the atomic age. This shift was triggered after the Lucky Dragon incident which was followed by a first wave of international protest against nuclear weapons, the NTS controversy, and the Test Ban Treaty in 1963.

1. Public awareness

a. Time for accountability

Due to the Cold War, the Federal Government's actions and decisions related to nuclear weapons were under a veil of confidentiality. The general public had no access to knowledge that was even remotely linked to the atomic complex since it was automatically filed as classified information. In *The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico*, anthropologist Joseph Masco addresses the consequences of a catalytic experience such as the Cold War or more recently, 9/11, asking "what happens when the submerged cultural legacies of nuclear nationalism come flooding back into the public sphere." In so doing, he identifies two major cultural achievements of the nuclear age: rendering the nuclear economy almost invisible to the public eye and the banalization of American nuclear weapons in the citizens' everyday lives.[4] The most disturbing fact about

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[3] "Budget," *Los Alamos National Laboratory*, Los Alamos, NM: Los Alamos National Security, LLC for the United States Department of Energy's National Nuclear Security Administration, http://www.lanl.gov/about/facts-figures/budget.php, accessed February 18, 2015.

[4] Masco, *The Nuclear Borderlands*, 3. Also see Garry Wills, *Bomb Power: The Modern Presidency and the National Security State*, New York, NY: Penguin Press, 2010. Wills defines the Bomb as the starting point of a process which "fostered an anxiety of continuing crisis, so that society was pervasively militarized." This

nuclear secrecy is that its purpose was not solely to keep the means of building a nuclear arsenal confidential or protect it from outside enemies but also to conceal the negative effects of the nuclear complex from the American public to protect the said complex from lawsuits.[5] The fallout of this policy can now be observed in all parts of the U.S. where the nuclear complex was established but even more so in New Mexico because of its entanglement with the historic development of the atomic complex.

The environmental legacy of the Manhattan Project is probably the heaviest cost inherited from the Manhattan Project and the Cold War. It is also the cost which the population is most concerned about. The most recurrent statement among New Mexican residents is that they had no knowledge of the dangers of radioactivity or at least of how dangerous it could be, even among those who worked at the Laboratories or other installations dealing with nuclear energy. If some felt cheated and angry, others thought the hazards of radioactivity were a necessary sacrifice for the economic development it brought to the state. Public knowledge has grown since the 1970s, and has grown even further as documents have been declassified and new research conducted. Not long after leaving Harrisburg, the site of the Three Mile Island accident, to settle in Taos, Allan Richards wrote in the *Taos Magazine* that "The public is on the edge. It has learned to fear. It lives in a cloak of mistrust. Weaned on paranoia, it knows the government doesn't tell the truth, the whole truth… but what it sees fit to."[6] With this realization came a new era of conflicting interests and major trust issues between the New Mexican population and the state's main nuclear facilities. Activists and watchdog groups mobilized against the Laboratories and state officials who sought to minimize the environmental and health impact of the complex. Meanwhile, the general public became more systematically confronted to two versions of the story: the alarming tale of experts commissioned by activists and the reassuring stance of the Laboratories' authorities. The

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process "redefined the government as a National Security State, with an apparatus of secrecy and executive control," as well as the rest of American institutions. According to him, the sequence of wars from World War II to the Cold War and to the war on terror correspond to "two-thirds of century of war in peace, with growing security measures, increased governmental secrecy, broad classification of information, procedural clearances of those citizens able to know what rulers were doing in secret." (8-9)

[5] Eileen Welsome makes the same analysis in *The Plutonium Files* She writes, "As far back as 1947, much of the secrecy was prompted by fear of lawsuits and adverse public relations." She explains how the fear of lawsuits dated back to the 1920s and 1930s when the deaths of young workers in watch factories—the workers painted the dials with radium and inadvertently ingested it—triggered many lawsuit and worldwide public sympathy. Thereafter, lawsuits were seen as a potential threat on the government's nuclear projects. Eileen Welsome, *The Plutonium Files: America's Secret Medical Experiments in the Cold War*, New York, NY: Dial Press, 1999.

[6] Allan Richard, "Hold the Line, Reflection on a Nuclear Drama," *Taos Magazine*, Taos, NM, Winter 1979/80, 16, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Technology—N.M.—Impact on Earth.

confrontation of numerous viewpoints and a widespread desire to maintain the state's prime resource for jobs and wealth resulted in a relative lack of powerful reaction to each new set of frightening revelations on waste disposal, leakages, contamination, accidents, and cancer rates. This proved that the philosophy of nuclearism and the risk-taking that comes with it had taken a strong grip on the land of "nuclear" enchantment. Professor of history and resident of New Mexico in the 1950s Les Adler commented on the story of the "broken arrow," a ten-megaton hydrogen bomb which was accidently dropped over Albuquerque in 1957 and refers to the public's accountability despite the prevailing secrecy:

> If exposure of these events is the first step in understanding them, then a subsequent stage should be a frank admission by all of us that we knew and even tacitly approved of the conditions that brought about those near-misses and what we might more appropriately call "poisoned arrows," the aboveground nuclear tests, the uranium mines and nuclear plants whose careless use contaminated our soil, ionized our atmosphere, poisoned our animals, and even irradiated our own bodies.[7]

At the end of the 1980s, Congress ordered a report to the Secretary of Energy for the National Research Council (NRC) to investigate health, safety, and environmental issues arising throughout the American nuclear complex. This request was prompted by the Chernobyl accident of 1986. In the preface, Chairman Richard A. Meserve writes that "acceptable risk must ultimately be measured by balancing the benefits of the activities against their costs." He identifies the benefit as "the supply of special nuclear materials and nuclear weapons" and the cost as being "measured in both financial terms and in less quantifiable health and environmental terms."[8] Expressions such as the "burden of past operations" or the "legacy" of those operations which burdens the complex appear repeatedly in the text clearly laying the blame on past actors and past decisions; he notes,

> Now, not only has the behavior of the radioactive effluents and wastes proven to be far more troublesome than anticipated but also the handling of the more familiar non-radioactive effluents and wastes has been shown to be seriously deficient. As a result there are now potentially serious environmental problems throughout the complex, and

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[7] Adler, "Albuquerque's Near Doomsday," *The Albuquerque Tribune*, C11.
[8] United States National Research Council and Committee to Provide Interim Oversight of the DOE Nuclear Weapons Complex, "The Nuclear Weapons Complex: Management for Health, Safety, and the Environment," Washington, DC: National Academies Press, 1989, vii.

> substantial pressure has arisen to restore the environment—a prospect that is both technically and financially challenging."[9]

The list of difficulties that account for the challenging nature of cleanup include the fact that the Department operated under much more public scrutiny, that it was no longer independent as other agencies had entered the equation, that safety and environmental standards had become more stringent, the budget had been cut, and, although nuclear weapons remained necessary for national security, they had lost some of their significance. In other terms, the costs had started to exceed the benefits, and as more environmental and health problems were unearthed, the balance was to be broken more glaringly.

The public's growing awareness crystallized on the issue of responsibility and accountability because those responsible for the damages had to be put in charge of the cleanup operations. The Laboratories thus made up for the decrease in their activities due to the loss of nuclear weapons' significance with cleanup and environmental monitoring activities.[10] Upon looking at the legislative history in terms of environmental and health radiation protection, one can note that there has been a clear acceleration and intensification of decision-making since 1970.

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[9] *Ibid*., 10-11.

[10] Joseph Masco quotes a New Mexican activist who accused LANL of environmental negligence, saying, "I think the lab has been able to coast along for forty-five years without having any environmental accountability. They didn't even keep track of what was put at Area G until the late 50s. And until 1967 they had outfall pipes coming out of the canyon wall at Acid Canyon with untreated radioactive sewage." Masco, *The Nuclear Borderlands*, 194.

Date	Legislation
1946	Atomic Energy Act
1963	Clean Air Act
1970	National Environmental Policy Act
1972	Clean Water Act
1974	Safe Drinking Water Act
1976	Resource Conservation and Recovery Act
1976	Toxic Substance Control Act
1978	Uranium Mill Tailings Radiation Control Act
1980	Comprehensive Environmental Response Compensation, and Liability Act
1980	Superfund Amendments and Reorganization Act
1982	*Nuclear* Waste Policy *Act*
1984	Hazardous and Solid Waste Amendments
1986	Emergency Planning and Community Right-To-Know Act.
1987	*Nuclear Waste Policy Amendments Act*
1988	*Indoor Radon Abatement Act*
1992	*Waste Isolation Pilot Plant Land Withdrawal Act*

Fig. 38: Environmental and Health legislation on nuclear matters 1946-1992.

b. The result of dangerous past practices

Past practices are pointed at in the NRC's report as "the source of the extraordinarily large cleanup and restoration project facing the Department today," and the Department is advised "to learn from its past mistakes to prevent the occurrence of an analogous situation forty years hence" by "improving current waste management practices and developing innovative waste management technologies." Dangerous practices, particularly those regarding waste management, were born in the hectic wartime atmosphere of the Manhattan Project which failed to prioritize the health and environmental impacts of producing atomic weapons. Mimicking the disposal practices in other industries of the time, chemical "wastes were placed in unlined and unprotected trenches; oils and organic solvents were poured into open standpipes in the soil; contaminated cooling water was deposited directly on the ground; unlined ponds that served infiltration basins were used for the disposal of various liquid waste streams."[11] While these practices improved in other industries, improvement was slowed down significantly by secrecy and a lack of public scrutiny at weapons facilities. Secrecy and the Cold War have been branded as the culprits of this perilous legacy, but, since the 1970s, the blame has been distributed to many others—the AEC, the DOE, the Labs, the uranium companies, the State Environment Department—and many believe the problem of dangerous practices is not a thing of the past.

Getting full knowledge of past practices and of their impact on New Mexico's environment has proven to be a complicated undertaking, even for experts with access to

[11] National Research Council, "The Nuclear Weapons Complex," 43; 34-35.

sensitive data. After the Cold War, many different institutions undertook environmental investigations to get a precise view of how damaging LANL's activities had been. Parallel to the actions of scientists and federal officials, activists and Pueblo representatives have pushed for impact studies since the 1980s. All of these conducted independent tests of air, water, soil, plants, and animals in the region. We now have a clearer view of the health and environmental damages produced by New Mexico's nuclear complex, but the extremely high economic stakes have slowed and influenced the public's reactions. The first wakeup call for New Mexico's environment occurred in the late 1970s with the disclosure of hazardous past and current practices at Los Alamos regarding waste management and disposal. LASL reports as early as 1973 collected evidence of radioactive contamination of the flora and fauna in the Mortandad Canyon liquid waste disposal area.[12] Beforehand, scientists believed radioactive particles would travel vertically into the soil rather than spread to neighboring areas. As part of the study started in June 1972, scientists also placed bee hives near the point where the liquid effluents were discharged into Mortandad, Acid-Pueblo, and DP-Los Alamos Canyons. Tritium was found to be the greatest source of contamination among the worker bees, and it rapidly transferred to the rest of the hive and the honey. Another study was conducted to determine whether radioactive releases from LASL were affecting human food sources. The fruit and vegetables study showed the presence of some radioactive contaminants in the samples, including uranium and plutonium, which LASL scientists believed were "likely" due to fallout from nuclear tests. The rest of the concentrations were considered insignificant with the exception of a peach tree that contained elevated levels of tritium, uranium, and strontium-90. Evidently, the spreading of radioactive contamination from the disposal of liquids had already been clearly established by the mid-1970s.

At the same time, serious doubts were raised as to the connection between the Lab's activities and the cancer rates in its vicinity. The Love Canal scandal[13] in 1978 and the Three

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[12] Niklaus and Feldman wrote that "One study reported in 1973 to a meeting of the International Radiation Protection Association in Washington, DC, noted that plutonium-238 and 239 concentrations in the lung and hide of rodents sampled in one Los Alamos canyon suggested that windblown soil particles may be a prime contamination mechanism. […] Cesium-137 was also discovered to be elevated in mule deer inhabiting the canyon areas, with one deer exhibiting concentrations of the radionuclide in muscle about 35 times higher than deer in non-contaminated areas. […] Elevated tritium concentrations two to five times normal were also observed in mule deer, ravens, and stellar jays collected from the canyon area." "LASL Scientists Keep Eye on Radiation's Spread," in Niklaus, et al., *How Safe is New Mexico's Atomic City?*, 28.

[13] The worst environmental disaster involving chemical waste in the U.S. occurred in the Love Canal neighborhood in Niagara Falls, New York. In the 1940s and 50s, the Hooker Chemicals and Plastics Corporation used the unfinished waterway to dump nearly 22, 000 tons of chemical waste. The site was then filled in and sold to the local school district to build a school and to the city to build a suburban neighborhood. Leakage of

Mile Island Accident a year later added fuel to the fire. In 1980, Phil Niklaus and Dede Feldman published a booklet that gathered a series of articles on radiation management practices and the handling and disposal of nuclear waste at LASL published in the *Albuquerque Journal* in October 1979. Following the publication of these articles, the journal received pro and con letters to the editor either from nuclear supporters or Los Alamos residents who were outraged to hear what was being dumped in their backyard. As part of their investigation, Niklaus and Feldman interviewed some forty individuals including present and former LASL scientists, state and federal health and environmental officials, state legislators, and Los Alamos area residents. Their findings were irrevocably bitter; they write,

> We have come to believe that the people of New Mexico have been seriously deceived as to the nature and extent of the routine and accidental releases of radioactivity from the lab. LASL, born in secrecy dictated by wartime conditions, has never been able to shake the habit. Information on lab activities, channeled through the New Mexico news media, continues to be seriously tainted by half-truths, routine down-playing of radiation accidents and, in some cases, outright falsehoods. As a result, the people of New Mexico have been lulled into complacency over the nuclear projects underway on 'the Hill.'

The authors made a list of all that they believed was wrong with LASL at the top of which was the releasing of chemical and radioactive substances in the environment and leaks from storage sites. This despite the fact that LASL reports, that had been distributed to New Mexico media, professed the contrary. A few LASL officials even criticized the local media for arousing the public's fear of radiation by not following the Lab's reports. Niklaus and Feldman exposed the consequences of these releases and leakages, quoting from the studies that showed high levels of radiation "in plants, animals, soil and water in some cases hundreds and even thousands of times greater than is present from natural and fallout radiation combined." Scientists and doctors, however, still had a limited understanding of the impact of low-level radiation on people's health and could not precisely attest the risk of these contaminations. At the time the two journalists published their booklet, the DOE had released its final Environmental Impact Statement on LASL operations, but no public hearings on the document had been planned contrary to what had happened after the release of same

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contaminants in basements was detected in 1978. 239 families evacuated the area, which was purchased by the state of New York, after a high incidence of chromosomal damage was established among residents, leading to illnesses, miscarriages, and other effects.

documents on other DOE sites including the Lawrence Livermore Laboratory. The reason invoked by the DOE and LASL had been a lack of public interest.[14]

An editorial in the *Albuquerque Journal* on Niklaus and Feldman's series of articles summed up their conclusions on overlapping jurisdictions, varying protection standards from one agency to the next, and the fact that the Lab was responsible for both the production of waste and the monitoring of its disposal. As a matter of fact, regulations regarding nuclear waste were then set by a conglomerate of state and federal agencies: the Nuclear Regulatory Commission, DOE, the EPA, the Department of Transportation and the radiation protection section of the state's Department of Health and Environment.[15] Nonetheless, the editorial insisted on the general lack of attention brought to the potential hazards of radioactive waste. Scientific arrogance is blamed, and LASL's annual budget is cited as an "example of the arrogance the industry has toward the public […]. Less than 1 percent—approximately $1 million—is budgeted for the disposal and monitoring of radioactive waste at Los Alamos. Scientists believe the amount is adequate. The public naturally is skeptical."[16] Two years later, the Lab spent 2.8 million and employed a staff of 55 people to handle its waste. Transuranic waste contaminated with plutonium was packaged, marked, recorded, and placed in dirt pits until it could be sent to a permanent burial site. Low-level radioactive waste was permanently buried at Los Alamos. Special concrete-lined shafts were used for tritium as it can migrate through the soil. Everything from gloves to trucks was buried in those trenches. According to Tom Kennan, head of the Waste Management Division, no chances were taken, and there were no "Love Canals" in Los Alamos.[17]

2. Cleaning up after nuclearism: cancers and lawsuits

Other authors have tackled the environmental legacy of the Manhattan Project in New Mexico.[18] Therefore, I will not attempt to recapitulate all instances of environmental and health concerns in the state, but I will rather focus on the main issues that New Mexicans have been confronted with since the first divulgences of information on the matter. The first of

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[14] Niklaus et al., *How safe is New Mexico's atomic city?,* 1-6.
[15] John Holmes, "Nuclear Waste: You Can't Toss It In The Garbage," *Albuquerque Journal Magazine*, IMPACT, Albuquerque, NM, 17 July 1979, 5, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Hazardous waste 1.
[16] Editorial, "LASL's Waste Woes," in Niklaus et al., *How safe is New Mexico's atomic city?,* 62.
[17] Burt Hubbard, "N.M. Research Leaves Radioactive Residue," *Albuquerque Tribune,* Albuquerque, NM, 3 February 1981, A-2, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Technology—N.M.—Impact on Earth.
[18] The most recent and thorough work on the subject is journalist Vincent B. Price's book *The Orphaned Land: New Mexico's Environment since the Manhattan Project.*

these matters of contention was cleanup. As early as the late 1960s, the AEC faced the necessity to clean up some of the sites of the nuclear complex that had been polluted by the haste, ignorance, and thoughtlessness of previous generations. In the 1940s and 1950s, contaminated material and chemicals were buried in cardboard boxes sealed with masking tape; these wastes were dumped in pits dug in the mesas no matter their radioactive composition; gases were vented to the atmosphere after limited filtration, and untreated highly-contaminated liquids were flushed into the surrounding canyons. Pits holding low-level waste remained uncovered for weeks. The 1962 inspection found that one gate being left open had led to a radioactive waste pit becoming a junkyard. In 1975, the U.S. Energy Research and Development Administration (ERDA), which succeeded to the AEC, discovered a plutonium 'pocket' south of the Los Alamos Inn. This area was originally the location of the Technical Area laundry where the workers' clothes contaminated with plutonium would be washed off. Few records of these events and of the various burial sites location were kept, so the Lab had trouble finding all its nuclear dumping grounds and did not know what had been buried in them.[19]

a. The infamous Acid Canyon

The most well-known cleanup site to which much attention has been drawn over the years is Acid/Pueblo Canyon. The Laboratory used it until 1964 as an initial long-term dumping area for liquid waste. Cleanup of the site started in 1967 and took two years during which about 600 dump truck loads of dirt and debris were removed. The debate over the plutonium found in the soil samples at Acid Canyon centered on the effect it might have on the general public even though Dr. Wayne Hansen, head of LASL's Environmental Surveillance Group who was responsible for monitoring land in and around the Lab's perimeter, said the radiation was "below any applicable standards." He added, however, that if they had been completely unconcerned, his group would not have existed. Hansen admitted that people who hiked in Acid Canyon were given no warning about the radiation there. According to him, there was no reason to inform them as there was no hazard, and he professed he would readily have taken his children to the Canyon. However, not everyone agreed with Hansen. In a letter, Dr. William H. Foege, Assistant Surgeon General with the U.S. Public Health Service, reported that the draft Environmental Impact Statement on LASL operations acknowledged "that low but measurable levels of long-lived radionuclides […] are

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[19] Szasz, *Larger Than Life*, 48.
Hubbard, "N.M. Research Leaves Radioactive Residue," *Albuquerque Tribune*, A-2.

being released from the Los Alamos facilities into neighboring terrestrial and aquatic environments."[20] The 25,000 gallon-a-day radioactive liquid waste generated at the Lab underwent processing at two treatment plants, where the most hazardous concentrations of some radionuclides were separated as sludge for burial in one of the Lab's solid waste storage sites, while the remaining, still-partially contaminated liquid effluent was then still released into surrounding canyons.

In 2008, when faced with a wrongful-death lawsuit, the University of California eventually officially acknowledged the releasing of radioactive liquid waste into Acid Canyon during the Manhattan Project and up until 1964; journalist Ramm Wong reported that "the Regents of the University of California acknowledged solvents, metals, plutonium and other radioactive materials were discharged from the former Technical Area 1 into a tributary drainage of the Canyon informally known as 'South Fork' until 1951" and further admitted "that former TA-45, located at the top of the South Fork of Acid Canyon, served as the radioactive liquid waste treatment plant and vehicle decontamination facility for the Laboratory, operating from 1951 through June 1964, treating the waste and discharging the remaining liquids from the mesa top down the canyon to the stream channel."[21]

As children, Peggy Franklin and Shirley Walkup played in Acid Canyon which was near their houses. In 1991, Walkup died of a cancerous brain tumor at age 55, after Franklin had successfully recovered from brain tumor at age 51. She had also had another tumor removed from her knee when she was fifteen. They both blamed the stream down in the Canyon where they had played as children for their health issues. No warnings or fences were put up to keep children out, and the pipe was so high on the canyon wall that it could not be seen from below. Declassified reports showed that from 1946 until 1951, when the two young girls played there, the pipe in Acid Canyon spewed 10,000 gallons of water a day with raw plutonium, uranium, and tritium. Then from 1951 to 1964, even if the waste was treated, it still exceeded modern standards for safety. Tyler Mercier, a local sculptor began listing suspected brain tumor victims in Los Alamos in the early 1990s and came up with 80 names. 22 were found to have primary tumors in the brain in a count dating back to 1965, and 8 lived on one block which was discovered to have been built on top of a waste dump. Mercier

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[20] "Radiation: How much is Too Much ?" in Niklaus et al., *How Safe is New Mexico's Atomic City?*, 9-13.
[21] Raam Wong, "Bomb Work Dumping Confirmed, UC Acknowledges Radioactive Waste Released During Manhattan Project," Santa Fe, NM, 18 June 2008, 1-2, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Hazardous waste 1.

blamed the secrecy of the Lab, as he knew of scientists' children playing in the area who did not know anything of the risks.[22]

b. The cancer paranoia in Los Alamos

Housing being built on contaminated ground has come to be a major issue since the first cleanup operations. It remains one of the prime concerns for citizens throughout New Mexico. One nuclear test site, Bayo Canyon, was opened to housing in the 1980s after cleanup was completed. The site had been used for high-explosive tests, and a 1976-survey had found three times the normal level of radioactive strontium in the soil. Opening the area for housing meant that residents would be exposed to increased radiation through home gardens, excavations, and light commercial activity, but the radioactivity would stay within federal safety standards.[23] Today, housing extends to Barranca Mesa beyond Bayo Canyon. The proximity between private houses and cleanup sites became the source of fears and speculations on the effect they could have on the residents' health—as exemplified by the Acid Canyon story.

In the 1970s, people had already started looking closely at cancer rates at Los Alamos because they believed a link could be established between the facility and the higher occurrences of the disease. One New Mexico Tumor Registry study indicated "that cancer mortality rates in Los Alamos County in white males from 1950-1969 ranked highest compared to control counties for leukemia, lymphosarcoma, cancers of the liver, prostate, and bladder." Between 1969 and 1974, the incidence of breast cancer in white females from Los Alamos was greatly elevated, more than twice the U.S. average—177 versus 75 cases per 100,000. Cancers of the stomach, pancreas, bladder, and rectum in males were three times the New Mexico average and more than double the statewide rate for cancer of the large intestine. However, the incidence of cancers in other parts of the anatomy studied by the Tumor Registry—brain, nervous system, biliary passages, liver, respiratory system, and blood—was roughly similar to the rest of the state. When Harold Agnew, Lab Director at the time, addressed the issue of the higher intestinal tract cancer in Los Alamos County, "he placed the blame for that on the rich foods consumed by the affluent Los Alamos population, including

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[22] Scott McCartney, "A Legacy of Deadly Secrets," Insights, *The Albuquerque Tribune*, Albuquerque, NM, 19 November 1991, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Los Alamos, NM—History of, General.
[23] Hubbard, "N.M. Research Leaves Radioactive Residue," *Albuquerque Tribune*, A-2.

the widespread appetite for hot green chili."[24] Yet, physicians actually considered *chile* as good food for the intestine.

The head of the Health Division contended that the statistics were not significant because they eluded all the other causes for cancer besides radioactivity: the fact that a significant number of the population was over 65 at the time, the type of contraception used by women, the fact that better educated women would look for a diagnosis sooner than less-educated women, and that the county was too scarcely populated to provide significant statistics. In most cases, it has proven complicated to establish any link between cancers and nuclear facilities because cancer-inducing factors have multiplied manifold over the past decades. Nevertheless, some people have accused the Labs of not giving serious thoughts to radiation as a cancer-causing factor and hiding behind other explanations.[25] Despite what officials from the Laboratory have been saying over the years, these figures continue to raise doubts and frighten New Mexicans. Betty Marchi Schulte was interviewed by Katrina Mason in the summer of 1992. Her father had come to the U.S. from Italy in 1922 and was a chef in Santa Fe before being in charge of the Fuller Lodge dining room in Los Alamos. At the time of her interview, Mason mentioned how worried Betty was because "her mother had died of cancer, her father had just died while battling cancer, her sister had been diagnosed with cancer, and her husband, who was suffering from cancer, had just had a stroke." Betty voiced her troubling thoughts because "she couldn't help but wonder about the connection of all this cancer to Los Alamos—and worry about whom it might strike next."[26]

In 1989, the EPA identified over six hundred sites that needed to be cleaned up at Los Alamos, most sites being old dumps where workers had buried trash since the 1940s. Most of them were on Lab property, but some were downtown, near Ashley Pond, close to residential areas. Steve Slaten, EPA official, estimated the cost for cleanup at nearly two billion dollars and projected an eight-year work period. The controversy at the time centered on the issuing of a permit for the Laboratories to use a waste incinerator full time to reduce the volume of waste stockpiled at the Lab. In all, LANL contained 12.7 million cubic feet (3.9 million cubic

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[24] "Cancer Rate Elevated in Los Alamos County," in Niklaus et al., *How Safe is New Mexico's Atomic City?*, 45; 42.

[25] *Ibid*., 48. A later study by the Division of Epidemiology and the New Mexico Tumor Registry at the UNM Cancer Center in 1993 showed that Los Alamos County ranked first in New Mexico for childhood cancer death rates between 1953 and 1987; and a state epidemiologist with the New Mexico Department of Health confirmed that the brain cancer rate in Los Alamos from 1984 to 1988 was twice the national rate. Price, *The Orphaned Land*, 190-191.

[26] Interview of Betty Marchi Schulte in Mason, *Children of Los Alamos*, 74.

meters) of nuclear waste buried in and around canyons.[27] C. Kelley Crossman, supervisor of the Hazardous Waste Bureau at the Environmental Division drew heat from members of the public when he announced he was satisfied that radioactive incineration met federal regulations. These people's reactions are demonstrative of the atmosphere of absolute distrust toward the Laboratories. Bradley Hanson of La Madera asked Crossman, "How in all honesty can you recommend this permit for approval when, in all honesty, you have neither the staff nor the funding to make sure Los Alamos Labs, and the people they are working for, are telling you the truth?" Franck Walker of Ojo Sarco asked, "How do I know that all the compounds are tested for and some of them don't fall through the cracks—that some of this stuff doesn't become an airborne Love Canal? That's what I'm asking you."[28] Despite reassuring speeches from the authorities, citizens grew warier, developing worries verging on paranoia. Joseph Masco names this phenomenon the "nuclear uncanny," a concept he describes as a colonization of psychic spaces by fear of radioactive contamination. He argues that people's perception of radioactivity has been shaped by their fear, leaving them "to wonder if invisible, life-threatening forces intrude upon daily life, bringing cancer, mutation, or death." As a result of the paranoia, people living close to nuclear facilities have thus often come to see radiation as "a means of explaining all manner of illness and misfortune—its very invisibility allowing its proliferation in the realm of the imagination."[29] Ironically, these fears of nuclear power had originally been fostered by the very agency responsible for the creation of the nuclear complex to guarantee the population's support in the 1950s. Thirty years later, the fear mechanism turned against the complex once the paranoia had shifted from fear of outside enemies to fear of inside threats.

The growing difficulty for the public combines the availability and complexity of information, the contradiction in speeches, and the multiplication of coincidental statistics. The problem with radioactivity, as the 1972 bee-hive study revealed, is that it can travel far and affect many people, if, for example, it is transported by the water current. This diffusing characteristic of radioactivity, along with its invisibility, is one of the most worrisome aspects of living close to nuclear sites. In June 1988, the Radioactive Waste Campaign, a public interest group based in New York released the result of a two-year study by nine researchers,

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[27] Hubbard, "N.M. Research Leaves Radioactive Residue," *Albuquerque Tribune*, A-2.
[28] Ben Neary, "EPA Postpones Cleanup Hearing At Los Alamos," 20 July 1989, 3, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Hazardous waste 1.
[29] Masco, *The Nuclear Borderlands*, 27; 32.

a 170-page report, which denounced the dangerous levels of radioactive pollution at the DOE's 16 major production facilities for nuclear weapons. At LANL, plutonium from radioactive waste was reaching the Rio Grande and flowing downstream as stored waste in the 14 known disposal sites in pits, trenches, and shafts in the canyons were spread by erosion, runoff, wind, and dust storms. These emanations endangered Rio Grande water users and close-by communities such as San Ildefonso, White Rock, and Pajarito Acres. According to the study, there had been "a pattern of growing mismanagement by the Department, which is allowing radioactivity to leak out of the sites through soil, water, and air—in many cases intentionally." The group sent a letter to Congress calling for immediate end of dangerous dumping practices, urging that these sites be given top priority for cleanup, and calling for the creation of an independent agency to oversee the weapons plants. Meanwhile, Jim Breen, spokesman for LANL, said that "every indication we have, from all the monitoring, which is year round, is that if there is any pollution of any sort, it is well, well below the standards (of safety) set by the government." [30] Nonetheless, cleanup operations multiplied and extended. Between 1990 and 2002, the government spent about $1.4 billion to clean up over 2,000 locations in Los Alamos.[31]

c. Water contamination in Albuquerque

In Albuquerque, the main health and environmental fears focused on contamination of water[32] as a result of radioactive waste produced by SNL, Kirtland AFB but also by UNM. In the 1970s, while LASL was under growing pressure, these facilities described how they disposed of high-level radioactive wastes by mixing the liquids with powdered plaster and compacting solids before placing them in drums that were stored in a separate building. The drums were then shipped to a burial site in Beatty, Nevada, or, in the case of UNM, to a

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[30] "Report: LANL contaminating nearby areas," *The Santa Fe New Mexican*, Santa Fe, NM, 8 June 1988, A-2, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Hazardous waste 1.

[31] Szasz, *Larger Than Life*, 48.

[32] One should point out here how important water is in the state of New Mexico, which mostly consists of dry land. "In this region, water is a scarce and precious resource; this was the case with the ancestral peoples who inhabited the area, and it is still the case in the twenty-first century. Water is, perhaps, the single most important factor in the development of any human settlement, and in New Mexico there are only six moderately dependable rivers. […] For this reason, water in New Mexico has formed the underlying basis of all human activity, and its abundance or scarcity is of the utmost importance for all that happens in the state." New Mexico Museum of Art, "History: "History: The Politics of Water," New Mexico Art Tells New Mexico History, New Mexico Art Tells New Mexico History, *New Mexico Museum of Art*, Santa Fe, NM: New Mexico Museum of Art, 2010. http://online.nmartmuseum.org/nmhistory/people-places-and-politics/water/history-water.html, accessed March 11, 2015. Also see Ira G. Clark, *Water in New Mexico: A History of Its Management and Use*, Albuquerque, NM: University of New Mexico Press, 1987.

commercial dump in Richland, Washington. As for low-level wastes, 95% of the waste generated at SNL, they were put into plastic bags which were thrown into a twelve-feet-deep (4 meters) trench at a 1.6-acre dump and covered with about three feet (1 meter) of dirt. According to George Tucker, Director of the Health Physics Division of Sandia Corporation, the 2,400 cubic feet (731 cubic meters) of waste that the Lab produced each year was, for the most part, not dangerous; he said, "the radioactivity is high enough that you can't ignore it but it's low enough that it doesn't warrant a major effort."[33] The conclusions of journalist V. B. Price over 30 years later, however, differed radically from Tucker's. According to Price, military dumping of toxic and nuclear waste into the city's water supply since World War II has contaminated a good part of southern Albuquerque which includes the heavily populated South Valley.[34]

The reason for this contamination is Sandia and Kirtland's proximity to the Tijeras Arroyo, which runs through the base before emptying into the Rio Grande and is "a major recharge area for the aquifer that, until 2008, supplied all of Albuquerque's drinking water."[35] The arroyo is believed to have been an illegal dumping site for years. It was lined with cement after a scandal of blue baby syndrome in Mountainview in 1970. In 1981, a six-month-old boy in Mountainview stopped breathing and was taken to the UNM Hospital where he was revived. The doctors found that the baby had been poisoned by nitrates in the family's drinking water which came from a private well containing 26 times the nitrates considered safe for drinking. The explanation that was given at the time was that the water had been contaminated by raw sewage from nearby septic tanks. Mountainview families with small children and pregnant women had been told to drink only bottled water.[36] In Price's view, the

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[33] Holmes, "Nuclear Waste: You can't toss it in the Garbage," *Albuquerque Journal*, 8.

[34] South Valley is one of the fifteen sites in New Mexico that are on the National Priorities List (NPL). This is the list of the most hazardous sites across the U.S. and its territories, also known as the list of superfund sites. According to the EPA, "In 1979, wells in the San Jose well field became contaminated by organic compounds, forcing closing of one private well and two Albuquerque municipal wells. Numerous sources are suspected of contributing to the problem. This is the top priority site in New Mexico." Ground water treatment and monitoring by the EPA are still underway. In 2011, the agency chose the site as a Return to Use Demonstration Project. The activity currently underway is "potentially responsible party remedial action," defined by the EPA as "the actual construction or implementation phase of a Superfund site cleanup that follows remedial design and is conducted by the potentially responsible party." "NPL Site Narrative for South Valley," and "cleanup Activities at South Valley," *United States Environmental Protection Agency*, Washington, DC: United States Environment Protection Agency, http://www.epa.gov/superfund/sites/npl/nar765.htm, and http://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.CleanupActs&id=0600881, accessed March 25, 2015.

[35] Price, *The Orphaned Land*, 24-25.

[36] Burt Hubbard, "Landfill 'Time Bombs' Ticking Throughout New Mexico," *The Albuquerque Tribune*, Albuquerque, NM, 30 January 1981, A-10, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Technology—N.M.—Impact on Earth.

area just north of the neighborhood, a "ten-mile stretch from Bridge Boulevard to the Isleta curve, between Broadway and Second Street, is, next to Los Alamos, Sandia National Laboratories, and Kirtland Air Force Base and other military installations, the most polluted area in the state, as it has been since the 1950s." This part is mostly wasteland, junkyard and small industries, but it is also residential—east San Jose neighborhood and the predominantly African American neighborhood called John Marshall.

In the 1950s, South Valley Works, operated by American Car and Foundry under contract with the AEC did R & D on nuclear engines in that area. A truck driver called John Beal, who worked for American Car Foundry, revealed to the *Albuquerque Journal* that the company "regularly dumped industrial solvents and liquid plastics into Tijeras Arroyo on Kirtland Air Force Base property." So, between 1955 and 1967, "170,000 gallons of these hazardous liquids were dumped into the arroyo, which emptied out in the Mountain View neighborhood." The South Valley Works site has since passed into the ownership of General Electrics', and in 1999, "the state attorney general, Patricia Madrid, sought some $4 billion in damages from GE and numerous other companies, alleging that the groundwater in the vicinity of the plant was permanently ruined and would never be potable again." Three years later, the New Mexico Environment Department (NMED) levied a determination of an imminent and substantial endangerment to health and the environment against SNL and the state "concluded that SNL endangered the population of Albuquerque with radioactive and industrial hazardous wastes they had dumped over the years on land that is perilously close to the aquifer and city and Kirtland Air Force Base water wells." Yet, as Price points out, one of the problems with polluting corporations is that the threat of being caught and having to pay a fine and pay for cleanup is not a strong enough deterrent since these costs might seem a trifle compared to the billions made while polluting. No matter which political party is in power, even under the "watch of an environmentally inclined governor like Bill Richardson and even when businesses are trying to appear to do the right thing," discriminatory dumping goes on.[37]

d. Other impacted areas in New Mexico and the risk factor

Outside of Los Alamos and Albuquerque, other areas have inherited a share of the nuclear complex's environmental legacy. In Socorro, over 40 tons of depleted uranium shells were tested at a firing range behind the New Mexico Institute of Mining and Technology from the early 1970s to the early 1990s. Residents are concerned about the effect of the testing

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[37] All quotes above are from Price, *The Orphaned Land*, 113, 118-119; 170; 97.

because depleted uranium, which is used in munitions, is a highly toxic substance. Both politicians and physicians have remained silent on the subject.

In Carlsbad, twenty years after the Gnome test 30 miles (48 kilometers) southwest of the city, the Bureau of Land Management was getting ready to open several hundred acres for a wildlife sanctuary. Decontamination of the site had taken 19 years. Gnome left more than 40,000 tons of salt, earth, equipment, and buildings contaminated with cesium 137, strontium and tritium. The AEC cleaned it up in 1968, some was buried in the cavity created by the blast and the rest was covered in soil. In 1972 when inspectors revisited the site, the waste was uncovered and exposed so DOE decontaminated the site once again in 1978, burying salt and dirt 1,100 feet (335 meters) underground. The Department declared the site safe for public use in 1980.

In the north, near Farmington, the Gasbuggy site was cleaned up in 1978. 70 barrels of contaminated water and sludge were buried in the crater. 3,000 pounds of waste were also sent to the Nevada burial site in Beatty while radioactive equipment was steam-cleaned before being put back into use. However, tests showed that some tritium remained in the soil there.

On the Chupadera Mesa west of Carrizozo, the land was still contaminated with residues from Trinity fallout over three decades after the blast. The *Albuquerque Tribune* attested in March 1981, that farmers and ranchers north of WSMR raised their crops and cattle on land containing up to 86 times the normal background level of plutonium. Bob Ramsey of the NRC declared, "Frankly, we don't know how to approach decontamination of that large a piece of land. We don't have a specific plan."[38]

In Grants' uranium belt, abandoned mines and tailings have contaminated water sources and endangered the health of many generations of miners and residents and their families. Near Shiprock, for example, a retired Navajo miner lost two grandchildren to birth defects before learning that his house was built on radioactive waste.[39] This issue will be more thoroughly addressed in the following section on environmental injustice.

Another concern for the local population must be mentioned as it was highlighted by the Chernobyl disaster in 1986 and more recently by the Fukushima catastrophe in 2011; that is, the risk of a nuclear accident. While risks during the Cold War were evaluated in terms of the likelihood of a nuclear war breaking out between the U.S. and the Soviet Union, it has since

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[38] Hubbard, "N.M. research leaves radioactive residue," *The Albuquerque Tribune.*
[39] "Hazardous Waste—N.M.'s Lethal Legacy," *The Albuquerque Tribune,* Albuquerque, NM, 26 January 1981, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Technology—N.M.—Impact on Earth.

then been redefined as a matter of domestic danger. The possibility of a nuclear accident at Los Alamos, Sandia, WIPP, or WSMR is a constant threat on local populations no matter how many precautions are taken. Numerous unpredictable natural causes figure among the most worrisome scenarios. In 2000, for instance, the terrible Cerro Grande fire in Los Alamos uncovered 300 toxic sites on the Hill.[40] Meanwhile, according to the Radioactive Waste Campaign report and Marvin Resnikoff, the group's research director in 1988, the biggest concern at SNL was the possibility of an accident involving a truck carrying radioactive waste. New Mexico had had 34 accidents involving radioactive waste in the past twelve years. No radioactive waste had leaked in those accidents, but that number remained the highest number of accidents involving DOE waste. The study also warned that flash floods were a great danger in Albuquerque, as they could carry ground and ground-water contamination to neighboring communities.[41] The issue of transportation was later renewed during the debate on the opening of a waste disposal site in Carlsbad.

More troubling still, is that even if an environmental catastrophe occurs, there is a chance for it to go almost unnoticed, as was the case in the terrible Chuck Rock spill of July 16, 1979. A huge earthen dam collapsed at the United Nuclear Corporation Church Rock uranium mill, releasing 1,000 tons of radioactive mill tailing and 93 million gallons of acidic and radioactive wastewater into a creek that flowed into the Rio Puerco. The waste flowed downstream for at least 80 miles [130 kilometers], past the homes of some 1,700 Navajo people. This was the largest radioactive accident in the nation's history but most Americans never heard about it because it affected people with little political agency.[42]

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[40] Szasz, *Larger Than Life,* 48. The Cerro Grande fire occurred on May 10, 2000. A fire that began as a prescribed fire to reduce some of the vegetative buildup in Bandelier National Monument burned into Los Alamos. It was the largest, most destructive wildfire in the state's history. More than 18,000 residents of Los Alamos and White Rock were evacuated. The fire burned about 48,000 acres and destroyed or damaged several hundred homes and Laboratory structures. It swept across forested acres in Bandelier National Monument, the Santa Fe National Forest, Los Alamos National Laboratory, Los Alamos County, and the Santa Clara and San Ildefonso Indian Reservations, causing about $1billion in property damage.

[41] "Report: LANL contaminating nearby areas," *The New Mexican*, A-2.

[42] Researcher in nuclear and environmental justice history, Linda M. Richards, writes, "The U.S. Geological Survey considers the Church Rock incident the largest accidental radioactive release in the United States. Earlier that year the nuclear accident at Three Mile Island power plant made national and international news; the Church Rock accident did not, even though it distributed more than three times (46 curies) the radiation levels of the Three Mile Island accident (13 curies). For Church Rock residents there was no state of emergency, no evacuation, and limited alternative water supplies." Cleanup operations performed by state and federal criteria took place in 1980 and 1981: 3,500 barrels of waste material were retrieved but this is estimated at only 1% of the waste and very little spilled liquid was pumped out of the water supply according to Paul Robinson, director at the Southwest Research and Information Center. Linda M. Richards, "On Poisoned Ground," *Chemical Heritage Magazine*, Philadelphia, PA: Chemical Heritage Foundation, Spring 2013,

3. Environmental injustice: a form of internal colonialism

a. Definitions

The fact alone that a nuclear complex is so developed in a state with a demographic composition such as New Mexico's, in such close proximity to Native American reservations, ruins, shrines, and sacred lands, or to centuries-old Hispanic communities can be identified as a factor for environmental injustice. Nuclear activities have now long been determined as among the most dangerous and riskiest of enterprises, so the repeated choice of New Mexico as the place to extend the country's weapons program, carry out tests, leave dangerous remains from uranium mining and build its first, and unique permanent underground radioactive waste repository, can hardly be interpreted differently than as a new form of internal colonialism. New Mexico is the only state that has supported the entire cradle-to-grave nuclear economy from mining to storage, and yet, it remains one of the poorest states in the country.

With 22 tribes, Native Americans represent over 10% of the state's population, and Hispanics, who are the majority community, represent over 47% of the population, but in terms of power and economy, they are a minority.[43] Throughout the state, nuclear or radioactive colonialism is manifested in the interactions between the nuclear industry, the often relatively poor, non-Anglo communities, and environmental issues. As we will see further in this part, the pattern is similar when it comes to economic matters. Others have reached the same conclusion when looking into the state's environmental challenges. When writing about the environmental legacy of the Manhattan Project and the Cold War in the American West, authors such as V. B. Price have come to observe a pattern of environmental injustice. He explains that, "seeing New Mexico as the Savage Reservation and, along with the rest of the arid West, as a national sacrifice zone helps us to understand environmental racism." His alarming study of New Mexico's environment lays open the damage caused by the scientific conquest of the region that he emphatically calls a "nuclear colonization" targeting "marginalized populations, the urban and rural poor of all races and cultures." Price designates poverty as the main characteristic of the affected populations over race. Often,

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http://www.chemheritage.org/discover/media/magazine/articles/31-1-on-poisoned-ground,aspx?page=1, accessed March 11, 2015.

[43] "State & County QuickFacts New Mexico," *United States Census Bureau*, Washington, DC: United States Department of Commerce, http://quickfacts.census.gov/qfd/states/35000.html, accessed October 23, 2014.

however, the two combine and reinforce the notion of injustice, anchoring the question in the nation's core struggles of identity, responsibility, and relations to minorities.[44]

To the north, LANL is surrounded by Hispanic communities in the Española and Chimayó valley, but their relation to the environment and Los Alamos is made more complex by the immense economic benefits that they received from the Laboratories' presence. Among interviewees of the "Impact Los Alamos" Oral History Project, all former LANL employees, none addressed the environmental impact of LANL beyond saying that they either believed the Lab was in control of its impact or that they had only heard rumors. Paul Fresquez remarked that he thought "a lot of people dump their trash in the Rio Grande" but also admitted he did not know anything about the impact of LANL on the environment of northern New Mexico.[45] Ramon Fresquez believed the high number of tumors and cancers at Los Alamos was due to the increase in the population but did not believe the Laboratories had anything to do with it, insisting that "Los Alamos is a good neighbor."[46] In this series of interviews, people were distinctly more vocal on economic than environmental concerns because of how much they had come to rely on Los Alamos for jobs and to elevate their social status. C. L. Hunter expressed his faith in modern science and technology's ability to deal with nuclear wastes. "We will contain these problems," he assured.[47] Several interviewees also mentioned the importance of knowledge to understand environmental impacts, whether they professed a lack of sufficient knowledge to venture an opinion on the subject, or they attested that their privileged access to knowledge allowed them to say that "the Lab has done its part in trying to provide a safe environment for everyone," according to Leroy Martinez, who explained that "working at Los Alamos opened [his] eyes on what is going on in research and development, what gets funded, what direction the U.S. is going as far as weapons go,

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[44] Price, *The Orphaned Land*, 12; 33; 19. Price notes that "Soil and groundwater pollution is ubiquitous but almost invisible in New Mexico, especially in areas occupied by people who are not well-to-do. Many poor people, lacking economic clout, are relatively voiceless and hence less troublesome to corporations and governments than better-heeled Americans are. In isolated and impoverished neighborhoods in Albuquerque, in mineral-rich desert lands around Native American communities in western New Mexico, in towns around military R & D operations, and in small cities in the southeastern New Mexico oil patch known as little Texas, dumping toxic waste on the lands of vulnerable people is a common practice." (96-97) He also studied the South Valley in Albuquerque, the most direly affected neighborhood that he calls "the city's major groundwater sacrifice zone." Demographics show that it has long been a rather poor area with a majority of Hispanic residents, 70% in the 1980s, 50% of whom lived below the poverty line. (116)

[45] Paul Fresquez, Interview by Kenneth Salazar, 6 March 1995, Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CDs 38-41.

[46] Ramon Fresquez, Interview by Kenneth Salazar, San Pedro, NM, 14 March 1995, "Impact Los Alamos Project."

[47] C. L. Hunter, Interview by Steve Fox, Española, 9 August 1994, "Impact Los Alamos Project."

and environmental concerns." He also proclaimed that "if there were more hazards before, it was because of a lack of knowledge."[48]

On the other hand, other former employees and children of former employees have also gone on to become activists. Their concerns often crystallize on economic and cultural matters—which will be analyzed further in this part—but these matters also often encompass environmental problems. Writer, journalist, and researcher Juan Estevan Arellano, whose father was employed at Los Alamos in the 1940s, is now an advocate of traditional agriculture and *acequia* culture. He refers to Los Alamos as "an aberration."[49] Today, grassroots organizations, such as *Juntos: Our Air, Our Water* based in Albuquerque, are meant to represent Latino families in their call for clean air and water. In September 2011, a poll by the Latino Sustainability Institute and Project New America Latino revealed that over 90% of Hispanic voters in New Mexico were "worried about water scarcity and forest fires, and nearly the same number were concerned about pollution of drinking water, lakes and rivers."[50] A large majority also supported additional public lands designated as national monuments, a way to preserve the area and create employment for the local population. That same year, Arturo Sandoval, Executive Director of the New Mexico-based Latino Sustainability Institute, fought against the cuts in the Land and Water Conservation Fund proposed in Congress. Environmental issues are, therefore, important to New Mexico Hispanics. They are also fundamentally linked to their social economic status and to the future of their traditions. Joseph Masco quotes one *Nuevomexicano* who wove together the threads of environmental hazards and social injustice in the following testimony:

> Who knows what is working its way down that mountain, into our water supply, into our soil. There is no way of telling, so we had better prepare. […] In the early days they weren't too careful up there. Today, a lot of men from the valley work up in Los Alamos as plumbers and electricians, they're afraid of what they might dig into when

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[48] Leroy Martinez, Interview by Carlos Vásquez, Chimayó, NM, 3 November 1991, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CD 64.
[49] Symposia for the Community, UNM Division of Continuing Education, 1996, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 2, CD 51.
[50] Dick Layman, "Latino Poll shows Support for Conservation Efforts," *Public News Service*, Boulder, CO: Public News Service, 21 September 2011, http://www.publicnewsservice.org/2011-09-21/public-lands-wilderness/latino-poll-shows-support-for-conservation-efforts/a22285-1, accessed November 4, 2014.

> they're working underneath people's houses, or what might be in the soil. We've always done the shit work up there and we don't know what the effects are.[51]

Other authors, however, have focused on race rather than on poverty as the prism to address environmental injustice. Valerie Kuletz, author of *The Tainted Desert: Environmental Ruin in the American West*, uses the terms "environmental racism" and "nuclearism," which she defines as a form of "internal colonialism" to describe the environmental destruction orchestrated by the agents of the nuclear economy.[52] She primarily writes about the relations between Native Americans, "those who were and continue to be made invisible" and the actors of the nuclear complex, "who choose to be invisible" in a land that the former consider as a "geography of the sacred and a crucial link to cultural survival," while the latter have made it into "a landscape of national sacrifice."[53] The Native American cultures and lifestyles are so grounded in their relation to the environment that, contrary to other communities, environmental concerns often take on more importance than economic matters. Kuletz observes that this landscape of sacrifice became a nuclear internal colony where the sparse Native population, usually people with a different cultural, racial, or class background, at best could be hired on "low-paid jobs to help build, maintain, and clean the emerging cities" or at worst "were ignored completely¯rendered invisible by a mixture of racism and a perception of desert lands as vast, uninhabitable wastelands."[54] This is what happened with the Church Rock spill; the Navajo families who were affected were invisible, especially in comparison to the Three Mile Island accident which had been widely reported in the mainstream media.

Masco, for his part, wrote about "a new form of global environmental discrimination" because the nuclear complex "has consistently targeted minority communities for the most dangerous nuclear projects." Some communities have been put at greater risk than others; therefore, Masco affirms that the politics of the nuclear industry are directly tied to race and class. He calls northern New Mexico "an enormous biosocial experiment" created by the Manhattan Project which continues indefinitely as the Pueblo nations "are defenseless from past and future radiological impacts, as the invisible materials from past and future U.S.

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[51] Interview in Masco, *The Nuclear Borderlands*, 194.
[52] Valerie L. Kuletz, *The Tainted Desert: Environmental Ruin in the American West*, New York, NY: Routledge, 1998, 7.
[53] One can note the recurrence and different interpretations of the term "sacrifice," already utilized by V. B. Price in the expression "sacrifice zone" and now used by anti-nuclear activists, but it also appears in the discourse of New Mexican interviewees from the Española valley and White Sands ranchers (see below) who have come to internalize the notion of patriotically sacrificing the land for national defense and local economic prosperity.
[54] Kultez, *The Tainted Desert*, xviii; 8; 43.

national security practices cross their territories, revealing themselves only in their effects."[55] In fact, Native Americans tend to be more affected by dangerous industrial and military practices because they are closest to the land and perpetuate traditional lifestyles—by using natural water sources for instance. The pollution of rivers and arroyos is affecting the tribes who use them for their daily needs.[56]

Furthermore, many contaminated areas are adjacent to or even rest upon sacred ground and ruins or shrines. Los Alamos, for instance, lies between Bandelier National Monument, 15 miles (24 kilometers) to the south, which is regarded by modern Cochiti people as their homeland, and the Puye ruins on Santa Clara Pueblo lands, 14 miles (22 kilometers) to the northeast, where the ancestors of the pueblo people carved dwellings in the cliffs. In between, the land occupied by the Laboratories is regarded by the San Ildefonso Pueblo people as their homeland, comprising sacred sites and shrines. Kaa Fedeh, former Pueblo Governor explained in 2001 to interviewer Annie G. Ross that they still have sacred places they need to go to in Los Alamos.[57] Federal laws were passed to protect archeological resources in the 1970s, but, until then, it was difficult to protect those sites. The Archeological Department of the state of New Mexico does not have a complete survey of the constructions of ancient Pueblo people that were destroyed in 1943 onward, and the Pueblo people do not wish to communicate on the locations of their sacred sites.

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[55] Masco, *The Nuclear Borderlands*, 27; 145. The Chuck Rock incident was particularly dangerous in terms of exposure for the Navajo families who used the Puerco River to water their livestock without realizing it had been contaminated with traces of radioactivity 80 miles (130 kilometers) away toward Arizona.

[56] Marley Shebala, "Poison in the earth," *The Navajo Times*, Church Rock, NM: The Navajo Times Publishing Compacy Inc., 23 July 2009, http://navajotimes.com/news/2009/0709/072309uranium.php#.VQLmTOEf0ao, accessed March 13, 2015. Church Rock Chapter Vice President Robinson Kelly "recalled that his uncle died of "cancer of the foot" a few years ago, which he believes was the result of wading through the acidic, radioactive effluent in the Puerco to gather up the family's sheep. It took until noon for the water level to drop enough for his uncle to cross the river. Like many of the local residents including children and elders who entered the water that day, his uncle later developed blisters and sores on his feet and legs."

[57] Kaa Fedeh interview in Annie Grace Ross, "One Mother Earth, One Doctor Water: A Story About Environmental Justice in the Age of Nuclearism, A Native American View," Doctoral Thesis, University of California, Department of Native American Studies, 2002, 60. Access to these sacred places had been a problem since the beginning of the Manhattan Project. Elmo R. Morgan, former worker with the U.S. Army, the Zia Company, and the AEC, recalled receiving a distress call from the security patrol guards and having to settle the argument they had with "two or three Indians inside of the fenced area just conducting rituals or meditating, or whatever, on some of their old, old ritual grounds there." The Pueblo people promised not to come back but Morgan assumed others would. (75)

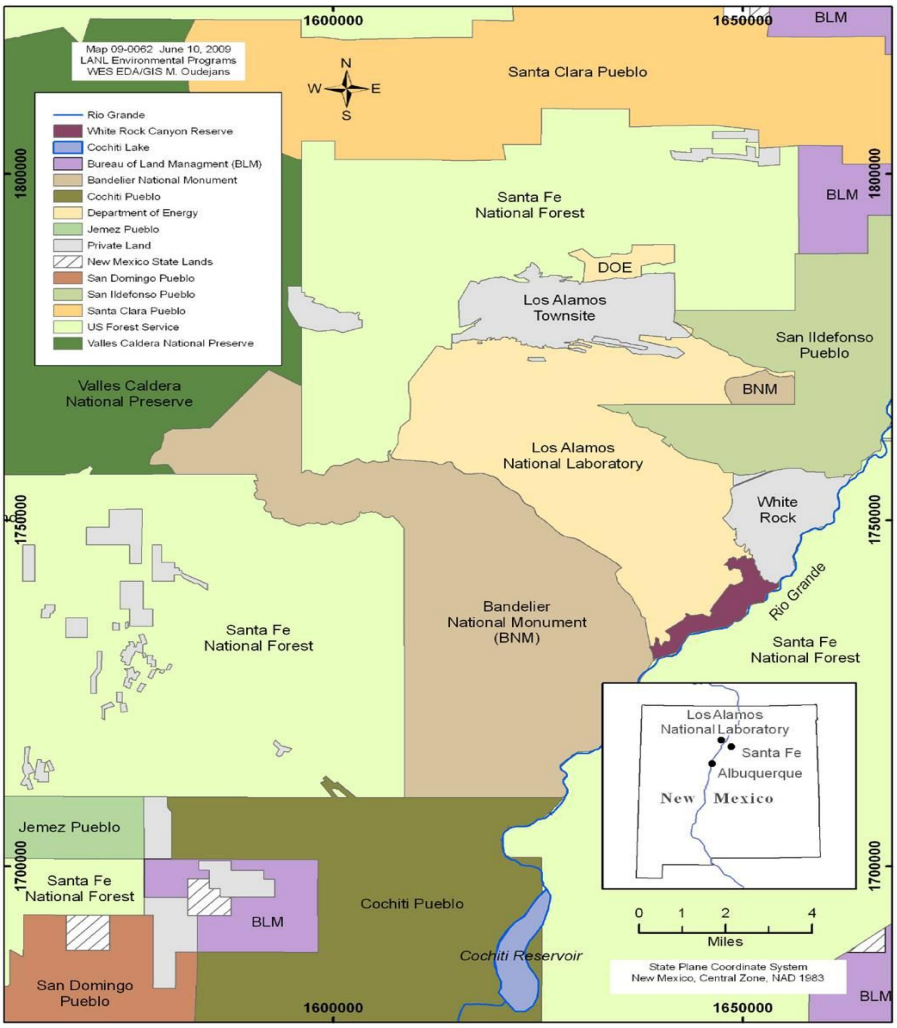

Fig. 39: LANL Boundaries. Source: "Background information," Los Alamos, NM: Los Alamos National Laboratory Trustee Council Natural Resource Damage Assessment and Restoration, http://www.lanlnrda.org/?page_id=88, accessed October 23, 2014.

Probably one of the sites that became most well-known at the time of the first cleanup operations is Tsirege Pueblo, home of the ancestors of the modern Pueblo Indians, the Anasazis, which lies on LANL property right next to Mesita del Buey, just off Pajarito Road between Pajarito Canyon and Canada del Buey. The small mesa, also called Area G for Material Disposal Area G—one of the nine disposal areas in Los Alamos—was the largest disposal site for wastes contaminated by radionuclide, toxic or explosive chemicals, and classified materials buried in pits or shafts dug into the mesa surface.[58] The San Ildefonso

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[58] William D. Purtymun and William R. Kennedy, "Geology and Hydrology of Mesita del Buey," LA-4660 UC-41 Health and Safety TIF-4500, Los Alamos, NM: Los Alamos Scientific Laboratory of the University of California, November 1970-May 1971, http://www.osti.gov/scitech/servlets/purl/4044830/, accessed April 19, 2015.
"Material Disposal Areas," *Los Alamos National Laboratory*, Los Alamos National Security, LLC, Department of Energy's National Nuclear Security Administration, 2015, http://www.lanl.gov/community-environment/environmental-stewardship/cleanup/sites-projects/material-disposal-areas.php, accessed October 23, 2014.

Reservation lies at the northern foot of the mesa on which archeological excavations have found ceramics, stone, and bone artifacts. When Area G began operations in 1957, five Native American ruins were destroyed.

In the same vein, Bayo Canyon, west of San Ildefonso was used from 1944 to 1962 for a series of 254 tests called the RaLa—for radiolanthanum—program to improve the implosion design. These tests created fallout that was documented over the northern Rio Grande valley and even measured by the U.S. Air Force over San Ildefonso, Santa Clara, and Española to train for the Pacific tests. Prevailing winds blow toward the east or northeast, toward the pueblos. The Air Force reported tracking a fallout cloud as far as 70 miles (113 kilometers) downwind. Safety personnel began tracking the clouds in 1952, closing roads on occasion. In later years, some tests were only allowed when the wind would blow away from the town of Los Alamos.[59] To make matters even more shocking, Pueblo people, firefighters from Zia and Jemez Pueblos, provided with radiation badges, gloves, and burlap bags, were hired in 1963 to clean up the Canyon site at the end of the experiments. They picked up the debris and removed truckloads of refuse to Area G.[60] Many in Los Alamos—those who worked on bomb design—knew of the RaLa program and its potential hazards, but there was no indication of any discussion with other workers or local communities in the reports on the experiments. The first public mention of the program appeared in a LASL newsletter describing the cleanup operations in 1963, and the first concerted efforts to inform the Pueblo people occurred in 1994 when LANL reviewed the program.[61] Thus, not only were the RaLa tests knowingly liable to affect the Pueblos as a result of a deliberate choice to protect downtown Los Alamos from fallout, but cleanup operations were also presented as a profitable job opportunity for the Native communities, making Bayo Canyon one of the most telling illustrations of environmental racism.

b. Local activism and reactions in the pueblos

Kuletz's and Masco's statements about race and environmental damage are all the more applicable to New Mexico in light of the situation in the northwest where the Navajo Nation is still struggling with the effects of uranium mining—a point which will be addressed below

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[59] Advisory Committee Staff, "Fact Sheet on Radiolanthanum (Rala) Tests," Memo to the Members of the Santa Fe Small Panel, *National Security Archive*, Washington, DC: George Washington University, 1 January 1995, http://www2.gwu.edu/~nsarchiv/radiation/dir/mstreet/commeet/pm03/pm3brf/tab_b/pm03b1.txt, accessed October 23, 2014.
[60] Masco, *The Nuclear Borderlands*, 135-138.
[61] Advisory Committee on Human Radiation Experiments, "The Human Radiation Experiments, Final Report of the President's Advisory Committee," New York, NY: Oxford University Press, 1996, 332-333.

and in the next chapter. Yet, in many other instances, the issue becomes more complex as the local population, including the members of New Mexico's native communities, is often split between supporters of the industry and its severe critics. Nevertheless, anti-nuclear activism has gained momentum in the state, and the vocabulary that activists use is often inspired by the writings of scholars or vice-versa. The Nukewatch New Mexico website for example refers to the state as the "ultimate national sacrifice zone."[62] Since the 1980s, Native American activists, such as Winona Laduke, have begun using the terms "radioactive colonialism" to describe the practices of dumping radioactive waste on Indian Reservations.[63] Activist groups have grown in influence in the past thirty years. They now provide much information on nuclear pollution in New Mexico. Associations such as Concerned Citizens for Nuclear Safety (CCNS),[64] Southwest Research and Information Center, and Nuclear Watch New Mexico form an active community with sophisticated expertise. Distrust toward the Laboratories has made many New Mexicans turn toward these groups for information.[65]

In that area, the community that is the most likely to be affected, and which has been affected in the past by the products released by LANL, is the Pueblo of San Ildefonso whose reservation shares a border with the Lab. The pueblo authorities have long been concerned about their wells and soil that might be contaminated by the Lab's activities. As early as 1979, "LASL samples of soil particles or sediments taken on San Ildefonso Pueblo land […] revealed plutonium levels ten times higher than the concentration attributed to fallout from all worldwide detonations of nuclear bombs."[66] One San Ildefonso spokesman said at the time, "They tell you there's no danger, but I know better. There's radiation dumps all over the place

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[62] *Nukewatch*, Santa Fe, NM: Nuclear Watch New Mexico, http://www.nukewatch.org/media2/postData.php?id=2329, accessed October 23, 2014.

[63] Churchill, et al., "Native America," *Critical Sociology*. Journalist, author, and activist Winona LaDuke is Anishinabe from the Makwa Dodaem (Bear Clan) of the Mississippi Band of the White Earth reservation in northern Minnesota. She became involved in Native American environmental issues at Harvard University when she met with Cherokee activist Jimmy Durham. At age 18, she gave a speech in front of the United Nations. She fought a legal battle for the Anishinabe people to recover lands illegally taken by the Federal Government and founded the White Earth Land Recovery Project. She was one of the founders of Honor the Earth in 1993, a Native American organization that works to raise public awareness and funds to grassroots Native environmental groups. In 1996 she ran for vice-president on Ralph Nader's Green Party ticket. She has become an internationally renowned spokeswoman for the environmental and indigenous causes.

[64] In September 1994, CCNS and Patrick Jerome Chavez filed a Clean Air Act citizen lawsuit against DOE and Siegfried Hecker to allege that LANL was not in compliance with the national emission standard for radionuclides at DOE facilities. The two parties reached settlement in 1997.

[65] One Tewa spokesman said, "I don't trust the Lab leadership to deal honestly with the Pueblos and protect their interests. For fifty years we heard nothing from them. It took groups like the Los Alamos Study Group and Concerned Citizens for Nuclear Safety to alert us to the environmental dangers in the late 1980s. Prior to that, nobody thought about health issues related to Los Alamos." Masco, *The Nuclear Borderlands*, 139.

[66] "Liquid Wastes Slowly Infiltrating Environment," in Niklaus et al., *How Safe is New Mexico's Atomic City?*, 23.

and rain puts radioactivity into the soil, that solid rock thing is bull—the tuff is porous as hell."[67] In 2008, plutonium was also found in wood ash from an interior woodstove at San Ildefonso, and high doses of strontium-90 were found in dust samples from Picuris Pueblo, 40 miles (64 kilometers) northeast of Española. LANL scientists concluded that the radioactivity collected mostly in indoor samples "did not come from the Labs, but rather from nuclear fallout during worldwide atmospheric nuclear testing in the 1950s or from naturally occurring radiation levels in northern New Mexico," which are generally high.[68] A member of the San Ildefonso community, Darryl Martinez, explained how the Pueblo has its own environmental program to monitor the water now. He underscored that they had no knowledge whatsoever of what the Laboratories were doing or of their environmental impact. Their first worry was how much the Labs were growing. He regretted that the things they used, such as the wood and the water, were never tested before. He wondered about the future of the community and whether they would have to settle elsewhere because of the Laboratories. He explained his ancestors would move their settlement when the weather would force them to or when the fields became overgrazed. LANL could be a new reason for departure according to him. He also pointed out that a worrying number of people in the community had died of cancer.[69]

Meanwhile, in the Pueblo of Ohkay Owingeh (also known as San Juan Pueblo) further north, Naomi Archuleta, program manager in the Office of Environmental Affairs, explained there was a lot of concern in her community over nuclides in the water, the air, and the soil—in the adobe they use to build their homes, for instance. She has been employed in the environmental field since 2000, and, at the time, one of the fears was the ashes from the Cerro Grande fire that would land on the Pueblo. They have done water samplings and used Geiger counters, and they now do work on waste water treatment plants, endangered species, and drinking water. The office also uses a newsletter to communicate their findings to the community. The most striking aspect in her discourse was how she repeatedly proclaimed that her community would never move, contrary to what Darryl Martinez had said. She believes they have been there forever, and that they will be there forever. That is the fundamental difference between Los Alamos and its surrounding communities, Archuleta emphasized, "This land is not their home. They don't care about what they leave behind them. They can

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[67] "LASL Aide Admits Waste Report 'Misleading'," in Niklaus et al., *How Safe is New Mexico's Atomic City?*, 41.
[68] Price, *The Orphaned Land*, 193.
[69] Darryl Martinez, Interview by Lucie Genay, Governor's office of San Ildefonso Pueblo, NM, 17 September 2013.

pack up their house in their cars and go back wherever they came from not caring about what they leave behind. They don't care, but we do. We will be here for many more generations. I don't see any tribe ever moving anywhere else."[70] Similarly, in 1993, at a meeting of the Southwest Indigenous Uranium Forum, Manuel Piño, an Acoma Pueblo activist had said that the uranium company had once asked the Paguate community if they would be willing to move because it was suspected that the village was built on the richest uranium deposit in the area. His reaction was to say, "This village is sacred land. You don't move a village like that for economic incentives."[71] Another Pueblo member interviewed by researcher Annie G. Ross said, "We are not mobile to be refreshed elsewhere. It is not like we can move to our second home in some other part of the country. This is home. This is our place."[72] These reactions are reminders of the cultures of the land that have existed for centuries in New Mexico and which are still strong markers of these communities' identities, even though economic pressures to lease or to sell the land and to exploit its resources have grown heavier.

However, elevated cancer rates among Native Americans have increased concerns among the communities. In Santa Clara Pueblo, just north of Los Alamos, physicians with the Santa Fe Indian Hospital have noticed a marked increase in the number of thyroid cancer cases since 1980.[73] Distrust has grown to such an extent because of the colonial image of LANL that "many Pueblo do not trust the Indian Health Service to record accurately causes of death, claiming that some people who have died of cancer have had other causes of death listed on their death certificates, which has skewed the official cancer rates for those living in the shadow of Los Alamos."[74] One Pueblo member testified that, "in the old days, LANL workers were given cigarettes at pay day, sort of like a bonus. Now, the Lab blames the cancer on the smoking." Elmer Torres, a tribal liaison between the Pueblos and LANL and former Governor of San Ildefonso asserted that LANL's plans had been shared with all the pueblos, but that he did not know whether they had read it or not. Torres defined the extent of the Lab's responsibility to the people as producing documents that are then released to them. But when researcher Annie G. Ross showed the said document to Pueblo people, they had never seen it and could not read it because the convoluted language was inaccessible to them.

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[70] Naomi Archuleta, Interview by Lucie Genay, Office of Environmental Affairs of Ohkay Owingeh Pueblo, NM, 17 September 2013.
[71] Peter H. Eichstaedt, *If You Poison Us: Uranium and Native Americans*, Santa Fe, NM: Red Crane Books, 1994, 164.
[72] Ross, "One Mother Earth, One Doctor Water," 168.
[73] Kuletz, *The Tainted Desert*, 53.
[74] Masco, *The Nuclear Borderlands*, 141.

Myron Gonzales explained that "the tribal councils have gotten used to the money, and do not want to ruffle the feathers of the Lab," showing how politics and economics are also part of the equation. One tribe member told Ross that LANL handpicked people who supported the Lab in their communities, like Elmer Torres. He added that their governors and former governors were paid to keep their job, keep quiet, and keep them quiet. [75]

c. New Mexico uranium miners

The epitome of environmental and racial injustice is certainly uranium mining, which has even been classified as a technological or human-caused disaster—as opposed to natural disasters, which are not purposely perpetrated. Several publications have addressed the shocking story of Navajo uranium miners; nonetheless, one could not write about environmental injustice in New Mexico without making reference to this issue.[76] The Navajo Nation, which is the largest reservation in the country and spreads on 16 million acres of land over three states—Arizona, New Mexico and Utah,—counts an estimated 1,000 abandoned uranium mines and four former uranium mills. Between 1945 and 1988, their lands contributed 13 million tons of uranium ore.[77] The largest uranium mine in the world sits next to Mount Taylor, a sacred site to several Native American tribes,[78] 22 miles (35 kilometers) northeast of Grants. After uranium was discovered so close to the reservation young men gratefully embraced the job opportunities in the mines: blasters, timber men, "muckers," transporters, and millers paid minimum wage or less—eighty cents to a dollar an hour. For many, it was their first contact with the wage economy.

Years later, workers started falling sick with lung diseases including silicosis, tuberculosis, pneumonia, emphysema, and cancers. The connection between uranium mining and lung cancer had been well established since the 1930s. In the 1950s, the U.S. Public Health Service began a study of uranium miners in the Colorado Plateau, but only on white miners and without communicating any information to workers. In 1952, William Bale and

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[75] Ross, "One Mother Earth, One Doctor Water," 110; 138; 139. See Frantz Fanon, who writes about the cultural assimilation of colonized people and about decolonization during the Algerian war: "*Voilà le monde colonial. L'indigène est un être parqué, l'apartheid n'est qu'une modalité de la compartimentation du monde colonial. La première chose que l'indigène apprend, c'est à rester à sa place, à ne pas dépasser les limites*." Frantz Fanon, *Les Damnés de la terre*, Paris, France: Éditions La Découverte/Poche, 2002, 58.

[76] See Judy Pasternak, *Yellow Dirt: An American Story of a Poisoned Land and a People Betrayed*, New York, NY: Free Press, 2010.

[77] Uranium is called *leetso* in Navajo which means "yellow brown" or "yellow dirt." It was the Indian Mineral Leasing Act of 1938 that allowed the leasing of unalloted lands within the reservation for mining purposes.

[78] Mount Taylor is also known as the Turquoise Mountain (*Tsoodzil*) and is one of the four sacred mountains that mark the cardinal directions for the Navajo Nation. It is also a pilgrimage site for Pueblo people.

John Harley's work on the effects of the energy released by radon daughter isotopes led to the definition of a Working Level. For years, though, scientists were forbidden to publicize concerns about the health hazards of radon in uranium mines. After reports showed that ventilation was necessary, the states gradually enforced regulations at the end of the 1950s. Moreover, exposure was not limited to the time the miners spent down in the mines, as they also lived on the site. The Kerr-McGee Company hired about 70 Navajo miners and 13 Anglo supervisors. The supervisors lived in prefabricated buildings and could get subsidized meals, whereas the miners fended for themselves. The Vanadium Corporation of America had doubts that the facilities would be used by the Indians if provided. Although the miners' exposure was within the national standards per hour and per week, their yearly exposure exceeded the safety standards.[79]

In 2007, Doug Brugge, Timothy Benally, and Esther Yazzie-Lewis published *The Navajo People and Uranium Mining*, a work based on statements given to the Navajo Uranium Miner Oral History and Photography Project that assessed the effects of uranium mining on the reservation beginning in the 1940s. The following are some of the testimonies they collected of Navajo miners who worked in the New Mexico uranium mines in the region of Grants. One of them, George Tutt, started working in the mines in 1949 at age fifteen. He was a "hand mucker" who shoveled uranium waste and uranium ore by hand without mask, gloves, protection, or water for drillers, for $2.50 per hour by 1960. There was no sign of health problems while he was working in the mine, but he started to experience respiratory difficulties a few years later. Most miners explained that they did not know anything about safety. Floyd Frank even wondered if they were "disposable to the government." Tommy James, miner in the 1950s in Shiprock, described how the smoke could give headaches and nosebleeds. He depicted his job as "slave work" and underscored the differences between Navajo workers, who built their own tents and for whom the companies "never prepared anything," and Anglo surveyors, mechanics, and office workers, who had cabins and showers. He also explained how sulfuric acid sometimes splashed and burned employees because they did not wear any protective gear and how waste was spilled out of the mill and flowed in the river. Joe Ray Harvey, who started working in the mines for Kerr McGee in 1961 blasting rock, complained about the lack of air and the smoke. Lastly, Minnie Tsosie, widow of a Navajo miner revealed that her two daughters had to have their uteruses removed. Indeed,

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[79] Eichstaedt, *If You Poison Us*, 43.

spouses and children were exposed as well because they washed the clothes and sometimes lived onsite in the tents. The children played in the radioactive dust and drank contaminated water.[80]

In 1990, the Radiation Exposure Compensation Act (RECA) to provide monetary compensation to atomic veterans and downwinders also integrated uranium miners. However, the Act did not reach all families because it did not cover all the diseases from which the workers suffered; widows had difficulties to have their traditional Navajo marriages recognized by the Department of Justice, and the millers who were exposed to uranium, silica dust, and to concentrated uranium oxide, were excluded from compensation. By the spring of 1994, 155 Navajo workers or families had been compensated.

Constituents	**Diseases seen in either human populations or experimental animals**
Uranium	Lung, bone, stomach, brain and skin cancers, kidney damage, birth defects, reduced sperm count, skin irritation, pulmonary fibrosis, liver damage, and nervous system harm.
Radium	Bone, nasal sinuses and mastoid air cells, leukemia, eye, breast, liver, kidney and nervous system cancers, bone and blood effects at very high levels, possibly cataracts.
Vanadium	Kidney, central nervous system effects, birth defects, inhibition of key cellular enzymes, cardiac palpitation, lung, skin, and eye irritation.
Beryllium	Lung cancer, lung disease (berylliosis), skin hypersensitivity, immunological changes, kidney damage.

Fig. 40: Main uranium constituent and their diseases seen in either human populations or experimental animals. Source: Doug Brugge, Timothy Benally, and Esther Yazzie-Lewis, eds., *The Navajo People and Uranium Mining*, Albuquerque, NM: University of New Mexico Press, 2006, 194-195.

Yet, the miners and their families are not the only population exposed to danger. The uranium industry still threatens all who live in the vicinity of the forsaken mines and mills. Once the industry had collapsed, these were abandoned and with them the huge tailing[81] piles: 24 million tons of waste over 340 acres at the Anaconda plant at Bluewater; 1.24 million tons over 40 acres at the United Nuclear-Homestake-New Mexico Partners tailings pile; 20 million tons over 170 acres at the Homestake-Spin mill; 2.6 million tons over 105 acres at the Phillips mill, and 30 million tons of tailings over 400 acres at the Kerr-McGee mill, the largest tailings pile in the United States that has been described as a manmade mesa.[82] Tailings were used as building materials for roadways, tribal buildings, and playgrounds. The government also endorsed a new role as environmental regulator to provide cleanup of the sites. The Uranium Mill Tailings Radiation Control Act of 1978 classified mills that were eligible for federal cleanup—called Title 1 plants—as those that had sold uranium exclusively to the AEC prior

[80] All quotes above are from Doug Brugge, Timothy Benally, and Esther Yazzie-Lewis, eds., *The Navajo People and Uranium Mining*, Albuquerque, NM: University of New Mexico Press, 2006, 12; 80; 50; 101; 122; 131.
[81] Tailings are radioactive wastes that result from conventional mining.
[82] Amundson, *Yellowcake Towns*, 162.

to 1971. Only one mill, the Phillips mill at Ambrosia Lake, which had closed before the commercial market period, qualified for federal cleanup. Therefore, the issue of the environmental legacy of the Manhattan Project and of environmental injustice in New Mexico is still problematic today and is perceived as a problem that will be passed on to the next generations, since solutions to treat radioactive waste are still being debated, and the half-lives of radioactive materials are counted in thousands of years.

CHAPTER 2: THE SOCIO-ECONOMIC AND CULTURAL IMPACTS

1. New Mexico's economy since World War II, an overview

a. The triumvirate of power

Sociologist Charles Wright Mills' power elite theory, first published in 1956, designates a triumvirate of powers dominating American society: the corporate, the political, and the military. According to this theory, all the other domains are duly subordinate to these three branches of power that have become enlarged, more administrative, and more centralized.[1] Mills argues their decisions or lack of decision-making have a tremendous impact on society. In the 1950s, the increase in militarism was profitable to the three branches as it enabled corporations to make bigger profits, the government to be provided with a strong vision, and the military to thrive. Historian of the Manhattan Project Peter Hales cites the same three elements as the main aspects of the enterprise and how the rulers of the Manhattan Engineering District sought to create places dedicated to a new order: "the physical landscapes manufactured by the District formed one manifestation of a complex and evolving ideology blending corporate capitalism, government social management, and military codes of coercion and obedience." His definition of the military-industrial complex was that of a "a new immensely powerful consortium of institutions ranging across the worlds of business, government, and the military, devoted to self-perpetuation and eventual colonization of the American democracy."[2]

The corporate, political, and military triumvirate, therefore, was the foundation of the country's nuclear complex, and those Mills calls "the masses" were also included in this conglomerate. Mills examines the powerlessness of these ordinary citizens, who are manipulated to serve the interests of the three ruling hierarchies. The power elite theory provides an interesting angle to better understand the relation of dependence that the state of New Mexico has had with these power entities, and how these relations have affected the local economy and society. Incidentally, the three elements also recall the three pillars of the

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[1] Mills writes, "The economy […] has become dominated by two or three hundred giant corporations, administratively and politically interrelated, which together hold the keys to economic decisions. The political order […] has become a centralized, executive establishment which has taken up into itself many powers previously scattered, and now enters into each and every cranny of the social structure. The military order, once a slim establishment in a context of distrust fed by state militia, has become the largest and most expensive feature of government, and, although well versed in smiling public relations, now has all the grim and clumsy efficiency of a sprawling bureaucratic domain." Charles W. Mills, *The Power Elite*, New York, NY: Oxford University Press, 2000, 7.

[2] Hales, *Atomic Spaces*, 2; 5.

state's Faustian Bargain—i.e., the nuclear industry, the Federal Government, and secrecy imposed by national security. The gradual disappearance of the pre-war subsistence economy incited New Mexican farmers and laborers to look for jobs from the largest employers. Pueblos were incited to lease their lands and participate in the energy economy. By putting their faith into the hands of corporate and government interests, these people fully became part of Mills' "masses." The mining corporations, SNL, LANL, the government, and the military nourished the mechanisms of economic growth and crisis in New Mexico to keep control over a social structure with these masses as its base.

The intricate heritage of the Manhattan Project has many ramifications that reflect the consequences of the elite's decision-making throughout the Cold War. However, all of these are interconnected in the fact that they have had a tremendous impact on the people and their environment. Thus, the environmental consequences of the nuclear industry are closely connected to its economic impact since restrictions, cleanup operations, or anti-nuclear activism have influenced the industry's future, its revenues, and its capacity to maintain the state's economy afloat. The extent of the nuclear industry's impact might be illustrated by the necessity of creating two counties each dedicated to one stage in the production of nuclear weapons: Los Alamos for research and development and Cibola—created in 1981—for the extraction of uranium.[3] Likewise, the disproportionate economic role of the military-nuclear industry is linked to the reliance on federal funding. In 1987, the number of federal employees in New Mexico—obtained by adding federal civilian employees, military service men and women stationed at defense installations around New Mexico, SNL and LANL employees, other DOE contract employees, and all other defense contractor employees who worked on defense installations around the state—totaled 79,338 employees. Combined with other state and local government employees, "one concludes that almost 47 percent of all employment in New Mexico can be attributed to governmental activity."[4]

The dangers of excessive reliance on defense jobs were felt several times in the state. An example was the closing of the Walker AFB in 1967. At the time, the base employed 3,200 military and 350 civilian workers. A year later, ACF Industries, an AEC-funded nuclear

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[3] Fern Lyon, "The Atomic Age: Research labs keep New Mexico in the forefront of technology," *New Mexico Magazine*, October 1987, 59.

[4] Other remaining activities, which had become much less significant in the local economy, included manufacturing—although in relatively small proportions as only four employers had more than a thousand employees and the total number of manufacturing jobs represented 7.3 % of the state's non agricultural jobs—mining (2.8 % of New Mexico's non agricultural jobs), tourism (8.5 %), and agriculture, which accounted for 3.6 % of all jobs. McDonald et al., *The New Mexican Economy*, 2.

weapons manufacturing facility in Albuquerque which employed about 2,700 people in 1964, was completely phased out by the agency. The two combined represented the significant loss of 2.4% of the state's non agricultural jobs.[5] A more recent example was the governmental shutdown in October 2013.[6] On the other hand, federal spending was also largely responsible for the state's periods of prosperity. After a first booming stage in the late 1940s and 1950s, New Mexico's economic growth slowed down in the 1960s because the nation's industrial expansion had little impact on the less industrialized states with small manufacturing sectors. Then, during the 1970s, federal expenditures and employment soared, including a sharp increase in DOE and DOD spending. It was a period of exceptional prosperity for New Mexico coupled with the second uranium boom fueled by the U.S.'s crusade for energy independence and skyrocketing energy prices due to the OPEC oil embargo. In the early 1980s, however, "the robust economic expansion of the 1970s came to a screeching halt with the first break in oil prices […] and troubles in the US nuclear power industry triggered by the Three Mile Island incident."[7] The uranium industry suffered its second bust period; between 1981 and 1987 mining employment was cut in half in the state and in 1982 nonagricultural employment fell for the first time in 21 years. Despite these setbacks, New Mexico's economic growth throughout the 1980s still exceeded the performance of the U.S. economy.

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[5] *Ibid*., 18.
[6] See Part 3, Chapter 2, The local politics of being dependent on federal funds.
[7] McDonald et al., *The New Mexican Economy*, 22.

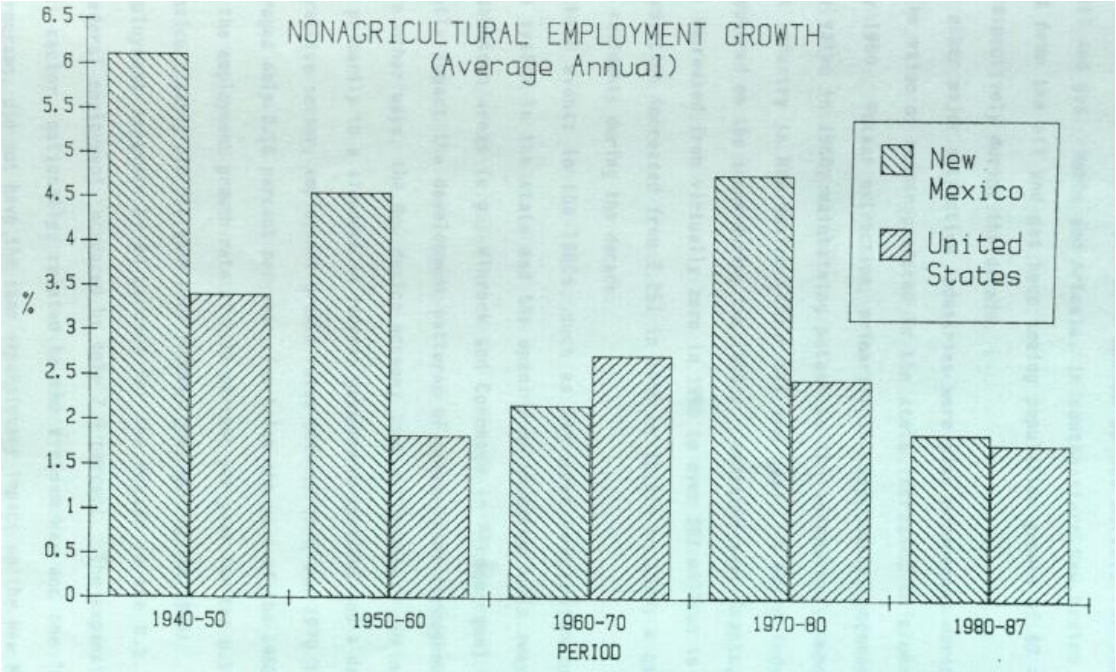

Fig. 41: Nonagricultural Employment Growth in New Mexico 1940-1987. Source: Brian McDonald, David Boldt, and University of New Mexico, "The New Mexico Economy: History and Outlook," Albuquerque, NM: University of New Mexico, Institute for Applied Research, Bureau of Business and Economic Research, 1988, 16.

b. An undeniable economic boom in a chronically poor state

New Mexico's 1940 population of 360,000 was multiplied by five and its 375-dollar income per-capita by 35 in 50 years. According to historian Michael Welsh, "New Mexico had outperformed the nation as a whole in both population and income growth," and "the state should be a case study for both economists and historians interested in the ability of the American economy to deliver on its promises."[8] However, this short overview of the state's postwar economic evolution demonstrates, again, how highly dependent it has been on the government and extractive sectors and how variations in both these sectors had repercussions on employment and, consequently, on poverty rates. Furthermore, improvements in poverty rates could be, in part, accounted for by the immigration waves of highly-educated immigrants who came to work at the Labs and other research centers and helped boost the median income. In that case, lower poverty rates do not necessarily equate less poverty for the poor but rather a bigger proportion of wealthier individuals in the state. There is no denying the improvement over the postwar years provided by such employers as the Laboratories, the Sandia Corporation and the DOE in terms of jobs and standards of living. This is observable in a series of reports issued by New Mexico State University that have studied the economic

[8] Welsh, "The Land of Extremes," in *Contemporary New Mexico*, 70.

impacts of DOE activities in the state.[9] For fiscal year 1990, LANL and SNL alone had a state-wide economic impact of $3.67 and $6.65 billion respectively or $7.32 billion together and provided close to 20,000 jobs.[10]

	LANL Funding	**New Mexico Expenditures**	**New Mexico Employment (average number of jobs)**
	Millions of dollars		
LANL	904.8	706.0	9,590
Mason & Hanger Silas-Mason	18.6	18.6	359
Pan American World Services	116.1	110.3	1,330
Total	1,039.5	834.8	11,279
	SNL Funding	**New Mexico Expenditures**	**New Mexico Employment (average number of jobs)**
SNL	1,210.8	785.4	7,670
Allied Signal (Albuquerque)	8.4	8.4	85
Total	1,219.2	793.8	7,755
LANL, SNL, and contractors	2,258.7	1,628.6	19,034

Fig. 42: LANL, SNL, and contractors funding, expenditures and employees in New Mexico, FY 1990. Source: Timothy M. Cohen and University New Mexico State, "The Economic Impact of Los Alamos National Laboratory and Sandia National Laboratories on the State of New Mexico Fiscal Year 1990," Las Cruces, NM: New Mexico State University, College of Agriculture and Home Economics, Agricultural Experiment Station, Cooperative Extension Service, 1991, 4; 9.

The spin-off effect on local businesses and the work opportunities for the local population were indeed phenomenal. Immigration enabled to boost the local consumer market and entrepreneurship at the same time. Yet, after decades of exceptional growth exceeding national performances, New Mexico is still, to this day, one of the poorest states in the U.S. Despite the dramatic increase in income, industrialization, modernization, and access to employment, many New Mexicans are still comparatively poor Americans.[11] So, the question arises: who were the beneficiaries of the scientific conquest?

In fact, with each new conquering step, new branches of the industry sprung up, and, with each new facility, newcomers immigrated en masse to Los Alamos, Albuquerque, Alamogordo, Grants, and Carlsbad. This torrent of immigrants, a logical outcome of the new economic situation, drastically underscored existing inequalities between ethnic groups and created new divisions as well. In 1997, a report aiming at a definition of poverty in New Mexico observed that, although there had been variations in the state's poverty rates, New

[9] These activities include the laboratories but also a biomedical and environmental research institute, a national waste repository, a national remedial action project, and several energy research and conservation programs.
[10] Timothy M. Cohen and University New Mexico State, "The Economic Impact of Los Alamos National Laboratory and Sandia National Laboratories on the State of New Mexico Fiscal Year 1990," Las Cruces, NM: New Mexico State University, College of Agriculture and Home Economics, Agricultural Experiment Station, Cooperative Extension Service, 1991, 6; 12.
[11] In 2008, even though statistics indicated an incredible rise in wealth and living standards, New Mexico still ranked fifth in the number of persons below the poverty level. United States Census Bureau, "Persons Below the Poverty Level, 2008," State Rankings – Statistical Abstract of the United States, 2012, https://www.census.gov/compendia/statab/2012/ranks/rank34.html, accessed September 20, 2013.

Mexico had constantly ranked among the nation's poorest states since statehood. Mirroring the trends in federal spending, the 1970s were a period of improvement as the poverty rate dropped more than 5 points to 17.5% between 1969 and 1979. Since the 1990 census, however, poverty rates had increased by 38%, and New Mexico ranked third in the nation for poverty. Since the 1970s, the economy has been characterized by "growing income inequality, and more favorable rewards for educated and skilled workers." Confirming what has already been said above, the report found that the benefits of economic growth did not "appear to automatically transfer to those in poverty," for "educational and training opportunities must be provided for local workers to reap the benefits of a growing economy." Regardless of a person's place of birth, language or ethnicity, full-time wage work has become the best insurance against poverty. Economists have argued that employment growth and local economic expansion by themselves may not reduce income inequality, as it also depends on who gets the jobs, whether they are locals or newcomers. American economist Timothy J. Bartik, who focuses on local economies, found that job growth benefits the locals in the long-run by bolstering the local employment rate and labor force participation rate.

The authors of the report separated the New Mexico-born, other U.S. states-born, and foreign-born populations to analyze the determinants of poverty status. They considered migration as a response to structural factors such as better economic opportunities or generous welfare benefits. Statistics revealed clearly that other U.S. states-born individuals were less likely to be poor than the New Mexico-born, whatever the criteria. Even when it comes to the number of degrees, New Mexico residents born in other states, "regardless of their educational attainment, have a predicated probability of being poor that is lower than that of college educated local-born New Mexico residents." This fact shows that there is a pattern of chronic poverty in the state due to the competition with outsiders for jobs that even education cannot always correct. In general, education pays off as the number of people reporting incomes below the poverty threshold decreases with the level of education attainment, but "the pattern of association between educational attainment and poverty is not straightforward." The results show that "the effect of education on poverty status is mediated by race [and] place of birth."

Speaking English was also identified as an important factor because foreign-born individuals with a good mastery of English were less likely to be poor than local-born New Mexicans whose mastery of the language was poor. Yet, "adult New Mexico residents who were born in other U.S. states have a distinct advantage over everybody else regardless of

their ability to speak English. When the only language that they speak is English, these domestic migrants have only a six percent chance of being poor, while local-born English only speakers are twice more likely to be poor." The median wage income for New Mexico born residents was around $16,000 compared to $22,000 for U.S. born immigrants. Even among individuals without any education, the difference between the median wage income for New Mexico and other U.S. states-born was around $2,000. That number reached $4,000 for college graduates.[12] What these figures suggest is a clear pattern of separation between the local-born poor, who seem to struggle more to get out of poverty through education, and immigrants from other American states, who seem not only to be protected from poverty but also to have higher income with the same educational attainment.

c. New Mexicans' new relation to the land

Thus, disparities in the form of poverty rates can be mapped out on both sides of the Rio Grande research corridor[13] between the counties that are part of it and those on the periphery. The ups and downs on the whole industrial complex had correlative repercussions on poverty rates and on the quality of life for New Mexicans, who, for the most part, did not have the job security of out-of-state Ph.D.s who came to settle in Los Alamos or Albuquerque after they were offered lucrative positions at the Labs. With the visible colonization of certain areas, old conflicts such as claims to land ownership surfaced. In the 1960s, New Mexico Hispanics led by The Alianza Federal de Mercedes[14]—the Federal Alliance of Land Grants—headed by Texas-born Mexican Reies López Tijerina, dubbed "King Tiger," the son of a sharecropper, started asserting their historic rights to the land. His fight revived the ancient struggles of the Mexican people of New Mexico to prevent land grabbing and thus emphasized the opposition

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[12] Alcantara Adelamar, Kevin Kargacin, Marie Mora, Richard Santos, and Lawrence A, Waldman, "Poverty in New Mexico: Who Are the Poor?," Albuquerque, NM: University of New Mexico, Bureau of Business and Economic Research, 1997, 3-5; 56; 89-98.

[13] The concentration of over thirty research centers and the two laboratories along the Rio Grande came to be known as the Rio Grande Research Corridor (RGRC) and to be described as an equivalent for California's Silicon Valley. LANL has worked with area universities, private technology companies, and the state government to develop the RGRC that encompasses New Mexico Centers of Technical Excellence and Technological Innovation Centers in Los Alamos, Santa Fe, Albuquerque, Socorro, Sacramento Mountains, Alamogordo, White Sands, and Las Cruces. Extending from Taos to Las Cruces, this Corridor recognizes the importance of Department of Energy institutions to the state and to the local population in terms of occupational opportunities. Dietz, "The Impact of Los Alamos National Laboratory on Northern New Mexico,"56.

[14] The Alianza Federal de Mercedes was formed in 1963 to pressure for reconsideration of land-grant settlements and defend the right of New Mexican landowners under the Treaty of Guadalupe Hidalgo. La Alianza's first convention included 800 delegates representing 48 New Mexico land grants. The organization composed of many impoverished land-grant heirs claimed that colonialism had robbed resources, depopulated the communities in northern New Mexico, and impoverished the people. See Reies López Tijerina, *They Called Me "King Tiger": My Struggle for the Land and Our Rights*, Houston, TX: Arte Publico Press, 2000.

between Hispanic and American lifestyles and economic views. In "Mexicano Resistance to the Expropriation of Grant Lands in New Mexico," Robert J. Rosenbaum and Robert W. Larson describe the "New Mexico grant residents who resisted" as "a rural, self-sufficient people engaged in a straightforward economy founded on subsistence agriculture," who were "confronted by emissaries from a powerful, modern nation-state bent on replacing the local economic system with one grounded on a market-oriented capitalism." They comment on the reactions spurred by the courthouse raid led by Tijeras in 1967[15] as being "typical of the responses by dominant groups everywhere to the mutinous rumblings of the subjugated." The authors underscore the colonial framework in which the two groups were opposed and note that "Those in power living close to the situation rarely publicize friction or report conflict because such revelations might frighten investment or, even worse, might raise troubling questions about the legitimacy of their dominance."[16] Thus, in land matters as well, secrecy and discretion were utilized as a tactic to protect the conquerors' legitimacy in the face of rebellion.

This movement put the Hispanic workers from the valley who worked at LASL in an awkward social position. Specialist of the history of the Pajarito Plateau Hal Rothman writes, "Although their economic position was generally better than that of their neighbors, they were regarded in varying degrees as *vendidos*, or sellouts." They were too few to constitute a strong middle class, so they "remained trapped between the increasing militancy of Hispanos and their own psychic and material aspirations in the Anglo world of Los Alamos."[17] Moreover, the revelations on the AEC's responsibility in hiding the release of tons of radioactive waste into the environment during the Cold War and other dangerous practices further antagonized the people living around nuclear facilities because accepting a job there, while it formerly meant gratefully accepting an excellent opportunity, now meant supporting the institution that had brought alarming health and environmental issues to the region. The Labs and other research and development centers became symbols of both social success and cultural betrayal.

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[15] On June 5, 1967, La Alianza members raided the Rio Arriba County courthouse in Tierra Amarilla to perform a citizen's arrest of the local district attorney for violating their civil rights and to free prisoners who had been arrested in the Tierra Amarilla land grant dispute. They wounded two lawmen and took a sheriff's deputy and a journalist hostage. See Richard M. Gardner, *Grito! Reies Tijerina and the New Mexico Land Grant War of 1967*, Indianapolis, IN: Bobbs-Merrill Company Inc., 1970.

[16] Robert J. Rosenbaum and Robert W. Larson, "Mexicano Resistance to the Expropriation of Grant Lands in New Mexico," in Charles L. Briggs and John R. Van Ness, eds., *Land, Water, and Culture: New Perspectives on Hispanic Land Grants*, Albuquerque, NM: University of New Mexico Press, 1987, 301; 270.

[17] Rothman, *On Rims and Ridges*, 276.

Activists' attempts to reclaim the land of their forefathers highlighted the attachment of New Mexicans to their land, regardless of their distancing themselves from farming activities. Sentiments of longing for a less arduous and more prosperous life had indeed undermined the role of agriculture in the economy as traditional occupations were rejected by younger generations. In other terms, in the context of rapid industrialization and modernization of their environment, agricultural workers deserted the rough and demanding labor on farms for easier and more reliable work in the cities. In addition, the overexploitation and erosion of the soil coupled with water shortages had long put a fatal strain on agriculture.[18] Thus, agricultural activities that had been the pillars of the economy before the Second World War declined, and this precipitated a demographic shift from a rural agrarian culture to an urban industrial one—a shift that one could call a belated industrial revolution. Conversely, welfare money increased in the declining agricultural counties:

> For the first time in 1950, half of all New Mexicans lived in cities […]. Four thousand farms went out of production in the decade, and only nine of New Mexico's thirty-two counties benefited from the job growth and population increases. In the sixteen declining counties, federal spending was modest to nonexistent, and welfare and social security payments grew significantly as a result: 240 percent and 2,600 percent, respectively.[19]

An identity crisis between tradition and modernity appears in filigree behind these statistics as many let go of their ancestral rural way of life to leave for town and find work in the technological and scientific sectors. As a result of the disparities in job opportunities related to geography, education, and attachment to traditions, inequalities were again augmented. The hiring and wage policies of the Laboratories have also revealed that, while having a positive impact on the state's economy on the whole, they have also played a significant role in increasing inequality. For example, if one looks at the evolution of the number of employees and payroll at SNL over ten years between 1965 and 1975, one notes a significant decrease in the number of SNL employees, while, at the same time, both payroll

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[18] William Desbuys wrote about this irresistible decline, especially that of subsistence agriculture which "could not resist the advance of cash and capitalism any more than farmers could resist the change of seasons. Cash was a vegetal force. It penetrated the mountains the way tree roots probe a granite fissure." Desbuys et al., *River of Traps*, 102. One indicator of the disappearance of old ways was also the decline of trading posts on Indian reservations. These were the tokens of the long-time established barter economy that connected communities and maintained ties between the Native American communities and neighboring Hispanic villages.

[19] Welsh, "The Land Extremes," in *Contemporary New Mexico*, 74.

and plant assets continued to grow. This difference means that employees were fewer but better paid.

Year	#Employees	Payroll (m)	Plant Assets (m)
1965	7,120	$69.5	$161.3
1970	6,530	$89.7	$240.9
1975	5,542	$95.3	$273

Fig. 43: Sandia employees, payroll, and assets 1965-1975. Source: Don E. Alberts, "Kirtland Air Force Base: Its Origin and Ativities," Research Reports, History of Albuquerque Exhibits Series, Vol. V, The Albuquerque Museum, History Division, March 1981 in Karafantis, "Weapons Labs and City Growth," 128.

The scientist and technicians at the Laboratories earn salaries unheard of in the rest of the state, but even security guards and janitors who are paid minimum wage or slightly above often consider their situation as Lab employees as an immense improvement because they have job security. Therefore, whatever their work position, these employees came to be viewed as privileged by other, less fortunate community members.

2. Los Alamos: an island of privileges

a. An island, an anomaly, a mirage

Nowhere else in the state do inequalities appear as unequivocally as in Los Alamos. The town and County have always been a curiosity in New Mexico because Los Alamos hardly has anything in common with the surrounding region, be it the population, the living standard, the number of Ph.D.s per capita, or the specific corporate culture and history. In 1969, journalist Walter Briggs underlined the antithetic juxtaposition of the two areas by writing of Los Alamos's "stark contrast between the ancient and the futuristic," underscoring its unique "combination of mystery, past and future." Briggs establishes a dichotomy between various elements, opposing the "remote frontiers of the physical sciences" to "one of the most cataclysmic of geologic occurrences"; "some of the most modern architecture" to the "panorama of some of the oldest of Indian ruins," and the "600 doctors of philosophy study[ing] scientific problems not even envisioned a dozen or so years ago" to the "Indian and Spanish-American communities living almost as their ancestors did."[20] While journalists insisted on the romantic contrasts of history, the socio-economic contrasts were just as striking. In 1970, 90% of the population in Los Alamos County was Anglo and only 2% were below the poverty line compared to 38% in neighboring Sandoval County.[21]

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[20] Walter Briggs, "Los Alamos, Mysteries, Past and Future," *New Mexico Magazine,* Santa Fe, NM, February 1969, 23.
[21] Hevly et al., *The Atomic West*, 105.

New Mexican author and activist Juan Esteban Arellano stresses the impression of disconnection between the Hill and the rest of the region; he writes, "Although physically in northern New Mexico, Los Alamos is really not part of the bioregion; like in *Gulliver's Travels*, it is a floating island."[22] Author Jo Ann Shroyer, for her part, calls the town an "anomaly" that she depicts as "a predominantly white society in the midst of a multicultural state that is mainly Hispanic and Native American," or else, as "an affluent community in a state that is one of the poorest in the nation." She notes the incongruous juxtaposition too: "its lifeblood is data—the concrete, observable information that is science—while it is surrounded by Indian cultural traditions whose roots are held in place by powerful, intuitive mythologies." In addition to the comparison with the pueblos, she also compares the town to Santa Fe that she calls "a magnet for people who live by art and intuition" just 35 miles (56 kilometers) away "but at least a light-year away in terms of attitude and focus" and "alive with antinuclear activists who keep a suspicious watch over their neighbors on the mesa." One of her interviewees at the Laboratories likened the two towns to Sparta and Athens, two towns at war with each other but also fundamentally needing each other to be complete.[23]

Historian Chris Dietz calls Los Alamos "an elite, Anglo island in New Mexico" as well, adding that it was both seen as "a place of great privilege and a place of evil." One of the respondents in his study commented that people "expect" it to be special, a place of "evolved human potential" where people "should have all the answers." When it becomes clear that Los Alamos is not all they expected but a town with problems similar to other towns, "people feel cheated." The island image is thus coupled with the idea of a mirage, mirroring Arellano's reference to *Gulliver's Travels*. Dietz evaluates the relations between the Hill and the surrounding region and writes about how biased the indicators of economic progress can be:

> When jobs and money generated are used as the prime indices for evaluating a science facility's impact on a region, a kind of tautological pretension occurs: jobs and money are needed in the region; the new facility begins operation; jobs and money are generated; therefore the impact is beneficial. These kinds of indices are expedient, easily available. But they are also simplistic, refining complex social and cultural relations to facile singularities. [...] Native New Mexicans have primarily participated at LANL in unskilled and skilled labor positions. Few Native Americans or Hispanos

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[22] Juan Estevan Arellano, "La Querencia: La Raza Bioregionalism," *New Mexico Historical Review*, Vol. 72, No. 1, January 1997, 32.
[23] Shroyer, *Secret Mesa*, 2-3.

> work in top level positions, but this is changing. This slow but changing nature of relations between LANL and the region may have urbanized the countryside, but it has not clearly aided in the assimilation of these groups.[24]

The main reason why Los Alamos had so much trouble "fitting in" according to Dietz was that the Laboratory did not acknowledge any potential of local minority students who would like to pursue a career in science. In other words, they believed themselves and other states to be the only possible reservoir of talent, discarding local institutions. Prejudice on both sides cemented the relations between the Laboratory and New Mexicans. One respondent spoke of the "genetics" of intelligence, opposing the intelligence of Los Alamos students to that of the area's students. Another respondent talked about class consciousness and the fact that most of the high salaried out-of-state staff members had never been around rural, ethnic people whom they found fascinating but "dirty." Española people were the bottom of jokes at LANL; so much so that the Lab had to issue a memo forbidding such jokes. Two respondents mentioned the "outrageous" real estate prices that were used to screen potential residents on the Hill and select the wealthier families, typically Anglo. A combination of paternalism with "the unclear awareness or indifference to the area's problems" shaped the attitudes of some residents of Los Alamos. During the Cold War, the primary national security mission was so overwhelming "that the generation of jobs and money in the area was considered sufficient in meeting regional requirements. It is as if the 'promise' of government sponsored science facilities was lost in what was deemed national priorities."

In an effort to "bridge the gap" with the region and be a "good neighbor," LANL and DOE launched programs such as Community Outreach, the Volunteer and Retired Volunteer Service Programs, the Cooperative Education Program, and Los Alamos County founded a regional planning organization.[25] In 1967, the North Central New Mexico Economic Development District was created to assist units of local government program and aid in its implementation. It was originally the result of the 1965 Public Works and Economic Development Act.[26] The plan at the time was already based on the observation that the

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[24] Dietz, "The Impact of Los Alamos National Laboratory on Northern New Mexico," 102; 105-106.
[25] *Ibid*., 87; 102; 58.
[26] The Public Works and Economic Development Act was passed in 1965 and reads, "In order to promote a strong and growing economy throughout the United States, Congress declares that […] local communities should work in partnership with neighboring communities, the States, Indian tribes, the private sector and the Federal Government to increase the capacity of the local communities to develop and implement comprehensive economic development strategies to alleviate economic distress and enhance competitiveness in the global economy." United States Department of Commerce, "Public Works and Economic Development Act of 1965, as

counties around Los Alamos—Santa Fe excepted—suffered from high unemployment rates and low median family income compared to national standards. The five counties on the graph below were designated as economically depressed.[27]

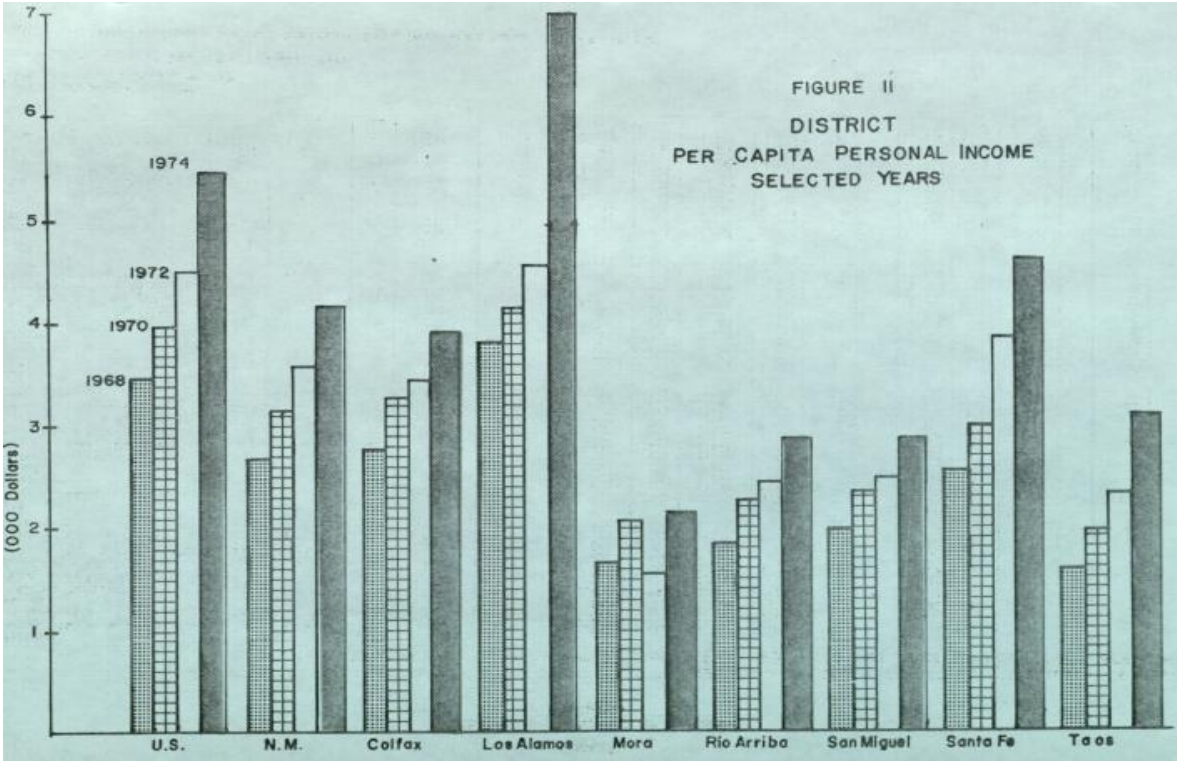

Fig. 44 a: Per Capita Income of Northern Counties 1968-1974. Source: North Central New Mexico Economic Development District, "Regional development plan for the North Central New Mexico Economic Development District," Santa Fe, NM, June 1977, 43.

Ammended ("PWEDA")," *Commerce.gov*, http://www.commerce.gov/sites/default/files/documents/2012/january/eda_pweda_042310_0.pdf, accessed March 15, 2015.

[27] North Central New Mexico Economic Development District, "Regional development plan for the North Central New Mexico Economic Development District," Santa Fe, NM, June 1977.

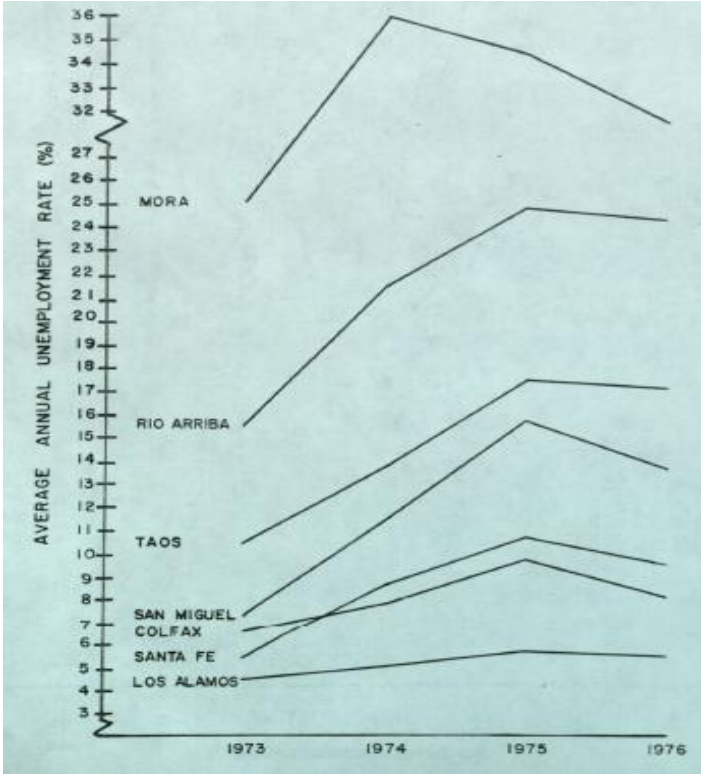

Fig. 44 b: District Unemployment Rates 1973-1976. Source: North Central New Mexico Economic Development District, "Regional development plan for the North Central New Mexico Economic Development District," Santa Fe, June 1977, 47.

b. Education and stereotypes

Education is the crux of the issue. Los Alamos is a stratified community, but by education and occupation rather than ethnic origin. Katrina Mason points out that "academic success was the leveler" and that "scholastic achievement, not family background, determined one's place in the children's social strata."[28] This statement is valid when one only considers the community from the inside, but, for those on the outskirts, the stratification along ethnic lines is a reality, meaning that education and ethnicity are related. Secundino Sandoval, son of Sam Sandoval, a skilled craftsman from Albuquerque, mentioned his experience at a Los Alamos school and the stereotypes outsiders had about New Mexicans; he said,

> You were a scientist, you were in an upper echelon. Your father was a carpenter, you were in a lower echelon... It caused me a lot of fights... We did have incidents in school. We had people who were coming in from say, Oklahoma or Texas to work in construction. In Texas or Oklahoma, back in those days, if you were of a different race, dark skin, dark hair, you were Mexican. They categorized everyone under the

[28] Mason, *Children of Los Alamos*, xii.

> name Mexican, whereas my father always said, 'Hey, we're Spanish.' Spanish-American, that was the term used then.[29]

One can note that the name "Mexican" is perceived virtually as an insult by a "Spanish-American" because of sensitivity to the social hierarchy in the region that New Mexicans have internalized. This hierarchy presents Anglos at the top, Hispanics or Spanish-Americans, Native Americans, and lastly, Mexican immigrants.[30] Ethnic categorization and classification being a prominent American feature, this differentiation is not surprising but reveals how segmented New Mexican society is, despite its reputation of colorful multiculturalism. Within the community, education has in effect always been a factor of social construction, but it has also been a factor of social reproduction, as many children went into physics because it was all they knew from their parents. These children had access to one of the best school systems in the nation, and, after going off to college, many returned to the town because they knew they could get hired at the Laboratory. Nella Fermi Weiner acknowledged that being the daughter a physicist had increased her chances for success; she said, "We [the kids of the physicists] were not necessarily more intelligent, but we certainly had more opportunities than these other kids."[31] Not to mention the fact that coming from a scientists' family offers more options financially, since Los Alamos is one of highest-income communities in the country.

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[29] Interview of Secundino Sandoval in Mason, *Children of Los Alamos*, 17.
[30] For more information about the history of Mexican immigration to the U.S., see Manuel García y Griego, "The Importation of Mexican Contract Laborer to the United States, 1942-1964," in David G. Gutiérrez, ed., *Between Two Worlds: Mexican Immigrants in the United States*, Wilmington, DE: Scholarly Resources, Inc., 1996, 45-85.
[31] Interview of Nella Fermi Weiner in Mason, *Children of Los Alamos*, 78.

Fig. 45: Schoolchildren in class in Los Alamos, 1949. Source: Mason Sutherland and Justin Locke, "Adobe New Mexico," *The National Geographic Magazine*, Tampa, FL, December 1949, 825, Ralph Carlisle Smith Papers on Los Alamos 1924-1957, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS149BC, Box 1, Folder 62. Caption: "All Los Alamos Children Seem To Know the Answer. Aren't Their Dads Ph.D.'s?"

Social reproduction and prejudice maintained a pattern in which employers turned automatically to other states to look for expertise. One Hispanic employee with 24 years of experience at LANL commented in 1989 that, "oftentimes, a local contractor would seek some specialized technology out of state because he did not realize the skills were locally available." According to this employee, LANL "chose not to take part" in regional affairs before 1980 because the national security mission was the overwhelming priority, but, "without LANL, New Mexico would be like Mississippi."[32] On a tour to talk to students in northern New Mexico schools, he asked them whether they wanted to "sweep floors at LANL" or "be on top, a scientist," thus using the "mystique" of Los Alamos to stimulate interest and insisting on the correlation between education and status. As for the students who are interested in science but would not work LANL because of personal beliefs, "I guess they'll have to go out of state," he said.[33]

Santiago Bustamente of Pecos said that it had always been hard for minorities to get a job at the Lab, but he could not understand why. "For one," he said "the people who do the

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[32] The comparison with Mississippi is interesting since the 2011 statistics showed that the only poverty rate that was lower than New Mexico's was that of Mississippi. Alemayehu Bishaw and U.S. Census Bureau, *Poverty: 2010 and 2011 American Community Survey Briefs*, U.S. Department of Commerce, Economics and Statistics Administration, September 2012, 3.

[33] Dietz, "The Impact of Los Alamos National Laboratory on Northern New Mexico," 90-91.

hiring don't think much of New Mexico schools." He was hired with three years' experience as a draftsman in 1951, and it took him a while to be made a staff member. They told him there were people above him without degrees who could not make staff members, so they did not feel right making him a staff member. Yet, when asked whether he thought it had something to do with the fact that he is part of a minority, he replied that he could not think of any other reason, especially when there were young Anglos "fresh out of high school who were made staff members right away." He eventually became assistant division leader for a division which had 650 people, 200 of whom were Ph.D.s.[34]

Senni Gallegos of Chimayó, a secretary word processor in the weapons division, explained working for the Lab was similar to going to college because she learned so much. "I have benefited from working here in more ways than I can tell you," she said. "You learn from your peers and co-workers, and we share. Sometimes I envy people I work with who have Ph.D.s. They are physicists, and they are always pushing their children to get an education. They have the money, and they can afford to send them." That is one of the solid barriers that are still erect between people from the valley and Los Alamos scientists who can afford to send their children to the best universities in the country and have them come back to work at the Lab on the best jobs, thus perpetuating the cycle of hereditary wealth. Nevertheless, when Senni depicted what each locale represented for her, she said, "Chimayó provides the house, family life, and religious community; Los Alamos provides my bread and butter." She emphasized that Chimayó is cheaper, nicer, and prettier, but making a living in Chimayó was not an option since the only choices she believes she had was to make a living as a gardiner, have a talent for weaving, or open a gallery.[35]

As a result of a combination of social reproduction and mistrust in local education Los Alamos remained resolutely disassociated from its state. Statistics[36] contributed to its image, standing out as an island of privilege disconnected from the work-related anxieties of the

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[34] Santiago Bustamente, Interview by Troy Fernandez, Santa Fe, NM, 8 August 1995, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CD 28.
[35] Senni A. Gallegos, Interview by Carlos Vásquez, LANL, NM, 3 March 1991, "Impact Los Alamos Project."
[36] These figures have already been mentioned above: in 1986, almost 70% of the population of Los Alamos County was from out of state, compared to 0.66% in the close county of San Miguel and 3.5% of the Los Alamos population was under the poverty level, compared to nearly 27% in San Miguel, with a median family income three times inferior. According to the 1988 State Policy Data Book, New Mexico ranked second in doctoral scientists and engineers per 10,000 in the nation, second in federal spending per capita and in government (both federal and state employees) but 29th in the number of high school graduates, and 38th in average annual income. Dietz, "The Impact of Los Alamos National Laboratory on Northern New Mexico," 50; 41.

surrounding communities. Maxine Beckman from the Hill talked about going down to the valley to shop and how people think that, because you are from Los Alamos, "you think you're better or something like that." She added that she couldn't imagine that people did not realize "how wonderful Los Alamos has been to northern New Mexico; it would be a poverty area without it."[37] Her comment reflects an issue of distorted views between Los Alamos residents and the valley. The Laboratory certainly had a positive impact on the surrounding region, but, despite the influx of money, it has comparatively remained a "poverty area." Starr Beckman, Maxine's daughter, even said she was envious of one of her friends whose marital name is Sandoval because, judging from the people around her, being a minority offers better chances. She also noted that she worked with machinists and technicians, among whom she guessed Hispanics accounted for 75%.[38]

Harold Gibson, an interviewee from Boston who came to work for the Lab as a contractor and moved to Chimayó was talking to Siegfried S. Hecker (LANL Director from 1986 to 1997) at a town meeting and told him, "for fifty years you've been talking of community outreach, but you haven't done it here, all you have done is hire people, fire people, and you have been a brain drain rather than create a brain trust." Hecker's reply was that the DOE had not given them money for that. Gibson also testified that he would get angry when he heard people on the Hill tell Española and Santa Fe jokes because they were insulting his new home and friends. According to him, the Valley suffered because the Lab did not see it as a viable partner. The educational system, for instance, suffered greatly because the DOE gave millions of dollars for the school system, but it was divided equally between Los Alamos, Pojoaque, and Española, even though they all provided the staff at LANL. Gibson underscored, however, that the one thing that the Lab had given the region was "great medical care," including "more doctors than most areas with the same kind of population" and "decent hospitals."[39]

Among the people from the valley who are employed at Los Alamos, few live on the Hill permanently. Even those who have been working for the Lab for decades do not necessarily aspire to entering the Los Alamos community as a result of the cultural divide. In *The 3 ½ cultures of Española*, a short booklet written by Gilberto Benito Cordova and his

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[37] Maxine Beckman, Interview by Linda Campbell, 11 February 1995, "Impact Los Alamos Project."
[38] Starr Beckman, Interview by Linda Campbell, 18 April 1995, "Impact Los Alamos Project," Oral History Projects and Video Recordings Collection, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS821BC, 1984-2006, Box 1, CD 27.
[39] Harold Gibson, Interview by Peter Malmgren, Chimayó, NM, 12 February 1996, "Impact Los Alamos Project."

students of Española Valley High School, the authors humorously analyze four cultural groups they named "the Native American," the "*Moja'o*," the "*Cholo*," and the "Anglo," proving that jokes have not circulated only at the expense of valley dwellers but the other way around as well.[40] Among the jokes mentioned in this booklet, one refers to the fact that some "*Cholos*" think that Anglos get their knowledge of Hispano culture by going to Taco Bell®. The authors give their own version of the story of the Los Alamos envoy who came down from the Hill during the War to have a drink in Española in order to start rumors about the secret work underway at the army camp; they write,

> The success of his mission depended on the paradoxical assumption that the local people were unsophisticated and ignorant, but inquisitive, and that those who frequented the cantina were true representatives of valleyites. The stranger proceeded to mingle boisterously, and drinking with the local '*borrachos*.' Faking intoxication later that night, he cunningly disclosed knowledge of a project at Los Alamos, but pleaded that he was sworn to secrecy. Many free drinks later his 'secret' was extracted from him. Los Alamos scientists, he disclosed, were researching a new awesome weapon, calculated to hasten the end of World War II: the weapon, windshield wipers for adobe submarines! And thus originated Los Alamos' patronizing attitude towards Española.

Behind these jokes and cross-racial stereotypes, one can see the reputation of Los Alamos in the valley where people believe that residents of the Hill "suffer from xenophobia, a fear of being inundated by the 'Brown' hordes from Española." The comparison is made between the fenced town and a medieval castle, the Los Alamos gates recalling a drawbridge,

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[40] Cordova mentions the other names to refer to the "*Moja'o,*" a Mexican immigrant: the "illegal alien," the "undocumented worker," or the "wetback," which is the English translation of *Moja'o* (also spelled *Mojado*). He is depicted as a character of paradoxes, both admired and scorned, who comes to the U.S. to seek the "American Dream" and believes education is the key to having a good future for his children. The "*Cholo*" is mostly described by the way he dresses (sleeveless tee shirts, khaki pants, flannel shirt buttoned at the top, sunglasses, derby hat or bandana, and tattoos). He slouches a lot; he is very religious, and likes to stay in group for protection. His favorite word is "bro." Gilberto Benito Cordova, *The 3 1/2 Cultures of Española*, Albuquerque, NM: El Norte Publications, 1990, 18.
The term "*mojado"* or "wetback" is a pejorative expression (although it is sometimes used by Mexicans to refer to themselves) which refers to the experience of illegally crossing the Rio Grande to enter the U.S. It is sometimes pejoratively used against Chicanos with the same prejudicial meaning as "greaser" or "spic." *Cholo* means mixed-race. According to Rafaela Castro, "Historically, *cholo* has been a pejorative term applied to poor, lower-class, and/or indigenous Mexicans and *mestizos* (people of mixed race)." The *cholo* is a young Chicano male distinguished by his clothes, speech, gestures, and "a defiant street style." Catro writes, "Although some may be gang members, some may be low riders (car club members), or just Chicanos influenced by the *cholo* lifestyle." Rafaela G. Castro, *Chicano Folklore: A Guide to the Folktales, Traditions, Rituals, and Religious Practices of Mexican-Americans*, New York, NY: Oxford University Press, 2000, 54-55; 159.

the residents likened to lords of medieval Europe, and the workers to peasants. Cordova comments, "THEY live atop the 'Hill' […], and the unskilled worker and garbage collector […] live in the Valley. This mentality was visually reinforced by the unofficial policy of hiring janitors and refuse collectors from Española, and recruiting young men, to be trained in skilled or semi-skilled professions from out of state." Ideologically, Los Alamos residents are thought to be "generally ultra-right wing, and adamantly opposed to state and federal handouts, except (accept?) those supporting Los Alamos."[41] C. L. Hunter, who was born in Española, remembered the tensions from earliest contacts between the two communities. He and his friend Richard Cook "watched with great concern when the outsiders started moving in the area, and it became quite a rift between the local pop and the outsiders. These guys came from out of town, and they had the money, the good-paying jobs and were attracted to local girls, and fights started." Tension developed between "the *nativos*" and these outsiders. "I don't think it ever ended," Hunter said "there is still the rivalry. Now there're gangs. The Los Alamos school had the same problems when they came down. They were the rich kids, the affluent society versus the meager lower income society of the north."[42]

Stereotyping is not confined to the centers of each community. It can also be found in the workplace since the type of occupations that employees have at the Laboratory can be crossed-checked with their being from the Valley or from the Hill. According to researcher in Native American studies Annie G. Ross, the "significant disparity in pay enforces the aura of superiority of the scientist-technicians over the other workers. Most often, the split reflects a racial and ethnic divide."[43] Within the Lab hierarchy, a great difference is also made between staff members (SM), i.e., scientists with degrees who work on the developmental phase of projects, and technicians (TEC) who do "hands on" work under the supervision of staff or supervisory technicians. In her anthropology thesis, Mary Meyer studies these two groups at LANL and, more specifically, their opinion of each other; she writes,

> SMs, particularly Ph.D.s, theoreticians, and physicists, are negatively stereotyped by others as being arrogant, 'prima donnas,' impractical dreamers, 'spacey' characters, and workaholics who are unreasonable in their demands and lacking in social skills or personal hygiene. By contrast, TECs are negatively stereotyped by some SMs as being 'clannish,' unmotivated, slow in their work and primarily interested in working their

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[41] Cordova, *The 3 1/2 Cultures of Española*, 49-52.
[42] C. L. Hunter, Interview by Steve Fox, Española, 9 August 1994, "Impact Los Alamos Project."
[43] Ross, "One Mother Earth, One Doctor Water," 130.

> hours, receiving a good salary, being promoted, socializing on the job, and using all their allotted sick leave regardless of illness.[44]

Therefore, the schism between the Hill and its surroundings gathers many variables including education, ethnicity, work opportunities, wealth, and culture, but it is also based on sixty-year-long practices of mutual prejudice and stereotyping. Danny Martinez referred to the legacy of the wartime era to account for the inequality issue in northern New Mexico; he said,

> "When Los Alamos first began, hundreds of educated gringos were imported into northern New Mexico and the people from the valley were brought in as janitors and stuff. It set up a big social difference that still exists today. […] Even a secretary at Los Alamos earns more than a carpenter that has a physical job to do. It is incredible the economic segregation which exists in Chimayó. Farmers who earn $3,000 a year compared to people who make $60,000. You have to feel sorry because you know that this is where you came from: you were in their shoes a few years ago."[45]

In recent years, the gap has not been reduced. Rather, economic inequalities seem to be growing. According to median household income data from the Census Bureau's Small Area Income and Poverty Estimates from 2011, Los Alamos County, home to the $2.2-billion-budget Lab, placed third richest county in the nation with a median household income of $110,000. That same year, with a 21.5% poverty rate, New Mexico was the second poorest state in the country.[46] Even though more locals have been able to better themselves and attain higher levels of professional achievement at LANL, they, in turn, are cut off from the realities of the valley. They are on the island which is visible on the following map, a speck of white in a pool of darker colors:

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[44] Mary A. Meyer, "Jobs, Work-Related Values, and Attitudes of Staff and Technicians at a National Laboratory," Doctoral Thesis, University of New Mexico, Department of Anthropology, 1984, 16.
[45] Danny Martinez, Interview by Carlos Vásquez, LANL, NM, 8 November 1991, "Impact Los Alamos Project."
[46] Tom Van Riper, "America's Richest Counties: Where They Make The Most," *Forbes.com*, New York, NY: Forbes.com LLC, 25 April 2013, http://www.forbes.com/sites/tomvanriper/2013/04/25/americas-richest-counties/, accessed January 31, 2014. And Bishaw, et al., *Poverty*, 3.

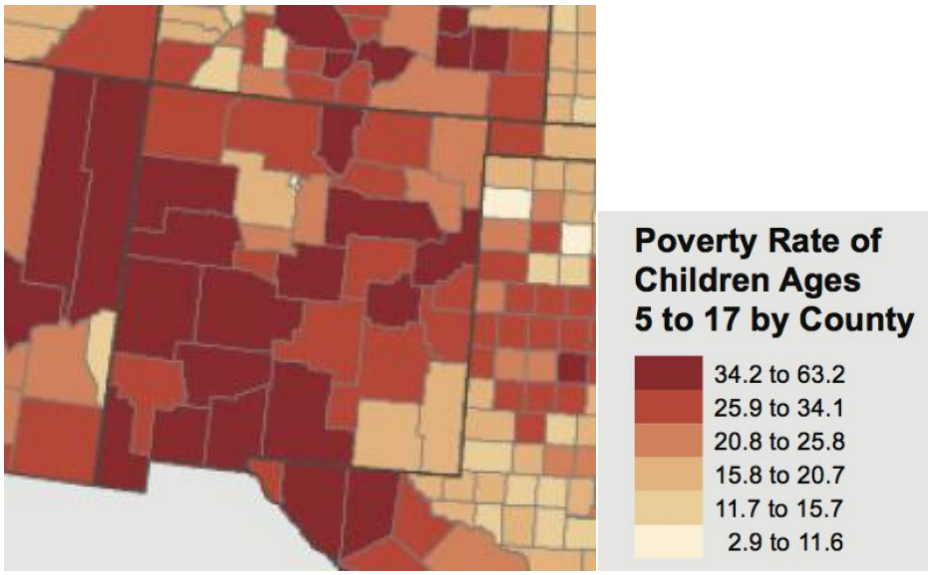

Fig. 46: Poverty Rates of School-Age Population by County, 2013. Source: "Poverty Rates of School-Age Population by County, 2013," U.S. Census Bureau Press Release CB14-229, "Census Bureau Estimates Show How School-Age Child Poverty in Every County Compares with Prerecession Levels," Washington, DC: United States Department of Commerce, Economics and Statistics Administration, United States Census Bureau, 17 December 2014, http://www.census.gov/newsroom/press-releases/2014/cb14-229.html, accessed March 16, 2015.

c. Dependence and discrimination

A striking fact about New Mexico is that the so-called minority populations are in fact the statistical majority in the state since they (Hispanics and Native Americans) have historically accounted for about 60% of the state's population.[47] They are nonetheless referred to as minorities because they are minorities on a national demographic scale, and factors such as the prevailing low income, educational attainment, and fewer employment opportunities, which are also due to nation-wide definitions, define them as such. In other words, they are power minorities. In his thesis on the structural causes of poverty in New Mexico, Nikolaos A. Stergioulas designates the following factors for poverty: the percentage of ethnic groups in the population; the educational level of the population; positive trends between unemployment and poverty; an imbalance of supply and demand on the labor market (that is, an excess of unskilled and semi-skilled labor); New Mexico's geographical situation, and its small market size. "However, since New Mexico's economy is lagging behind the national economy, higher rates of poverty and unemployment will always be part of the State's problem," he concludes.[48] According to data from the 1990 Census, three-quarters of the poor were racial or ethnic minorities and 90% were native U.S. citizens, so, although one could say

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[47] See Rodolfo O. De la Garza, Z, Anthony Kruszewski, and Tomás A. Arciniega, *Chicanos and Native Americans: The Territorial Minorities*, Englewood Cliffs, NJ: Prentice-Hall, 1973.
[48] Nikolas Athanassios Stergioulas, "An Analysis of the Structural Causes of Poverty in New Mexico," Master's Thesis, University of New Mexico, 1979, v-vi.

that immigration from Central and Latin America would be the cause of poverty in the state—and they indeed had the lowest median income,—the foreign poor represented no more than 10% of the state's poor population. Native Americans constituted the poorest racial group, with a 1989 poverty rate of 47%. The rate for Hispanics was 27.7% and 10.4% for the White non-Hispanic population. Hispanics and Native Americans represent some of the most educationally disadvantaged groups in the nation, and their being a majority in the state has had significance in the evolution of poverty.[49] The fact that Stergioulas and other historians or economists have made the connection between poverty and racial minorities raises the question of equality of opportunity but also of discrimination.

Discrimination is a fundamental element in the establishment of a colonial labor system; because the development of the nuclear industry has been demonstrated in this thesis as an example of internal colonialism, discrimination and dependence maintaining the larger part of the local populations in inferior positions are at the heart of the mechanism. The definition of a colonial labor system according to Chicano writer Mario Barrerra[50] is when "the labor force is segmented along ethnic and/or racial lines, and one or more of the segments is systematically maintained in a subordinate position." Furthermore, a subordinate position means "to be disadvantaged with regard to the labor market or labor process in comparison with another group of workers"—in this case local-born New Mexicans and other U.S. states immigrants. Barrerra identifies five aspects in a colonial labor system: labor repression, the dual wage system, occupational stratification, minorities as a reserve labor force, and the buffer role.[51] In the twentieth century, most of these aspects were diminished or eliminated, but others continue to be observable in regions and industries subjected to a form of economic colonialism. Occupational stratification at the Laboratories, in the uranium mines, and in the other workplaces of the nuclear chain in New Mexico has been maintained throughout the twentieth century. Even though disparities have been exposed more often in recent years, it is still a reality if one refers to statistics and to the accounts of workers who say that three fourths of the support staff is from the valley at LANL. The use of minorities as a reserve labor force was one of the basics of the work organization during the Manhattan Project and

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[49] Adelamar et al., "Poverty in New Mexico,*"* 36.
[50] See Part 2, Chapter 1, The Nash Thesis.
[51] Barrera, *Race and Class in the Southwest,* 38; 43. A dual wage system means paying minorities and non-minorities different wages. Occupational stratification refers to the "practice of classifying certain kinds of jobs as suited for minorities and others as suited for non-minorities." A reserve labor pool is used to give elasticity to the labor force and to control workers by letting them know that they can easily be replaced and their role as "buffers" or "shock absorbers" is useful in difficult economic time because they can be fired at a disproportionate rate.

has left its imprint on modern organization within the industry. Finally, Lab workers have described in their own words the "buffer" role they felt they were assigned by saying how they sometimes felt dispensable. Thus, while the number of identifiable aspects pertaining to a form of colonial labor is limited, the situation of many workers in New Mexico's nuclear industry can nonetheless still be described as part of an internal colonial system in which minorities are at a disadvantage.[52] As a telling example of segregation between work groups, Carlos Vásquez, director of the Oral History Project "Impact Los Alamos," reported that "Hispanics and Native Americans often told of not being allowed to eat in the same lunchrooms with whites and being referred to as 'aborigines.'"[53]

For the first decades, the lack of Hispanics or Native Americans in scientific positions was regarded as "as a function of educational level rather than systematic disorder."[54] At the same time, the increasing reliance on wage work that eventually integrated local communities into the cash economy built up harsh competition among job seekers; as already mentioned, in many cases, New Mexican workers and graduates of local tertiary institutions were unable to compete with outsiders. Anglos just out of school became employed as staff members on the spot, while valley workers had to wait for years for those jobs. Such occurrences did not mean that only Anglos could get jobs. Rather, as interviews of Lab employees suggest, a glass ceiling came to exist, which prevented local non-Anglo residents from easily obtaining high-level positions. Loyda Martinez, who started working at the Lab at eighteen as a secretary through the vocational school and became an activist years later, had announced that she wanted to get involved in politics in Washington, so she could come back to "help her people." She explained that, "when you reach a peak at the Lab as a minority, you hit this *glass ceiling* and many people are disillusioned. I have got the ambition, the motivation, the drive and the education, but I never got the fairness and the opportunity that my white

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[52] Moreover, according to Peter Hales, even if no proof such as specific records can be found of a discriminatory system within the MED in the wartime period, reports of meetings, and memories point toward a policy based on six directives: hire colored workers reluctantly, use such workers only for low-skilled, low-paid jobs, "observe the local status quo as long as that status quo militates against integration and improved conditions for colored workers," espouse separate but equal, remain vigilant to limit contact between whites and colored, and prevent the creation of a community. These rules primarily applied to African American workers at the Hanford and Oak Ridge sites but in New Mexico, "colored workers" were those who the District called "Indians" and "Mexicans"—these terms comprised everyone from Navajo and Pueblo traditionalists to Castilian Spanish-Americans. Some of these workers had been farmers, laborers, and sheepherders holding U.S. Forest Service grazing permits to the mesa. With the Manhattan Project, they were back on the mesa as servants. The linguistic stratification of the community helped race separation as the residents and employers had no knowledge of Spanish or Native American languages and the workers often had little mastery of English. Hales, *Atomic Spaces*, 193; 203, 207-8.

[53] Vásquez, "Impact Los Alamos," *New Mexico Historical Review*, 7-8.

[54] Rothman, *On Rims and Ridges*, 277.

counterparts have. We need more minority role models to be a drive for younger generations. Because of socio-economic barriers, we don't get the opportunities."[55] Such instances of preferential treatment reveal forms of ethnic, geographical, and educational discrimination, which have been witnessed by multiple generations of nuclear industry workers.

Paul Fresquez of Española had heard about racial discrimination involving stories of minorities being kept down from upper staff positions such as group or division leader; he said, "they were always not qualified enough or something to that effect, when they had been working there quite a long time." On the other hand, however, he acknowledged how much his community owes to the presence of Los Alamos, saying, "economically, I would say that if Los Alamos was ever to shut down we would have a ghost town in Española. It is the heart of the northern community**.** Without it, people around here wouldn't be as well-off as they are."[56] One member of the San Ildefonso tribal council talked about the same dilemma in 1979, saying that his people were "concerned about radioactive pollution from Los Alamos, but can do little because they are economically dependent on the Lab."[57] In the same line of thought, a former member of the Santa Fe City Council summed up the current conundrum in the following terms:

> You downgrade Los Alamos because of its agenda, but Los Alamos has provided a terrific base for the people of northern New Mexico. Yes, we didn't go to Harvard and a lot of people didn't graduate high school, at Española High, but they make a heck of good living at Los Alamos. They have beautiful homes in Chimayó, everywhere, built on what they have made at Los Alamos. That's not to say there is not pollution, and that they don't need to tighten up what is going on up there but to condemn the whole thing... they need our support to clean up and keep it clean.[58]

Pueblo member Kaa Fedeh related that his father thought they were lucky to have the Lab, that it was a blessing for the economic difference it made in worker's lives, the potential opportunities, and promised education. Conversely, his son freshly graduated from college affirmed he would never work at the Lab. Their diverging opinions illustrate the great disparity between Lab supporters and resisters, those who work at the Lab and those who will

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[55] Loyda Martinez, Interview by Peter Malmgren, Chimayó, NM, 3 December 1995, "Impact Los Alamos Project." Italics added by Lucie Genay.
[56] Paul Fresquez, Interview by Kenneth Salazar, 6 March 1995, Impact Los Alamos Project."
[57] "LASL Aide Admits Waste Report 'Misleading'," in Niklaus, et al., *How Safe is New Mexico's Atomic City?*, 41.
[58] Interview in Masco, *The Nuclear Borderlands,* 192-193.

not. Some tribe members believe the promises of the Lab never materialized as the Native American and the Spanish of the area are still "at the bottom of the work ladder."[59] Ruben Montoya shared some of the bitterness he felt because of salary and discrimination issues. He figures among the interviewees who reported hearing one of his superiors call him and his colleagues "aborigines." On October 25, 1973, he wrote a letter to Senator Joseph Montoya in which he wrote,

> I have been a victim of discrimination. Mr. H., section leader was responsible for most of the harassment. If someone went to that section, they would see that Anglos always got better jobs and raises than Hispanic surname persons, no matter how qualified they were. You wouldn't find any Anglo laborer or janitor or any other menial jobs: this kind of work was left to us, so-called Mexicans. In December 1971, I hurt my back at work and missed a few days. I was called in the group leader's office, and they told me I should look for another job. In the same group, another guy was injured on the job, he got all kinds of breaks, but his name was Anglo. At the present I am on ordinary disability retirement. My wife and I are trying to make ends meet with an arts and crafts store, but it isn't working out. Please don't let this happen to anyone else on the Hill. I do not wish to return to Los Alamos.[60]

Montoya's testimony suggests that, although education and skill are repeatedly cited as the solution upward on the social ladder—and out of poverty as argued in reports dissecting its mechanisms, discriminatory practices at the Lab, inherited from its beginnings and produced by its specific culture of excellence, need to be taken into account. Likewise, the victimization parameter of the people who were put in inferior positions should not be overlooked. Yet, no matter the degree of exaggeration or bias in these workers' discourses, socio-economic figures support their testimonies in portraying Los Alamos as an island of privileges.

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[59] Ross, "One Mother Earth, One Doctor Water," 126.
[60] Ruben Montoya, Interview by Carlos Vásquez, Santa Fe, NM, 9 August 1994, "Impact Los Alamos Project." Montoya was hired in 1946 to do layout, then worked in the Ceramics Department where they made crucibles, and in fabrication to build large cylinders.

3. Cultural consequences

a. Traditionalists versus modernists

As New Mexicans sought to better themselves through more profitable jobs in the nuclear economy and traditional occupations declined, substantial cultural changes occurred.[61] In the Hispanic communities, the gradual disappearance of former lifestyles close to the land caused the loss of ancestral know-how, which has been criticized by traditionalists. Tijerinas's movement in the 1960s and 1970s had already heightened the cultural significance of the land. At the end of the twentieth century, the same concerns for cultural preservation existed. Juan E. Arellano expresses his regrets at these cultural losses when he writes, "*El que pierde su tierra pierde su memoria*,[62] and no amount of money or technological advances will help us recover that loss. For some, Los Alamos has been seen as the Promised Land. For others, it has become an enigma, a virus destroying all the data on the hard disk with no way of retrieving it or saying it." Arellano defines *la querencia*, which is the title of his essay, as "that which gives us a sense of place, anchors us to the land, and makes us a unique people." Traditions of subsistence gardening have been fading; so has the knowledge of how to care for the land and water from the *acequias*. In his view, the relation of people with their land and its resources is the heart of the Hispanic culture. Therefore, to preserve this culture, New Mexicans need "a strong rural economy." This point of view may be considered as wishful thinking in the present day, considering the plight of rural farming-dependent counties such as De Baca, Harding, and Union.[63] He blames Los Alamos for destroying the rural economy and the original diversity in northern New Mexico to create in its place an "economy based on a fantasy." Because few locals manage to "get past a certain wage level," he also emphatically designates the situation in the Rio Arriba Bioregion a colonial economy. Meanwhile, he remarks, the new protectors of the land are anti-nuclear environmentalists who do not share this agricultural past.[64]

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[61] Valerie Kuletz underlines the importance of understanding nuclearism not only as having an impact on the land itself or on the physical bodies but also on "the cultural foundations of non-Euro American societies with traditions of commitment to, and identification with, particular regions, lands, and places considered by them to be sacred." Kultez, *The Tainted Desert*, 51.

[62] Translation: He that loses his land loses his memory.

[63] See Anil Rupasingha and J. Michael Patrick, "Rural New Mexico Economic Conditions and Trends," CR-651, Las Cruces, NM: New Mexico State University, College of Agricultural, Consumer and Environmental Sciences, Cooperative Extension Service, April 2012, 2, http://aces.nmsu.edu/pubs/_circulars/CR-651.pdf, accessed April 19, 2015.

[64] Arellano, "La Querencia," *New Mexico Historical Review*, 32; 35. *Querencia* means attachment, fondness in Spanish. On bioregionalism, also see Kristina Fisher Gray, "Reclaiming Querencia: The Quest for Culturally Appropriate, Environmentally Sustainable Economic Development in Northern New Mexico," *Natural*

Economically, the viability of a strong rural economy in New Mexico is more than uncertain because of the many changes that the sector has undergone since the mechanization and industrialization of farming and livestock raising activities. Culturally, however, the loss of former ways is relevant because it has entailed an identity crisis symbolized by the split between traditionalists and modernists. The testimony of Paul Montoya, reported in the *Albuquerque Journal North* in 2003, illustrates to what lengths his life was altered by the arrival of the Lab and how he felt about letting go of his family's land-based lifestyle. Montoya was seven in 1942 when U.S. marshals asked his family to pack their things and leave their ranch on the Pajarito Plateau. He said, "It was a blessing to get out of the work—no more hauling, no more chasing cattle […] We thought of it as a blessing until we realized there was no more going back." Montoya and his brother later got jobs at LANL. He considered himself lucky for he had a good job that compensated for the fact that losing the land "always lived in his mind." When he retired in 1993, after 31 years at LANL, however, he was diagnosed with beryllium sensitivity, a condition that weakened his immune system attributable to his work as a fabrication technician handling nuclear materials. His grandson, Gilbert Montoya recalled how "Every once in a while, he [his grandfather] used to cry just like a baby, and I would say 'What are you crying for?' 'Oh, my ranch,' he said. That sort of emotion and connection to the land left its mark."[65] The cultural connection to the land was one of the unifying factors between the three cultures of New Mexico, whereas, now, the new society is divided into smaller groups created by diverging views on the most controversial issues at stake; e.g., the reopening of uranium mines, the environment, working for the Laboratories, and federal and local politics of the nuclear complex.

Language is also a key cultural component mentioned by several interviewees. Leroy Martinez, a mechanical engineer at LANL, regretted that the tradition of speaking Spanish is fading and would have liked for his children and him to be fluent in Spanish. Upon seeing the many people coming from all over the country at the Lab, he would think, "it seems like they don't have any roots, they don't have any traditions. They don't know where their parents and

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Resources Journal, Albuquerque, NM: New Mexico School of Law, Vol. 48, No. 2, Spring 2008, 479-531. Gray writes, "Over the past 25 years, a new model of community economic development has emerged in the Hispanic villages of northern New Mexico. Its goal is to replace the region's impoverished colonial economy with a bioregional one: a diversified, resilient economy that is both culturally appropriate and environmentally sustainable." (479)

[65] Adam Rankin, "Heirs Say Lab Must Pay For Its Land Grab, Attorney Says Homesteaders Are United Behind Lawsuit," *Albuquerque Journal North*, Albuquerque, NM, 5 May 2003, 5, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Los Alamos National Laboratories—Pajarito Plateau Hom 1.

grandparents came from. I can pin point everything in the network of families that we have here." He feels he might be losing his family and tradition, if he were to live closer to Los Alamos, but his family is also the reason why he works there because the job, somewhat paradoxically, is what enables him to stay close to his roots.[66]

In the Pueblos, the arrival of nuclear jobs accelerated the breakdown of traditional Pueblo insularity. To get a sense of the proportion of northern pueblo members employed at LASL, figure 47 presents statistics for the year 1969, date of a study by Anne Marie Smith with the New Mexico State Planning Office on difficulties for Native Americans in New Mexico.

Pueblo	Estimated Workforce	Employed at Los Alamos
San Ildefonso	83	14 (16.8%)
Santa Clara	183	53 (28.9%)
Tesuque	56	8 (14.2%)
San Juan	259	48 (18.5%)
Nambe	--	3

Fig. 47: Number of Pueblo members employed at Los Alamos in 1969. Source: Anne Marie Smith and New Mexico State Planning Office, *New Mexico Indians: Economic, Educational, and Social Problems,* Santa Fe: Museum of New Mexico Press, 1969.

Historically seen as an asset for tourism and as a reservoir of cheap labor, these communities have suffered from the mix between traditional ways and the intrusion of "modernity" into their organizations. The desire to find work close to the reservations and come back to the community after brief periods of employment has long been pointed out as the main difficulty for young Native Americans to succeed by American standards. Those who stick to a job are usually the best educated youths, and their tribes are hence deprived of the leadership they could have provided. In her study, Smith wrote,

> Many Indians feel 'split down the middle', with one foot in Indian culture and one in the modern world. This was vividly expressed by one talented Pueblo Indian who, in the course of an interview, took a piece of paper and quickly sketched a man. One half of the man was Indian, with feathers in his hair, arm bands, moccasins, dance kilt, and in his hand evergreen boughs, and flanked by a typical *horno* (outdor beehive-shaped

[66] Leroy Martinez, Interview by Carlos Vásquez, Chimayó, NM, 3 November 1991, "Impact Los Alamos Project." Lucille Sanchez also commented on the use of Spanish. When she was in school in Chimayó, speaking Spanish was discouraged; it was also discouraged when she worked at Los Alamos. She worried about having an accent when she first went to the Hill because of discrimination, but now, she insisted she was proud of her heritage and of her language. She believes the younger generations have changed and are more connected and proud of their culture and language. One difference she noted about the "outsiders" who live in Los Alamos, is that they do not seem to be as close to their families as the valley people are. Lucille Sanchez, Interview by Carlos Vásquez, 27 October 1991, "Impact Los Alamos Project."

> oven), clouds dropping rain, corn growing up. The other half of the man showed a Stetson hat, cigar in the corner of the mouth, shirt and necktie, trousers, and at his side an automobile, refrigerator, money bags, and in his hand a book.[67]

Hispanics and Indians are sometimes considered as "bicultural" groups because they combine the culture of their origins and the dominant American culture. This biculturalism is not necessarily portrayed as richness. "Cultural resistance" has thus been determined as a factor for poverty.[68] Smith thus divides pueblos, for instance, into three categories reflecting their degree of openness: "conservative, transitional or advanced." She also recognizes the problems of overgrazing and soil exhaustion of the land base as a factor for poverty because it had become "grossly inadequate to support the population in the traditional grazing-farming economy."[69] Historians and anthropologists have observed that, like Hispanic communities, land is the basis of the indigenous economy and is considered by Native American as their most precious possession, but since the mid-twentieth century, two difficulties regarding land have appeared in some communities. First, erosion due to overuse and overgrazing of the land is a problem. On the other hand, as Charles H. Lange had already observed in the late 1950s at Cochiti pueblo, "owing to a declining interest in agriculture among the young men, there has been for some years considerable unused acreage under the Cochiti ditches."[70] The enduring exodus from the pueblos has had many effects on the pueblo structure, reducing leverage against the culturally deviant, decreasing the number of people available for community labor, displacing community responsibility to wage-earners, increasing envy for modern conveniences, and shifting from subsistence, all-purpose agriculture to selected crops and arts and crafts.[71]

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[67] Anne Marie Smith and New Mexico State Planning Office, *New Mexico Indians: Economic, Educational, and Social Problems*, Santa Fe: Museum of New Mexico Press, 1969, 22-23.
[68] Stergioulas, "An Analysis of the Structural Causes of Poverty in New Mexico," 35.
[69] Smith, *New Mexico Indians*, 89; 54.
[70] Lange explains, "There has also been some hesitancy on the part of those who do farm to ask for additional acreage in view of the continued threat of water shortage. Others feel that farming is more difficult and tedious than other forms of labor and that the water shortage, though a factor, is not the dominant one contributing to the decline of farming." Lange, *Cochiti*, 45.
[71] "Working conditions and employer-employee relationships are outside the control of pueblo officials, thereby eliminating many forms of economic sanction formerly levied against those who deviated from the main cultural stream. Community-labor projects and tribal offices must be borne by fewer individuals […]. If families seriously need financial aid, the absentee wage-earners are most likely to help. Pueblo community responsibility is thereby displaced by competitive considerations. Pueblo residents visiting the city homes of these absentees become envious of various conveniences and want the same, or comparable, improvements in their pueblo homes. The power of money is emphasized repeatedly in many situations, causing increased exodus from the village to wage-paying opportunities. Those who remain in the pueblo have reacted by a tendency to shift from subsistence, all-purpose agriculture to fewer and selected crops which can provide cash income. In some cases,

b. Positive changes and disruptions

In Native American and Hispanic communities alike, job opportunities have divided traditionalists and progressives. The dilemma is often between economic and cultural survival. The gradual intrusion of modern life into traditional village life brought many changes among which many positive changes that were welcome by villagers. Pueblo governments used the income from the new jobs and the increased arts and crafts sales to improve their communities by installing electricity or indoor plumbing, and buying farm equipment.[72] Yet, the accelerated intrusion of the cash and wage economies into the indigenous world brought disruptions including the transformations of gender roles and alcohol and drug problems. Traditionally, men worked in the fields, and women raised the children and made pottery. After 1943, men transferred their agricultural skills to whatever assignment they could get on the Hill, and, in the early years, when many Pueblo women were hired as maids for the project, their working and shopping on the mesa altered the cultural patterns in the villages. They left their children in the care of grandmothers, while they went to work for Anglo families and look after the children of scientists. The increasing demand for housekeepers made women more valuable than men, and they sometimes earned a better salary. The direct consequences were that fields were left uncultivated, and men were stripped of their traditional roles as providers. Thus, the pueblo economy shifted more definitely from subsistence, using a barter system, to cash, and became notably more dependent on the outside world for its survival. Cultural arts and crafts were also affected. Pottery that used to be fabricated to symbolize personal sentiments was increasingly mass-produced to satisfy the consumption of new visitors. San Ildefonso was known for its complex decorative rugs, but rug-makers preferred the security and steadiness of work at Los Alamos.[73]

Furthermore, in terms of cultural impacts, the presence of the Lab was problematic because the pueblos no longer had access to areas beyond the fences where they formerly gathered wood, water, or greens for their dances, and had sacred places. In her description of the scientific revolution that happened on the Pajarito Plateau, Peggy Pond Church mentions one sight that symbolizes the oxymoronic cohabitation of the sacred and the dangerous; she

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agricultural pursuits have been completely forsaken in favor of commercial arts and crafts and for wage-earning." Lange, *Cochiti,* 190.

[72] Some historians such as Chris Dietz have argued that these revenues have enabled these communities to preserve their traditional lifestyles and Ferenc Szasz mentioned George Lopez, a wood-carver from the Hispanic community of Cordova, who supported his family in part by working at Los Alamos and was able to revive this historic Hispanic craft on his spare time..Szasz, *Larger Than Life,* 79.

[73] Fisher, *Los Alamos Experience*, 89.

writes, "On the one side of the road is a tightly woven metal fence bearing in enormous red letters the warning DANGER! PELIGROSO! On the other, a 'sacred area' has been set aside where the Indians of San Ildefonso still tend traditional shrines and place prayer plumes when their hearts are right."[74] One Tewa resident of the valley explained to Joseph Masco how the pueblos lost some of their land to the Manhattan Project including areas they used for ceremonial purposes. He mentioned the archeological excavations that were carried out at the MESON physics facility and at Area G, saying, "all of these acts are acts of desecration and none of the laws work to protect our interests. It's always the anthropologists, archeologists, and engineers who have the legal advantage."[75] All New Mexican tribes—the pueblos but also the Acoma, Zuni, Hopi, Navajo, Mescalaro Apache, and Jicarilla Apache—regard the Jemez Range as a significant cultural site, a place to collect spring water, medicinal plants, minerals, and clay. To compel non-natives to understand their point of view, Native American spokesmen have compared the desecration of their cultural and spiritual landmarks by corporate or military development to building a factory and dumping waste on the Vatican. Governor Walter Dasheno of Santa Clara Pueblo expressed his indignation: "when Los Alamos National Laboratories, for example, proposes to set off explosions on sacred ground, or to dump high level nuclear waste in sacred areas, the affront to our culture and religion is complete. We should not be required to specify in measurable terms why a sacred area is sacred." Geronima Cruz Montoya of Ohkay Owingeh (also known as San Juan) described the pain of desecration as "having inflicted deeper wounds on the Indian people than some of the worst political injustices. For the disappearance of such sanctuaries has left a vacuum which nothing the white man has to offer will fill."[76]

Gregory Cajete of Santa Clara and Darryl Martinez of San Ildefonso both observed that most of the people they knew were associated in one way or another to someone working at Los Alamos or working themselves at Los Alamos. Cajete's mother and Martinez's grandmother were housekeepers for the scientists there. So their communities did benefit from the influx of money but Cajete also expressed his unease as to the reason why they were chosen to be the neighbors of a nuclear weapons laboratory; he said, "But also I think [the Lab was built here] because of the fact that it was being put in a place where if something did

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[74] Church, *The House at Otowi Bridge*, 2.
[75] Interview in Masco, *The Nuclear Borderlands*, 106. The Clinton P. Anderson MESON Physics facility is now known as the Los Alamos Neutron Science Center, it was built between 1968 and 1972.
[76] Interview in Masco, *The Nuclear Borderlands*, 110-111. In March 1996, the Los Alamos Study Group and the Eight Northern Pueblo Council filed suit to halt LANL dump's expansion onto sacred Pueblo lands.

indeed go wrong it wouldn't affect too many people. And the people it would affect, in a sense, in that time and that place, were considered, I think, in some ways of thinking, almost expendable."[77]

c. The effects of a sterile, patronizing culture

In 1989, Chris Dietz' analysis of the impact of LANL on northern New Mexico was partially based on responses from Lab employees and their opinion of their employer. Four of his case studies are particularly relevant to this section as they concern employees from local communities. Two of these cases were Pueblo members. The first one was a young LANL technician who was proud of his job and of encountering other Native Americans working at LANL, knowing they too had had to work hard to be there. However, he talked about "a window at his lab overlook[ing] a mesa top which held a defunct reactor next to some old Indian ruins. It was a 'strange' juxtaposition. He felt as though his land had been 'invaded,' and he was concerned about the 'ecology' of the area." When he drove up to the Hill, he would drive into "the white world" that "is out of control," and when he drove back down, he would return to "his world," his "land," and his "place" of "traditions." Although he was aware of LANL's history and mission, he "avoided thinking about it." He had no idea how to resolve the issue of the region's reliance on a defense-related institution but felt no one else had. The description of a dichotomy between the "white world" and the Pueblo world of traditions is a reminder of the drawing showing an Indian "split in the middle" with symbols of two separated cultures; it also mirrors the discourse of Hispanic interviewees who separated the work they did on the Hill from the traditional world of the valley.

The second Pueblo member had worked at Los Alamos for the first nine years of the Lab's existence. He commented on the difficulty to adapt to such rapid change and on the fact that their voices remained unheard no matter how serious the health consequences were: "Over the years; some people in the Pueblo have found it hard to follow, the changes coming so quick. But it is what it is. Jobs, money. Some don't like it. But you have to cope. I knew several men who worked up there who got sick. Contaminated. They became sterile. After World War II, they tried to sue the government, but no luck. No one would listen to them."

Case study number three was a New Mexico Hispanic living in Los Alamos since the late 1940s. He mentioned how he enjoyed and felt proud of his son coming to work with him

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[77] Gregory Cajete of Santa Clara at the LANL 2000 conference in Masco, *The Nuclear Borderlands*, 132-133 and Darryl Martinez, Interview by Lucie Genay, Governor's office of San Ildefonso Pueblo, NM, 17 September 2013.

until "he got older, and started thinking about what I did, what Los Alamos was all about, he stopped coming with me. Never went to work with me again. That hurt. Los Alamos is an awful place to live. I don't know why we've lived up here so long. It's expensive. And they treat you like second class citizens." These comments show evidence of the contradictory feelings that some Hispanic workers have experienced because of their being torn between two different worlds: one they are attached to but that can no longer provide sustenance and the other that they have come to hate despite its advantages.

Finally, the last case study was a woman of Hispanic ancestry who grew up in Los Alamos. She recalled the first time she went down the Hill to the valley and became aware of her cultural losses; she said, "I couldn't believe it. I saw cows. A horse. And poor people. […] In Los Alamos there was no culture, no Hispanic culture. I had no sense of roots … or a home. […] I didn't even know my mother spoke Spanish until my dad died and she moved away from Los Alamos." The culture shock made her see Los Alamos is a different light; she stated, "Los Alamos is a very materialist place. I had 48 outfits. […] Most parents worked at the Lab. If your parents worked for Zia, you were nothing. Dirt." When she started spending her summers in Española, the people from Los Alamos "couldn't believe" she would "hang out with them [people from the valley]."[78] In her case, the difficulty was not to adapt to a new culture or to rapid change but to recover part of her cultural identity that had been lost after her family's assimilation into the Lab's culture.

What these four people's testimonies demonstrate is how they had to partly let go of their cultural identity to enter the sterile environment on the Hill and how, in turn, this environment modified their relation to culture. The inter-generation tensions show through the comments on adaptability and work ethics, and so does the patronizing attitude toward "second class citizens," which is a denunciation of discriminatory practices as well as the expression of consistently being the dominant group's victims. For Gilberto Benito Cordova and his high school students from the Española valley, one of the striking features of the Anglo culture that were worth caricaturing was the Anglos' condescension. The patronizing Anglo attitude is depicted in the little booklet as more overtly displayed toward the Native American than the Hispano. Using exaggeration, the authors depict "some transients, who sincerely believe that without them, Tewa tradition will die. They see it as their sacred responsibility to preserve on film as much aborigine culture as possible." Many tourists

[78] The four case studies are from Dietz, "The Impact of Los Alamos National Laboratory on Northern New Mexico," 88-94.

believe themselves to be experts on Native American culture, as Cordova noted, "some Anglos believe that they know more about the Native American than the Tewa himself. Archeologists and West Texas tourists have been observed lecturing Tewas on the meaning of being Native American." Nevertheless, the one thing that Tewas and Hispanos have in common according to the authors is that they "have been unwilling to consent to cultural suicide, their suicide, so that Española can progress towards Americanization; even sadder is that in a desperate effort to purge themselves from their feelings of inferiority, they have patterned themselves after some of the worst that America has to offer."[79]

Today, several cultures of secrecy cohabit in Northern New Mexico and in the rest of the state where the providers of nuclear jobs are juxtaposed to traditional communities. Each culture uses secrecy in an attempt to protect itself from the attacks of the other while they continue to permeate each other nonetheless.[80] Though they are more diluted in the larger cities, these cultural tensions are a state-wide phenomenon. They are the cultural dilemmas that New Mexicans are confronted with when they seek to enter the dominant culture that is presented in American society as the most legitimate way of life and point of view. According to Patricia Limerick, these are part of the legacy of the conquest. She argues that "The contest for property and profit has been accompanied by a contest for cultural dominance. […] In a variety of matters, but especially in the unsettled questions of Indian assimilation and the disputes over bilingualism and immigration in the still semi-Hispanic Southwest, this contest for cultural dominance remains a primary unresolved issue of conquest."[81] The contemporaneity of these issues will be at the core of this part's last chapter which is devoted to the most recent controversies and challenges that New Mexico and its nuclear industry is still facing.

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[79] Cordova, *The 3 1/2 Cultures of Española,* 53; 59.
[80] Joseph Masco argues that several cultures of secrecy developed in the Pajarito Plateau region after 1942; he writes, "as physicists worked to unlock the power of the atom in laboratories and test sites, Pueblo leaders sought to manage the ecological balance in their universe through the ritual maintenance of a complex system of shrines and sacred sites." Masco, *The Nuclear Borderlands,* 102.
[81] Limerick, *The Legacy of Conquest,* 27.

CHAPTER 3: POST-COLD WAR CONTROVERSIES

Since the end of the Cold War, controversies concerning the pillars of New Mexico's defense-oriented industry have multiplied. Be it the Laboratories, WSMR, WIPP, uranium, land issues, or cleanup operations, these debates have repeatedly opposed locals to outsiders and revealed future challenges. Likewise, New Mexico's issues are completely integrated in the global debate on nuclear energy as some look to the past for reasons to oppose its continued development, and others look to the future and see in the nuclear fuel cycle a solution to palliate anticipated energy shortages. This last chapter addresses some of the most recent contentions in order to illustrate how the legacies of the Manhattan Project affect both New Mexicans' present and future. The Project's legacy cannot be deemed all poisonous and toxic, despite the invisible, noxious particles, the piles of dangerous wastes, the aging weapons of mass destruction, and the worrying cancer rates. One should not exclude improvements in education, healthcare, technology, public services, and economic dynamism. However, the point of the Devil's bargain is to evaluate its long-term price rather than its short-term rewards. One important observation is how events since the end of the twentieth century have set off the division between proponents and opponents of the industry who all seek to put forward the interests of their communities.

1. Land controversies

a. The White Sands Ranchers' protest

One long-standing and unresolved issue at the core of the region's historic roots, land, again became the center of attention in the last decades of the twentieth century and into the twenty-first century. Despite the many changes undergone by the state, land has remained an immutable matter of contention and protest to defend local identities. The resilience of New Mexicans regarding land issues showed from the end of the 1960s and Tijerina's movement onward. The rise of activism in the region during that period also coincided with the duplication of the impacts of the Manhattan Project on the environment, on people's health, on the economy, on local society, and on culture.

The first unresolved land issue, which resulted in a decade-long lawsuit, was the plight of the White Sands ranchers. In the 1970s and 1980s, some of the 150 or so expropriated ranching families put up a long fight against the Federal Government and the Army. When the government had taken their land and grazing rights, some had had to liquidate their livestock because they were unable to relocate and were never reimbursed for their losses, but others

had kept their leases, which were subsequently assumed by the government. These ranchers were subleasing the government but continued paying property taxes. When the range expanded eastward in 1955, some of those who had relocated, such as Pat Withers, had to give up part of their new properties again. One rancher, however, John Prather, took a stand against the expansion, and the Army never gained control over his land until his death in 1965. The condemnation lawsuit at the Albuquerque U.S. District Court resulted in a ninety-day eviction notice but Prather responded with a public statement "I'm going to die at home." Military officers offered him $200,000 for his property and warned him that missiles would be launched over his house, but Prather said he did not feel it would be dangerous for him to go on living on his ranch. He continued to send the check back, refusing to cash it. The White Sand authorities rejected his symbolic offer to lease his ranch for $1 and sent two U.S. Marshals to physically carry Prather off the ranch. When he refused to leave, they were told to leave him alone to avoid bad publicity.

Other ranchers (about 25) came to help Prather by bringing food supplies and transforming the main house into "headquarters." The old rancher was portrayed in the media holding a gun, in a state of siege, but he was not a violent man according to Irving Porter, a protégé of the family. Porter depicted how, one day, the Army showed up with tanks, armored vehicles, cannons, and machine guns to run off "one old man" and said that Prather had made them look foolish. They withdrew on orders from Washington. In the end, the Army granted Prather 15 acres of land around the house after going back to court and obtaining a writ exempting the area from confiscation. The rest of his property was incorporated into the military reservation. The Army sent out a group of representatives to attend Prather's funeral while seizing the remainder of his house and adding it up to the military range.[1] John Prather became a symbol of resistance in the local and national media and inspired other New Mexico landowners a few years later.

After years of court battles from the beginning of the taking in 1942, the government announced in the 1970s that the ranches would not be returned, despite the signed agreements stipulating that all personal property would be restored, and ranchers would be compensated for their losses. Condemnation proceedings were initiated at that time, and the ranchers were

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[1] Irving Porter, Interview by Donna M. Wojcik, The Porter residence, Piñon, NM, 9 October 2009, "Farm and Ranch Folks Project."
Marc Simons, "The Last Stand of John Prather," *Prime Time,* Albuquerque, NM: Prime Time Publishing Company, April 2007, 4, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, White Sands, NM—Monument, Missile Range, Ranchers' Protest.

told they would be paid only for the land they actually held in deed, even though the patriotic sacrifice that these families had made during the War was almost wholly based on the notion that it was temporary.[2] Ernest Aguayo was one of the ranchers involved in the Court of Claims lawsuit of 1969, along with many others organized in the White Sands Ranchers' Association who had sent witnesses to testify. This lawsuit and the association set precedent for the Hispanic Homesteaders's legal battle in the 1990s. Aguayo recalled that, while some of the ranchers were happy with the outcome, most of the others felt cheated and sought additional compensation through this lawsuit. New Mexico Republican Congressman Joe Skeen, who testified on behalf of legislation to rightly compensate the ranchers, told the House Judiciary Subcommittee on Administrative Law and Governmental Relations that "It is ironic that a nation which can establish a Marshall plan to rebuild Europe after World War II has failed to adequately compensate its own citizens." He was accompanied by two ranchers, Alyce Cox and G. B. Oliver, who also testified. The former put forward the fact many of these families had members in the service and denounced the way they had been treated during the War. She said, "there was no reason for the ranchers to be treated in the rude and dictatorial manner by these employees of the government." The latter claimed the ranchers had been "held hostage by one kind of lease or another for over 40 years."[3] The lawsuit resulted in the White Sands Fair Compensation Act of 1989 sponsored by Senator Pete Domenici for which money ($17.5 million) was set aside for additional compensation to the ranchers, but the government reneged and said that they would need to use the compensation funds for defense costs.[4]

By 1980, WSMR had conducted over 60,000 weapons tests on the reservation.[5] Nearly every missile in the U.S. arsenal has been tested there. In parallel, it became the heart of the U.S. space program. In 1982, Dave MacDonald, 81 years old, and his niece Mary became nationally famous for their armed occupation of their family ranch within the boundaries of WSMR to show their refusal to let go of what was left of their property. They put up barbed

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[2] Congress passed several acts to acquire the land: the Military Construction and Reserve Forces Facilities Authorization Acts and the Military Construction Act in 1973, and the Military Construction Appropriation Act in 1980.

[3] "Skeen, Ranchers Testify On Compensation Bill," News from Congressman Joe Skeen, Press Release, Washington, DC, 13 June 1990, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, White Sands Missile Range 1.

[4] Ernest Aguayo, Interview by Beth Morgan, Las Cruces, NM, 14, 19, 25, 26 June and 11 July 2001, "Farm and Ranch Folks Project."

[5] Ryan H. Edgington, *Range Wars: The Environmental Contest for White Sands Missile Range,* Lincoln, NE: University of Nebraska Press, 2014, 1.

wire on the road and held up signs reading "road closed to U.S. Army" or "deeded land no trespassing." McDonald said at the time, "It looks like they just want to age me out" because many other aging ranchers had simply sold out at whatever price the military set for their land[6] and grazing rights, which amounted, in McDonald's case, to $30,000, whereas a rancher-real estate man had appraised his lease holdings at $1,600,100.[7] That same year, in 1982, agricultural economists at New Mexico State University set out to find the income and the value the ranches would have, if the government had not condemned them. They figured that the cumulated net income plus interest from a 1000-head ranch operated in WSMR between 1942 and 1982 inflated to 1982 dollars was about $10 million—based on historical budgets, land sales, and capitalization rates. This was the income that a rancher would have made in the 42 years after the Army took their land. The forgone net income for McDonald's ranch after subtracting the government's lease payment was $4.9 million.[8]

At the fortieth anniversary of the Trinity blast, Dave MacDonald and 17 other displaced ranchers and their family members gathered outside the Tularosa gate to WSMR to remind the visitors who were heading toward the Trinity site that they were still seeking compensation for their ranches. They were asking for $50 million. Mary McDonald declared, "The government lied, cheated, and stole from those people who gave up their land."[9] Lawyers were hired to represent the ranchers in the Court of Claims, but nothing happened. R. Norman Cramer Jr., Mountain States attorney representing the ranchers, based his argument on the precedent set in the 1950s when ranchers on the McGregor Range near New Mexico's southern border were paid for the value of their ranches as a whole unit including private land, state and federal leases.[10] Personal pleas to Congressmen Domenici and Skeen did not help

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[6] By that time, the army had acquired about 70% of the private lands through arrangements or through condemnation. Edgington, *Range Wars*, 156.

[7] Bob Groves, "The Atomic House that Schmidt Built," Impact, *Albuquerque Journal Magazine*, 14July 1987, Center for Southwest Research, University Libraries, University of New Mexico Vertical Files, White Sands, NM – Monument, missile range, ranchers' protest.

[8] At the request of Howard McDonald, who challenged government compensation, "Drs. John Fowler and James Gray prepared a staff report containing data and information on cattle prices and valuations of ranches on WSMR." Using historical budgets prepared by the University economists since the 1930s and a 1979 survey on the market value of different size ranches, the economists found that "net returns for the 1000-head ranch in 1982 dollars ranged from a loss in three year to a gain of $172,476 in 1979," and, after adjustments were made, the number added up to ten million. New Mexico State University, "Values Figured For Ranches On White Sands Missile Range," 8 February 1983, 28; 29, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, White Sands Missile Range 1.

[9] Bill Diven, "Angry Ranchers Take Up Vigil at White Sands," *Albuquerque Journal*, Albuquerque, NM, 17 July 1985, 2, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, White Sands, NM—Monument, Missile Range, Ranchers' Protest.

[10] Denise Tessier, "Land Commissioner Draws Ranchers' Fire By Stalling White Sands Compensation Case," *Albuquerque Journal*, Albuquerque, NM, 14 July 1985, C-1, Albuquerque, NM: Center for Southwest Research,

and the fight simply died out when the ranchers' children no longer had the motivation or knowledge to pursue it. Many ranchers could not afford to pursue it. Dave McDonald paid out considerable legal fees, but meetings with lawmakers and lawsuits were unsuccessful. In the end, the family received $60,000 for the land. The McDonald Ranch is now part of the Trinity tourist tour.[11] It became a historical landmark and was restored for $256,000 before being opened to visitors who can walk in to see an exhibit on the last preparations of the "Gadget" leading to July 16, 1645.[12]

Fig. 48: The McDonald Ranch, Trinity Site. Source: Personal picture by Lucie Genay, October 2008.

Despite the fences, the risks of living next to the largest overland military reserve in the country include exposure to radioactive fallout, stray missiles falling in people's backyards, and loud explosion noises. This problem was denounced by Mary McDonald who almost got killed by her mare gone crazy as a plane flew over their heads. The Air Force paid $7,500 for the lost animal but did not pay anything for her jaw surgery ($49,000).[13] To some of the range's neighbors, however, the Army was a good neighbor. In the 1990s, ranchers Kathy and Oliver Lee, for instance, worked closely with the Army under a special agreement, allowing

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University Libraries, University of New Mexico, Vertical Files, White Sands, NM—Monument, Missile Range, Ranchers' Protest.

[11] David McDonald, Interview by Jane O'Cain and Beth Morgan, The McDonald residence, NM, 4 June 1997, "Farm and Ranch Folks Project."

[12] Isabel Foreman, "Ranch House Part of U.S. Atomic History," *Albuquerque Journal*, Albuquerque, NM, 9 September 1984, D-1, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, White Sands, NM—Monument, Missile Range, Ranchers' Protest.

[13] Bartimus, *Trinity's Children*, 7.

missile firings on their ranch about 30 miles (48 kilometers) north of the range's northern boundary. The Army paid them a flat fee of $10,000 and $2,500 for each test. Some ranchers criticized these practices as a form of extension of the range's activities onto private lands. The practice also included additional issues in terms of security; a tactical missile fired from Fort Bliss toward the Lees's ranch went awry because it suffered a computer software error and landed 25 miles (40 kilometers) short of its target on another private ranch.[14] As exemplified by these examples, both peaceful and conflictual relations between the Tularosa Basin ranchers and their imposing military neighbor were often solved by money transaction, underscoring the fact that, while the Army sought to take advantage of the ranchers, the latter also sought to derive some benefits from the situation.

Environmental historian Ryan Edgington has explored the convoluted fifty-year struggle between the military, ranchers, environmentalists, and state and federal environmental agencies to define and gain control of the White Sands military reserve. However, his vision of military sites contrasts with previous definitions of the military West as a "tainted desert," the "Ugly West," or as "reduced to irredeemable wastelands cratered by weapons testing." He argues that these sites have acquired a new dimension as conservation landscapes and wildlife preserves; he writes, "By removing domestic livestock, eliminating the barbed wire fences that demarcated private property prior to World War II, and keeping poachers away from wild game, White Sands has transformed a rural landscape once dominated by small ranches and an extensive cattle business into an unexpected haven for wildlife."[15] Interestingly, Enerst Aguayo recalled that in 1994-1995, during a visit to his former ranch, he saw wild horses and wild cattle. He added that oryx, an African import, roamed the range.[16] This and Edington's thesis prove that military presence and the loss of private properties have not necessarily meant the end of life in the Tularosa Basin. Yet, the struggle over land is representative of the cyclic nature of tensions in the region. These

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[14] Richard Pipes, "White Sands Reaches Out to Ranch Lands," Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, White Sands, NM— Monument, Missile Range, Ranchers' Protest.

[15] Ryan Edgington adds that "neither the Department of Defense nor the Department of Energy (and its predecessor the Atomic Energy Commission) entered into protecting wild game of their own accord. Environmentalists and the Fish and Wildlife Service have used the National Environmental Policy Act (1969) and the Endangered Species Act (1973) to compel the military to play a greater role in conserving the lands that it occupies." Edgington, *Range Wars*, 1-2.

[16] Ernest Aguayo, Interview by Beth Morgan, Las Cruces, NM, 14, 19, 25, 26 June and 11 July 2001, "Farm and Ranch Folks Project."

tensions congregate around the notion of land ownership, reflecting the region's legacy of successive conquests, be it by succeeding waves of conquerors or by nature.

More recently, protest has also grown from families and descendants of families who lived in the Tularosa Basin at the time of the blast. In 2005, residents founded the Tularosa Basin Downwinders Consortium to draw attention to the high number of cancers and thyroid diseases in the communities that were affected by fallout from the Trinity test. They blame the government for never having "undertaken an epidemiological study of what happened subsequent to the test" and of having been "negligent in its responsibility to the people of the Tularosa basin and New Mexico." The association reports cases of miscarriage, effects on eyesight, internal ingestion of contaminated food, milk, and water, and many different kinds of cancers. According to Tina Cordova, co-founder of the Tularosa Basin Downwinders, she, her family, and the other members of her village "were unknowing, unwilling, uncompensated participants in the world's largest scientific experiment with devastating consequence."[17] Aside from their call for compensation, these protesters' goal is to be acknowledged in the history of America's rise to nuclear supremacy, much like the evicted Hispanic homesteaders of the Pajarito Plateau.

b. The Pajarito Plateau Homesteaders' legal battle

As already mentioned, the land controversy in the state was first stirred up by Tijerina who launched the fight for the return of land grants to their original Hispanic owners in the 1960s. He did not spare LASL in his attacks, as, in the wake of his 1967 famous raid on the Rio Arriba County Courthouse, he attempted to make a citizen arrest on Norris Bradbury in 1969—then Laboratory Director—for trespassing on the Ramon Vigil land grant on which part of the Laboratory sits.[18] Almost thirty years later, the fight over land in northern New

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[17] Tina Cordova, "Statement of January 28, 2010," *Tularosa Basin Downwinders Consortium*, Santa Fe, NM: Southwest Research and Information Center, http://www.sric.org/voices/2010/v11n2/TBDC.pdf, accessed April 9, 2015.

[18] "Tijerina's Citizen's Arrest Attempt Unsuccessful," *Santa Fe New Mexican*, June 8, 1969. Some of the Alianza members never stopped fighting, and, at the end of the 1990s, when Hispanics mobilized again to call for fair compensation for the land they had given up to the government, these members seized the opportunity to speak up again in newspapers. But the Guadalupe-Hidalgo Treaty Land Claims Act, while having passed the House in September 1998, never passed the Senate. President Bill Clinton issued a statement of administration policy to explain why his administration opposed the bill; he explains, "In summary, this bill would renew land title disputes that already have been resolved by an international agreement or operation of law, in many cases over 50 years ago. It would create a process that provides no legal standards or rules of evidence, no means for final resolution of these reopened claims, and no judicial review. In addition, this bill could disrupt Federal land managers' abilities to carry out their duties, including protection of natural resources and of existing uses and rights on Federal land including grazing, hunting, fishing, and mineral and water rights." William J. Clinton, "Statement of Administration Policy: H.R. 2538—Guadalupe-Hidalgo Treaty Land Claims Act (10 September

Mexico was taken up by the descendents of the Hispanic homesteaders who lived on the Pajarito Plateau before the winter of 1942-1943. Again, like in White Sands, the families of the original landowners entered a long legal battle. The two fights shared many characteristics—the only major difference might have been timing. One similarity was that three territorial periods and three different systems had succeeded each other in Los Alamos before the land was handed over to the government: the indigenous, the Spanish, the Mexican, and the American systems. The result of this superimposition was the multiplication of claims to the land by representatives of the three ethnic groups, each claiming to be holding more legitimate rights to the land.

San Ildefonso Pueblo had pursued a claim on the plateau since the 1960s on the grounds of an oral history at the Pueblo that "documents a gift of land in late 1942 from the Pueblo to the Manhattan Project to help in the war effort, land that Pueblo officials believed would be returned after the war."[19] In 1995, Senator Pete Domenici, an Albuquerque Republican supported by Jeff Bingaman, a Silver City Democrat, proposed legislation for a transfer of excess land from LANL to Los Alamos County and San Ildefonso Pueblo. They argued that it would help the development of the city of Los Alamos and that the tribe had never been compensated for their loss in 1942. Two years later, the DOE made the same proposition, and Congress approved legislation to turn over 4,600 acres of LANL land. This proposition prompted the reactions of the Rio Arriba, Santa Fe, and Española city councils who "called on the DOE to return the land to its original owners or their heirs." After requesting an investigation by the Army Corps of Engineers, "the Army determined that the homesteaders had no legal basis for more compensation, ruling that the original condemnation had been proper."[20]

The Hispanic heirs organized in the Pajarito Plateau Homesteaders Association and braced themselves for a court fight behind their leader, Joe Gutierrez, the association's executive director and a long-time employee of LANL. In 2000, Gutierrez used the Cerro

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1998)," *The American Presidency Project*, Gerhard Peters and John T. Woolley, 1999-2015, http://www.presidency.ucsb.edu/ws/?pid=74392, accessed December 10, 2014.

[19] Masco, *The Nuclear Borderlands*, 147.

[20] Kathleene Parker, "Hispanic Claims Ignored In Los Alamos Deal," Opinion, *The Santa Fe New Mexican*, Santa Fe, NM, 11 January 2003, A-5, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Los Alamos National Laboratories—Pajarito Plateau Hom 1.

Jim Yardley, "Hispanic Heirs Seek Reparations For N.M. Lab Land," *The Albuquerque Tribune*, Albuquerque, NM, January 2000, A-5, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Los Alamos, NM—Impact of Manhattan Project on Area Communities, Homesteaders on Pajarito Plateau, 1942.

Grande Fire disaster as an opportunity to make a parallel between the displaced victims of the fire and the homesteaders; he said that, contrary to the former, the latter "didn't have the benefit of media coverage or community donations, nor were there any politicians tripping over themselves to help."[21] The lawsuit lasted until 2004 when Congress approved $10 million for a Pajarito Plateau Homesteaders Compensation Fund to be divided among over 300 descendents. Some believed the sum was not enough; others had hoped to get the properties back, but most were tired of waiting—only one homesteader who had experienced the buyout, Emelina Grant, in her nineties, was still alive,—so they approved the deal. Juan Antonio Martinez said the news "took a toll" on his grandfather who had lost 300 acres, a sawmill, and tools. After 1943, he had worked temporarily as a janitor at Los Alamos. On the other hand, he explained he was glad "for the closure of it" and that his mother "could use the money." Joe E. Gonzales, 86 at the time, said he "missed this place even now" and that he lived in Pojoaque "while 'rich people' live in expensive houses on his family's lost acreage." He called the government's proceedings "plain discrimination." His plan for the money was to spend it on college tuition for his grandchildren.[22]

As for the decades-old claim by San Ildefonso Pueblo, it was finally settled in the Pueblo de San Ildefonso Claims Settlement Act of 2005. The agreement gave the Pueblo a payment of $7 million from the Federal Government and the opportunity to acquire other property from the Santa Fe National Forest—about 7,600 acres—in exchange for extinguishing certain claims against the government, or, in other words, for letting go of their claims to the Pajarito Plateau.[23] These legal battles between the government or the Labs and resilient New Mexicans often ended in the same way: with a settlement that would quiet the protest and provide some measure of economic relief to the families. However, these legal developments did little to change the relations of the giants of the nuclear industry toward the poorer local populations, but it proved that the latter's resistance was enduring and could attract nation-wide attention to issues that would tarnish the image of the industry.[24] The

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[21] Moutain, "Los Alamos Fire May Bring Heat and Justice to Original Latino Families," *Imagen*, 25.
[22] Heil, "Justice draws near for heirs of land taken by U.S. government," *The New Mexican*.
[23] Congressional Budget Office Cost Estimate, "S.1773 Pueblo de San Ildefonso Claims Settlement Act of 2005," 19 April 2006, http://www.cbo.gov/sites/default/files/s1773.pdf, accessed December 11, 2014. "House OKs San Ildefonso Land Claim Settlement," *Albuquerque Journal*, Albuquerque, NM, 13 September 2006, http://www.abqjournal.com/news/state/apclaim09-13-06.htm, accessed December 11, 2014.
[24] At the end of *Children of the Pajarito Plateau*, Kathryn Cordova reprinted an editorial from editor Ralph Damiani's *Los Alamos Monitor* that reads, "But to take 65 years to pay those whose land was taken is shameful beyond words. And those payments have really not even started—they are still in the works. There are times when our government does not do us proud and this is one of those times. […] While the settlement is too small and too late, at least it is something. We find ourselves agreeing with Chuck Montano, former head of the

homesteaders' fight in the 1990s highlighted how unfairly the benefits of the Cold War and of the Lab's presence in northern New Mexico had been distributed. The perception of Los Alamos either as a blessing or as the epitome of pollution, cancers, and nuclear weapons compelled researchers from the University of New Mexico's Oral History Program to seek "individuals who would be willing to share their remembrances and perspectives in interviews" about LANL.[25] Thus, by casting a new light on the told and retold Los Alamos story, the land controversy evidenced a different angle and provided the opportunity to look at the arrival of science on the Pajarito Plateau from a local point of view.

According to Roxanne Dunbar-Ortiz, "post-World War II issues of land ownership; land use, control of mineral resources, taxation, timber and water; and the controversial production of uranium and atomic energy have stimulated a need for a historical perception of land tenure in the area."[26] She further argues that, in order to understand the land tenure question in New Mexico, one must not focus solely on cultural relationships between the three main groups—Indian, Hispanic, and Anglo—but also on "the relationship of the former agricultural producers to capital." She sees in the land issue the reflection of a "class struggle […] being waged by indigenous peoples and some of the former Mexican citizens of New Mexico" against the "most powerful corporations in the world, often in collusion with elements in federal and state governments," which "extract mineral and other natural resources and the surplus value from cheap labor, reaping fantastic profits and destroying the delicate environment."[27] While the White Sands ranchers' fight was primarily to denounce an attack against private property and demand financial justice for those who had lost their businesses, the Hispanic Homesteaders' plight was underlined with an even more profound legacy of resistance to invasion, expropriation, and loss of livelihood.

While the government long refused to acknowledge the homesteaders' right to fair compensation, the Los Alamos community wanted nonetheless to celebrate this period of the plateau's history in an effort to preserve remnants of the Homestead era. After the Cerro Grande fire, the only remaining physical evidence of that time was the Romero cabin, which

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Hispanic Round Table, who said the settlement is 'long overdue.' To say the least." Kathryn M. Cordova, *Children of the Pajarito Plateau: Manuel Lujan Sr., Lorenzita Lujan and Their Descendants,* Albuquerque, NM: Downtown Printing, 2007, 265.

[25] Juan Esteban Arellano, "Oral Hisory Program Examines Impact of Los Alamos National Lab on *Paisanos,*" winter 1993-1994, Center for Southwest Research, University Libraries, University of New Mexico Vertical Files, Los Alamos, NM –Impact of Manhattan Project on Area Communities, Homesteaders on Pajarito Plateau, 1942.

[26] Dunbar-Ortiz, *Roots of Resistance*, 9.

[27] *Ibid*., 172.

had been moved during construction projects in the mid-1980s. The Los Alamos Historical Society took action to restore the cabin and install it in downtown Los Alamos in 2009. Today, visitors can take a stroll on a “Homestead Tour” around downtown Los Alamos. The juxtaposition of historic landmarks such as Fuller Lodge, the Homestead signs, and modern buildings are the physical representation of the superimposition of ownership and of America’s capacity to accumulate occupation waves on certain areas of its territory, while nostalgically romanticizing past lives and tokens of previous presences.

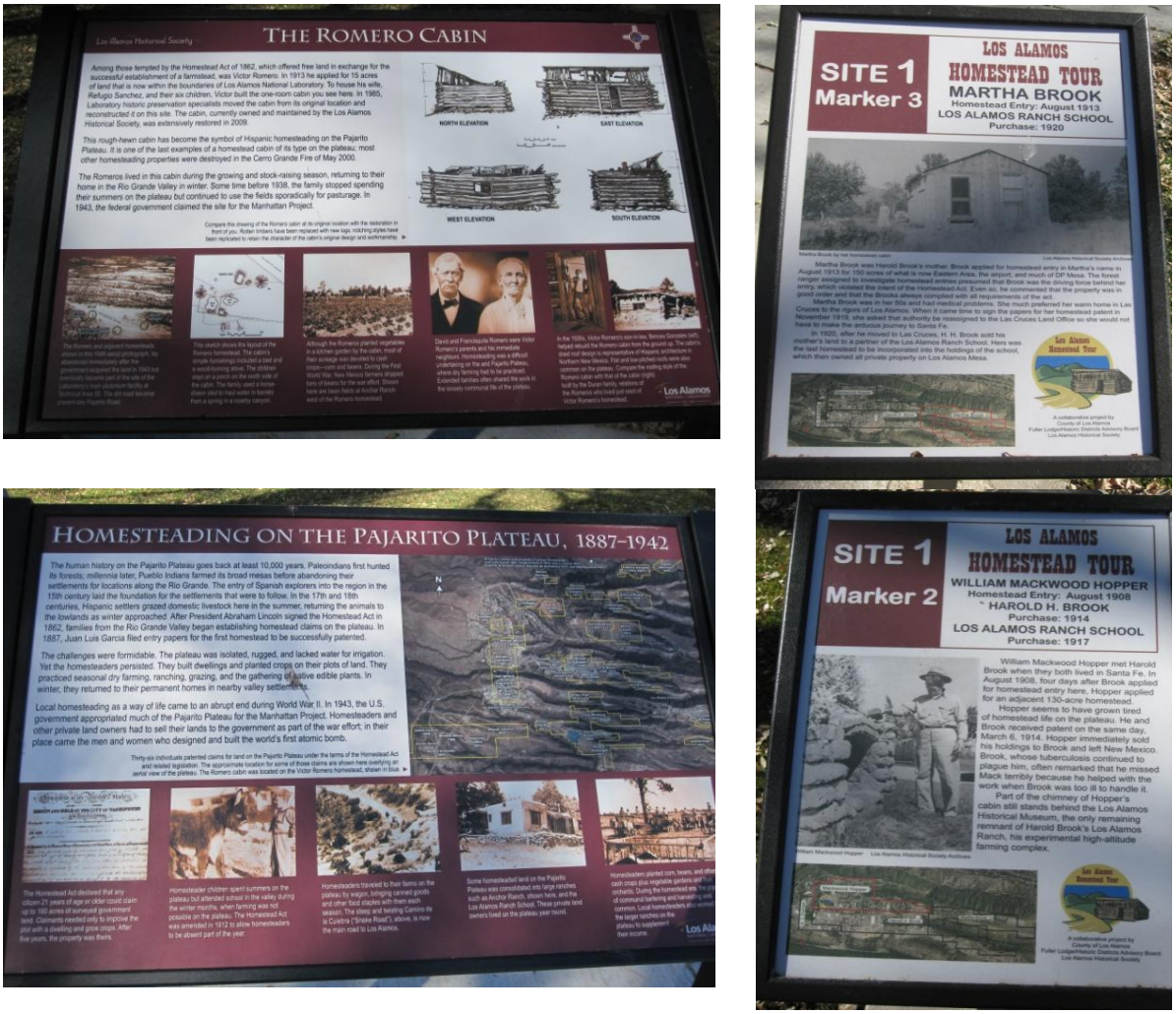

Fig. 49: Los Alamos Homestead Tour. Source: Personal pictures by Lucie Genay, November 2012.

2. The Laboratories: more lawsuits, lay-offs, corruption, and cleanup

a. At the Los Alamos National Laboratories

At the end of the 1990s, the first lawsuits for racial discrimination were filed against LANL.[28] While these lawsuits originated in the call for compensation for lands ceded to the Federal Government, they had the additional effect of revealing some of the poor working conditions. Testimonies surfaced, revealing some of the immediate harmful sides of the Project. According to the class action lawsuit reported in the *Albuquerque Journal North* in 2001, Hispanics removed from their land were allegedly "subjected to slave-like labor conditions, detention under armed guards, and involuntary medical experimentation." The suit was filed in Santa Fe federal court and claimed that the DOD and the DOE "perpetrated slavery, false imprisonment, and illegal confiscation of property between 1942 and 1945." The Pajarito Plateau Homesteaders, Inc. was included in the plaintiffs, and Joe Gutierrez explained how revelations uncovered during the land lawsuit led to the filing on this second lawsuit. Sylvia Molina, an heir of Jose Gomez, claimed he was required to clean areas around the project believed to be contaminated by radiation for a $2-per-day salary. He was regularly examined by doctors, and was forced to drink an unidentified substance every day before leaving work. Ninety-eight-year-old Marcos Gomez, brother of Jose, said "he was forced to swear an oath at gunpoint not to reveal any of the activities he saw while being forced to live in Los Alamos military barracks and dig ditches for the project at a $1 a day." According to Gutierrez, the main purpose of this lawsuit was to "strengthen plaintiffs' claims in the land expropriation case."[29] Other lawsuits, however, focused on the discriminatory aspect.

After the Cold War, disarmament meant that there would be less money for the Labs and that employees would have to be absorbed in other branches or laid off. With each weapon or space program that would stop, either a new program could take in transfers or employees would be let go. The Clinton administration created the Stockpile Stewardship and Management Program, most of which is undertaken by the national laboratories, to ensure the

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[28] A first sex-bias discrimination lawsuit had been brought in the 1980s by Janet E. Wing, 58-year-old physicist and mathematicians employed at the lab for twenty-two years. Yet, in the next two decades, Los Alamos had to face several complaints and make several settlements to alleviate the discrimination problems. Betty Childers, Judicial Affairs Writer, "Los Alamos Losing Ground in Sex-Bias Suit," *Albuquerque Journal*, Albuquerque, NM, 29 April 1984, B-11, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Los Alamos National Laboratories—Employee Relations 1.

[29] Wren Propp, "Suit: Nuke Project Harmed Hispanics, Mistreatment In 1940s Alleged," *Albuquerque Journal North*, Albuquerque, NM, 10 February 2001, 1-2, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Los Alamos National Laboratories—Pajarito Plateau Hom 1.

safety and reliability of the aging stockpile.[30] LANL Director Stephen M. Younger called for continued research, development, and reliance upon nuclear weapons as deterrents and to "maintain and continue the paradigm of nuclear build-up of the Cold War."[31] Still, the Lab made cuts in the workforce, and other discrimination lawsuits were filed when it became clear that the percentage of Hispanic laid-off employees was disproportionate to the total percentage of Hispanic employees at the Lab. In May 1998, the Department of Labor's Office of Federal Contract Compliance Programs (OFCCP) announced it had reached a $625,000 settlement with LANL resulting from an investigation of discrimination against 98 Hispanic workers in a November 1995 layoff at the facility. Federal contracts and subcontractors are required by law "to guarantee equal employment opportunity without regard to race, color, gender, religion, national origin, disability or veteran status and to meet affirmative action obligations," but, in 1995, the OFCCP found that LANL had "failed to follow its own layoff criteria, which resulted in Hispanic employees being terminated at a statistically significant higher rate." The money was used in pay back to the employees who had been terminated during the reduction in force due to the decrease in the Lab's activities, and LANL also reinstated 24 employees to comparable positions.[32]

In the 2000s, two more lawsuits for discrimination against Los Alamos and the University of California were underway: Barber, *et al.* and Garcia, *et al.* v. Regents of the University of California. These cases alleged "that the Regents of the University of California discriminated against female and Hispanic employees in terms of pay, promotion and educational opportunities."[33] The Regents denied any wrongdoing. The cases had begun in December 2003 when Veronique A. Longmire and Laura Barber filed a complaint alleging

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[30] The National Nuclear Security Administration is in charge of maintaining a "safe, secure, and effective nuclear deterrent." The difficulty lies in the fact that the nuclear weapons in the U.S. stockpile were produced 30 to 40 years ago and were not "designed or intended to last indefinitely." The Stockpile Stewardship and Management Program includes "maintaining the active stockpile, Life Extension Programs (LEPs) and Weapons Dismantlement." From U.S. Department of Energy, "Maintaining the Stockpile," *National Nuclear Security Administration*, http://nnsa.energy.gov/aboutus/ourprograms/defenseprograms/aboutdefenseprograms, accessed March 25, 2015.

[31] Ross, "One Mother Earth, One Doctor Water," 41.

[32] "OPA Press Release: Los Alamos Laboratory Reaches $625,000 Settlement to Remedy Discrimination Against Hispanic Workers," Washington, DC: United States Department of Labor, 13 May 1988, http://www.dol.gov/opa/media/press/opa/archive/opa98210,htm, accessed December 17, 2014.

[33] "If you are a Woman or Hispanic and Were Employed at the Los Alamos National Laboratory On or After December 10, 2000, A Proposed Class Action Settlement May Affect Your Rights," *Albuquerque Journal*, Albuquerque, NM, 11 August 2006, A-10, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Los Alamos National Laboratories—Layoffs 1.

violation of the Equal Pay Act[34] and breach of contract in U.S. District Court. In January 2004, a second complaint was filed in Rio Arriba District Court by Yolanda Garcia, Loyda Martinez, Gloria A. Bennett, Yvonne Ebelacker, the Hispanic Roundtable of New Mexico, and University Professional & Technical Employees on the same grounds, along with other claims. In 2004, Pete Nanos, Laboratory Director, announced in a Lab-wide e-mail that 670 employees would receive salary adjustments from $170 to $10,000 a year in their next paychecks, but the four women filing suit were excluded. These adjustments were made "based on an in-house review of LANL pay practices released by Nanos in August 2003, the so-called Welch report. The report showed significant differences in pay for four out of 30 worker groups evaluated." They earned 1.5 to 2.3 % less than their white male counterparts. According to Chuck Montano, Chairman of the Hispano Round Table and Lab employee, the Welch report "downplays the pay gap and includes in its analysis LANL's subjective employee ratings." Out of the four women, two had Master's degrees and one had a Ph.D. Martinez declared legal action "appears to be the only way to get them (LANL) to implement policies and procedures" that are non-discriminatory.[35] The "Barber action" and the "Garcia action" then consolidated.

That same year, in 2003, former director of the Pojoaque Pueblo Gaming Commission, Randy Padilla of Velarde, filed 17 charges against the Lab with the Equal Employment Commission. He had applied for 24 Lab jobs between November and July and had gotten only one interview. He believed he had been discriminated against because he was Hispanic, even though he was as or more qualified than the hired Anglos. "It's beyond me why a local person can't get a job in their own vicinity when they're well qualified," he said. He had a Master's degree in business administration and had worked at the Lab as a college student in 1994 and 1995.[36] These legal actions stemmed from the decades of discriminating practices and racial disparity in job opportunities. There was no trial but the parties in the Barber and Garcia actions reached a settlement agreement including a twelve-million-dollar "settlement

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[34] The Equal Pay Act of 1963 was a measure against gender-based disparity enacted as an amendment to the Fair Labor Standards Act of 1938 on minimum wage, overtime, and child labor. The Act requires for men and women working in jobs with similar skill, effort, responsibility, and working conditions to be paid the same. However, the act also permits differences in wages that are based on other criteria such as seniority, merit, quality, and quantity of production.

[35] Rankin, "Heirs Say Lab Must Pay For Its Land Grab," *Albuquerque Journal North*, 1.

[36] "LANL accused of racial discrimination," 28 August 2004, B-1, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Los Alamos National Laboratories—Layoffs 1.

fund" in 2006.[37] In 2012, another layoff wave began in the form of a "voluntary separation program" to affect 5 to 11% of the workforce at the Lab. Senator Jeff Bingaman "noted that a growing federal debt necessitates belt tightening" and that, "given the amount of federal resources New Mexico receives, austerity is unfortunately going to affect our state." The 2012 Lab budget of $2.2 billion was $300 million lower than that of 2011.[38]

In 2005, financial auditor Chuck Montano sued LANL for retaliation after spending nine months isolated in a basement in Los Alamos, "stripped of all duties after blowing the whistle on what he terms waste, fraud and abuse at the nuclear facility." Montano felt he had a "bull's eye on his back" for the last 16 years of the 32 years he had worked at the Lab because he had organized the first employee group. Members formed in the Citizens for LANL Employee Rights (CLER), successor of the Hispanic Round Table, in 1995, at the time of the reduction in force that had targeted Hispanics disproportionately for termination. He declared that, although he had an MBA from the University of New Mexico and had acquired four professional certifications, he was not able to secure advancement at LANL. The parties settled in 2011.[39] In his "Impact Los Alamos" interview in 1996, Montano commented on his difficulties to access leadership positions, always being "passed over by people with fewer credentials, fewer years of service, Anglos." His words powerfully express the predicament of New Mexicans regarding LANL; he said,

> After ten years at the Lab, I became very frustrated. I saw people coming in with three or four years of service who would move ahead of me. […] They [employees holding leadership positions at the Lab] are being brought in from back East by their relatives or friends already working at the Lab, giving me the message that my degrees from

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[37] "Barber, et al. v. Regents of the University of California, Garcia, et al. v. Regents of the University of California, Class Action Settlement," 5 June 2008, *Federal Contractor Misconduct Database, Pogo.org*, Washington, DC: POGO, http://www.contractormisconduct.org/ass/contractors/54/cases/1019/1391/university-of-california-lanl-equal-pay_summary.pdf, accessed December 17, 2014.

[38] Jackie Jadrnak, "LANL To Cut 400-800 Jobs," *Albuquerque Journal*, Albuquerque, NM, 22 February 2012, 3, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Sandia National Laboratories 1.

[39] "Whistleblower tells his side of the story; LANL: former auditor speaks out a year after settling lawsuit," *The Los Alamos Monitor Online*, Los Alamos, NM: The Los Alamos Monitor, 18 January 2012, http://www.lamonitor.com/content/whistleblower-tells-his-side-story, accessed December 18, 2014.
SNL also had its whistleblower case when Shawn Carpenter filed suit against Sandia for wrongful termination. Carpenter had been let go in 2005 after having revealed a security breach at major U.S. contractors to the F.B.I. The jury awarded him nearly $4.4 million in compensation and punitive damages in 2007.
Also see Amy Goodman and Juan González, "Birthplace of Atomic Bomb, New Mexico Remains Center of Massive U.S. Nuclear Arsenal," *Democracy Now!*, New York, NY: Democracy Now! 11 October 2012, http://www.democracynow.org/2012/10/11/birthplace_of_atomic_bomb_new_mexico, accessed January 02, 2015.

> UNM are not as good as theirs. Every day, you are reminded that because you're a native of the area and you went to New Mexico schools, you're not kind of the same caliber as somebody that went to an out-of-state school. It doesn't mean it has to be an Ivy League: from anywhere, you're better off. […] This is an enclave community of outsiders with one biding overwhelming characteristic: they are not from New Mexico. If you are from within New Mexico, you will always be a visitor here. The people that isolate themselves up there, when they go anywhere else in the state, it is almost like an excursion to a third world country. They identify with each other, with the fact that they are not from New Mexico; up here, they belong. Those of us who are New Mexican and live in Los Alamos, we are the outsiders.[40]

In this speech, Montano summed up the antagonisms that built into the Los Alamos community and that stem from the Lab's policies since its creation. The main evolution in terms of employee rights has not been on the side of LANL, but rather on the side of New Mexican employees who developed a keener awareness of circumstances as minority and local Lab workers. In 2006, as the northern New Mexico Vice President of the Hispano Roundtable of New Mexico, Montano also exposed the inequalities in funding between the Los Alamos and the other school districts. Española Mayor Richard Lucero threatened suit over the Los Alamos school district receiving millions of dollars annually from the DOE, while surrounding school districts received nothing, despite the fact that half or more of the LANL workforce reside outside Los Alamos. This $8 million subsidy enabled Los Alamos to invest nearly twice as much per student as Española, according to the Española School Superintendent. Art Blea, Pojoaque School Superintendent complained that "his best educators were being siphoned away to Los Alamos by the higher salaries." Laboratory officials proclaimed that the Los Alamos Foundation, which had been created to address that concern, "celebrated the distribution of $1.2 million to northern New Mexico schools/students in Taos, Santa Fe, Española, and Los Alamos." However, Montano pointed out that the foundation had an over forty-million endowment balance at the time.[41] This example illustrates how the issue of education and inequalities among schools and institutions of

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[40] Charles Montano, Interview by Carlos Vásquez, 16 April 1996, "Impact Los Alamos Project." Montano identified the Reagan era as the origin of increased discrimination; he said, "This stemmed from the Reagan era, I saw less reluctance on the part of lab managers to be blatant in the way they treated minorities: it was no longer taboo to keep shoving them aside. It became chic to be ultra-conservative."

[41] Chuck Montano, "60 Years and the Rent's Still Owed," Advocacy, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Los Alamos, NM—Impact of Manhattan Project on Area Communities, Homesteaders on Pajarito Plateau, 1942.

tertiary education have been a concern among the New Mexican population who increasingly aspire to higher educational attainment for their children.[42]

Along with the discrimination lawsuits, other claims concerning exposure to radioactive waste and reproducing earlier claims reappeared in the state. One of the firsts of its kind was filed in 2008 by the family of Lowell Ryman, who had died of cancer in 2005 at age 63. The family contended that exposure to radioactive wastes, including plutonium, while playing in Los Alamos-area canyons as a boy in the 1950s led him to develop multiple myeloma as an adult. The complaint also mentioned exposure through food, water, and air. The identified defendants were the University of California and the Zia Company that performed management and maintenance duties until 1986. The lawsuit was brought by Ryman's daughter, Rene, and her lawyer Michael Howell "said the lawsuit could turn into a class action suit if enough people come forward."[43] Instead, the plaintiffs dismissed the suit two years later, in 2010, for financial reasons. Two women who had joined in because they also had played in canyons near the Lab in the 1950s and later developed thyroid cancer also dropped out of the case.[44]

Lastly, the Lab is also under increasing pressure from state regulators to meet their deadlines in term of cleanup. Last spring, in 2014, LANL faced penalties because of its delays cleaning up above-ground and buried hazardous waste sites scattered around the Lab which are threatening groundwater. After having granted extensions since 2011, the Environmental Department stopped agreeing to the Lab's requests on the grounds that they did not have the funding to clean it all up at once.[45] Meanwhile, militant groups are still active in providing the public with alternative sources of information on the Laboratories' impact on health and on the environment in northern New Mexico. The multitude of accusations, legal claims, and attacks against Los Alamos shows that local populations have long been frustrated and have fully embraced new possibilities to assert their rights or expose some of the institution's

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[42] Paul Emilio Fresquez recalled the politics of the school system as he was a senior student body president in Española. He said they were "the laughing stock of the state" and was appalled when he saw the subsidy figures. He knew a lot of federal money was coming into the system through Los Alamos and the Indian Reservations but his school "had to beg for light balls." Paul Emilio Fresquez, Interview by Kenneth Salazar, La Mesilla, NM, 24 April 1995, "Impact Los Alamos Project."

[43] Wong, "Bomb Work Dumping Confirmed."

[44] Mark Oswald, "Costs Force Plaintiff To Drop LANL Lawsuit," *Albuquerque Journal*, Albuquerque, NM, 18 May 2010, http://www.abqjournal.com/news/state/18234661559newsstate05-18-10.htm, accessed December 19, 2014. See the story of Peggy Franklin and Shirley Walkup in Part 4, Chapter 1, The famous Acid Canyon.

[45] Staci Matlock, "LANL faces penalties in cleanup delays," *The Santa Fe New Mexican*, Santa Fe, NM, 27 June 2014, http://www.santafenewmexican.com/special_reports/from_lanl_to_leak/lanl-faces-penalties-in-cleanup-delays/article_fa31eb3c-fd36-5209-97d6-e531dbae436f.html, accessed December 19, 2014.

wrongful doings. This change is largely due to the declassification of documents and to less drastic secrecy measures that had so far concealed such compromising information. However, these legal manifestations or the materialization of long-standing underlying tensions, are also the chance for the state's population to take position on the future of the industry in the state. While some will side with the plaintiffs and seize the opportunity to criticize all they deem wrong about the Labs, others will defend the positive economic impact and potential of the facility for New Mexico's future.

b. At the Sandia National Laboratories

In Sandia, cleanup and employment are also the central controversy. Contrary to LANL, however, SNL profits from a better reputation as one of the state's main employers. New Mexico is still dependent on the corporation, and its leaders, well aware of its footprint on the state, have shown their reliance on its stability. Albuquerque mayor Martin Chavez made it clear in 2002 to the University of Texas that he did not want them taking over SNL and even declared, "We are not anybody's colony […]. We don't want Texas running New Mexico."[46] In 2003, the Hispano Chamber of Commerce gave Sandia its inaugural Aguila Award. Chamber President and CEO Loretta Armenta said, "Sandia National Laboratories has been one of the most stable and reliable economic forces in New Mexico for the past 50 years, but until late 1993 the Labs did not have a relationship with the Albuquerque Hispano Chamber of Commerce."[47] Despite a wave of layoffs in the late 2000s, in 2010, the corporation remained a "bedrock of more than 10,000 high-paying local jobs, an 'essential pipeline' of new jobs for local talent and it continues to pump big bucks into New Mexico's economy to the tune of more than $2 billion a year. […] In addition, Sandia paid $67.5 million in corporate taxes to the state of New Mexico." That year, Sandia hired a little over 700 people and Paul Hommert, President and CEO proclaimed that, while "many of them are new to this great state," many others "are from our community and educated in our schools in New Mexico." According to a 2010 impact report, however, a minority of 203 among the new hires had in fact graduated from a New Mexico university. So, as at LANL, graduates from local institutions still seem to have difficulties to compete with outsiders. According to

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[46] Jim Ludwick and John Fleck, "Chavez to Texas: Hands Off Sandia," *Albuquerque Journal*, Albuquerque, NM, 16 March 2002, A-1, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Sandia National Laboratories 1.

[47] "Hispano chamber honors Sandia, Lockheed and TVC," *Albuquerque Journal*, Business Outlook, Albuquerque, NM, 10 February 2003, 8, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Sandia National Laboratories 1.

Albuquerque Mayor Richard J. Berry, the loss of Sandia would have a devastating impact on the city's economy but not just in dollars and cents because "It's pretty hard to go someplace in the city of Albuquerque without running into someone who is an employee or has some tie with Sandia who is involved doing something outside of their scope of work"—he mentions Little League, scouting, churches, and communities.[48] Thus, Sandia remains a keystone in the state's economy, but anxieties remain centered on the rise and fall of federal spending that have immediate repercussions on the corporation's ability to provide and maintain employment for locals and outsiders alike who, in turn, also contribute to the local economy in many subsidiary ways.

The greatest controversy that Sandia has faced in the recent years concerns cleanup. In the early 2000s, the Mesa del Sol project, a green, sustainable, and water-wise urban community on the south-east corner of Albuquerque raised some issues because it is situated approximately two miles (3 kilometers) from a mixed-waste landfill that was operated as a "classified landfill" from 1959 to 1988 by SNL to dispose of waste in more than 50 unlined pits and trenches. Although SNL officials and the New Mexico Environment Department in charge of monitoring the landfill believed the depository to be safe, Citizen Action, an Albuquerque watchdog group believed otherwise and asked for cleanup. "According to the environment department, the landfill contains approximately 100,000 cubic feet [30,480 cubic meters] of radioactive and hazardous waste estimated to have contained more than 6,300 curies of radioactivity at the time of the disposal" including trichloroethylene, carbon tetrachloride, lead, cadmium, cobalt-60, iodine-129, and cesium-137. The three scientists who were commissioned by Citizen Action to make an independent analysis of the landfill concluded that Sandia's risk assessment was flawed in various ways. For instance, it calculated health risks to adult males using outdated conversion factors that did not consider risks to women, children, and infants.[49] The main problem is that the landfill is located above Albuquerque's sole-source aquifer. In 2005, the Secretary of NMED Ron Curry issued the final order to Sandia allowing SNL to cover the dump with three feet (1 meter) of dirt under

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[48] Michael Hartranft, "Sandia Primes N.M.'S Economic Pump," *Albuquerque Journal*, Business Outlook, Albuquerque, NM, 14 February 2011, 4, Santa Fe, NM: Palace of the Governors, Department of Cultural Affairs, Fray Angélico Chávez History Library Vertical Files, Sandia National Laboratories 1.

[49] Tim Anderson, "Mesa del Hole," *Alibi*, Albuquerque, NM, 28 November—4 December 2002, 28, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Technology—N.M.—Impact on Earth.

the Long-term Environmental Stewardship Program.[50] Since then, Citizen Action has filed a lawsuit against NMED "on the grounds that shallow burial of transuranic waste (also known as TRU waste) is prohibited under federal law."[51]

The conflict over the landfill has not been resolved yet. Citizen Action's latest report in 2011 maintained the site is still a threat. Meanwhile, commercial development of Mesa del Sol, the green community focused on sustainable values, began in 2005. Residential construction began in 2011, and the first model homes opened in 2012. Environmental Lawyer and executive director of Citizen Action in Albuquerque, Dave McCoy has been fighting to draw attention to the poor "cleanup" of 2009 that consisted in installing a three-foot dirt cover over the dump. He claims having evidence that the trickledown effect into the city's water supply has begun. Nickel, Chromium, cadmium, and nitrates have already started entering the groundwater, and their presence has been documented by the very agency, the NMED, that approved the cover solution. Soil vapor studies conducted in 2007 by Sandia show that "cancer-causing volatile organic solvents are moving deeper beneath the Mixed Waste Landfill," that "tritium concentrations are ten times higher, and found at deeper levels, than a decade ago; tritium is a radioactive form of hydrogen that binds well with oxygen to form radioactive fluids." Senator Jerry Ortiz y Pino introduced Memorial 34 to ask Sandia to comply with NMED's Final Order of 2005, "which had approved the dirt cover on the condition that Sandia reevaluate the situation every five years to assess whether excavation had become necessary." Eight years later, Sandia had not performed the assessment but had made and been granted a private request to NMED that this requirement be waived.[52]

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[50] Long-term stewardship "refers to all activities necessary to ensure protection of human health and the environment following completion of remediation, disposal, or stabilization of a site or a portion of a site. Long-term stewardship includes all engineered and institutional controls designed to contain or to prevent exposures to residual contamination and waste, such as surveillance activities, record-keeping activities, inspections, groundwater monitoring, ongoing pump and treat activities, cap repair, maintenance of entombed buildings or facilities, maintenance of other barriers and containment structures, access control, and posting signs." "Long-term Stewardship Resource Center," *Energy.gov*, Washington, DC: United States Department of Energy Office of Environmental Management, http://energy.gov/em/services/communication-engagement/long-term-stewardship-resource-center, accessed January 02, 2015.

[51] "What is the Mixed Waste Landfill," *Citizen Action New Mexico To Clean Up Albuquerque's Nuclear Waste Bump*, Albuquerque, NM: New Mexico Community Foundation, http://www.radfreenm.org/index.php/mwl-overview, accessed October 21, 2014.

[52] Stephanie Hiller, "Cover-up and Collusion at the Sandia National Laboratory Corral," *La Jicarita*, Penasco, NM: Rio Pueblo/Rio Embudo Watershed Protection Coalition, 11 April 2013, https://lajicarita.wordpress.com/2013/04/11/cover-up-and-collusion-at-the-sandia-national-laboratory-corral/, accessed December 19, 2014.

3. Uranium and waste disposal: the ongoing controversies

a. Uranium mining

Similarly to the Mixed Waste Landfill polemic, the abandoned uranium mines and mills in the northwestern part of the state pose a serious environmental problem. Three out of the 15 National Priorities List or superfund sites in New Mexico are former uranium mining or milling sites: Homestake Mining Company in Milan, NM, United Nuclear Corporation in Church Rock, and the Jackpile-Paguate Uranium Mine at Laguna Pueblo. At the Homestake site, a site added to the list in 1983 where the company operated a mill between 1958 and 1981, removal activities started in August 2012. Removal is defined by the EPA as "short-term cleanup intended to stabilize or clean up a site that poses an imminent and substantial threat to human health or the environment. Removals can occur at any stage of the Superfund cleanup process, but are often the first response upon discovery of a hazardous substance at a site."[53] United Nuclear Corporation operated a mill near Church Rock, 17 miles (27 kilometers) north of Gallup between 1977 and 1979 when the Church Rock spill occurred. Up to 500 predominantly Navajo people live within two miles (3 kilometers) of the site and use the land for sheep, cattle, and horse grazing. They now use bottled water for drinking because the well water has a bad taste. Pollutants include acidic mill tailings, sulfate, thorium, radium, aluminum, ammonia, and iron. The site is not ready for reuse yet; it will be turned over to the DOE for long-term care and monitoring after closure.[54]

The population that is primarily concerned by the risks of radioactive tailings is the Indigenous people. In 1985 and 1986, the DOE even involved them by employing about 40 Navajo construction workers to consolidate the Shiprock mill tailings, covering the two piles with about seven feet (2 meters) of impermeable soil sloped so that water would run off, and then covered with about three feet (1 meter) of rock, but the cleanup was ineffective since the groundwater around the tailings remained contaminated. Another example of unsuccessful cleanup is the Jackpile-Paguate Uranium Mine, which was the property of the Anaconda Copper Company and operated from 1953 until 1982. The open-pit mine, which covers 3,000 acres, is located on Laguna Pueblo land. After 1982, it remained untouched for seven years,

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[53] "Superfund Site Progress Profile Homestake Mining, Co.," *United States Environmental Protection Agency*, Washington, DC: United States Environment Protection Agency, http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0600816, accessed March 25, 2015.

[54] "United Nuclear Corporation Mill Site, New Mexico," *United States Environmental Protection Agency*, Washington, DC: United States Environment Protection Agency, http://www.epa.gov/Region6/6sf/newmexico/united_nuclear/index.html, accessed March 25, 2015.

tanks filling up with rainwater, inviting children to swim and animals to drink, leaching toxic byproducts and metals into underground water, until the pueblo itself started reclamations.[55] Surface waters of the Rio Paguate and in the Paguate Reservoir where studies on fish documented that the water contained elevated levels of Isotopic Uranium,[56] which could have an impact on cultural and ceremonial uses of surface waters. In 1986, the Pueblo of Laguna, the Bureau of Land Management, the Bureau of Indian Affairs, and the Anaconda Copper Company entered into an agreement for the site to be cleaned up. In June 1995, the Jackpile Reclamation Project was officially completed. Nevertheless, in September 2007, when a Record of Decision Compliance Assessment for Jackpile-Paguate Uranium Mine was performed to determine if the post-reclamation had met the requirements of the Environmental Impact Statement and Record of Decision, this report concluded that reclamation of the mine was still not complete: the EPA is currently "working to determine whether there are human exposures to contaminants."[57] During the public hearings for the environmental-impact draft statement for the mine's reclamation project, the technical experts explained in complex technical language that the country's largest uranium mine could safely be left unclaimed. All these experts were under contract with Anaconda.[58] Tribal representatives, indigenous activist groups, and grassroots organizations have been fighting for additional and more efficient cleanup procedures on their lands, especially on Laguna and Navajo lands.

On September 24, 1993, on the second day of a meeting of the Southwest Indigenous Uranium Forum—an activist group against uranium mining and milling on native lands— that took place in Laguna Pueblo, in the village of Paguate overlooking the Jackpile mine, Manuel Pino, Acoma Pueblo activist and teacher from Arizona State University, talked about the dangers of economic promises. The mining companies would argue that the miners were trained in a marketable skill, but these skills were worthless once the mines shut down. He warned that "economic incentives did not necessarily improve our way of life," but as land was lost and wages gained to buy the products of modern America, these incentives brought "social problems" including alcohol and drug abuse, spouse and child abuse, higher dropout

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[55] Eichstaedt, *If You Poison Us*, 129; xvi.
[56] "Isotopic" means that the isotopic composition of uranium has been changed artificially to give new properties to the element.
[57] "National Priorities List, NPL Site Narrative for Jackpile-Paguate Uranium Mine," and "Superfund Site Progress Profile Jackpile-Paguate Uranium Mine," *United States Environmental Protection Agency*, Washington, DC: United States Environment Protection Agency, http://www.epa.gov/superfund/sites/npl/nar1865.htm, and http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0607033, accessed October 24, 2014.
[58] Kuletz, *The Tainted Desert*, 29-30.

rates at school and suicide rates at the pueblo.[59] The many impacts of mining are still visible and remembered among these families. Yet, the health issues did not end with the shutdown of the mines because of the waste that was left behind. Dust from the tailings still spreads through the wind or the water, contaminates the soil, plants, and animals, including the tribe's livestock that, in turn, contaminates the people who drink the milk and eat the meat.[60] Children play in the abandoned mines; they are sometimes used by animals and humans for shelter as proved by cans, chips bags, or food wrappers found there. There are few signs to warn of the dangers. The Navajo use earth to build traditional *hogans* (houses made of logs and earth), so there are many buildings that are contaminated with radioactivity this way. Another difficulty is to explain how radioactivity works to Navajos, as it is invisible and inodorous. The results of this exposure are higher cancer rates, kidney diseases, hypertension, and respiratory problems among tribe members. Hundreds of abandoned mines are still not cleaned up, and no solution exists to permanently clean up these sites without leaving the waste there. The tribe is asking for removal of these wastes from their land to a safe repository.

In the first decade of the twenty-first century, a "Nuclear Renaissance" occurred, promoting the use of nuclear energy as the most viable long-term solution to meet the growing demand for energy in the world. One of the functions of the Global Nuclear Energy Partnership (GNEP) in 2006 was to revert the mining and processing of uranium back to the U.S. After forty years of exploitation of its uranium resources, the country had turned to importation of cheaper uranium from overseas and Canada. In order to be more autonomous in terms of energy, the U.S. revived interest in its own uranium deposits in the southwest. New, mostly Canadian, uranium companies have begun lobbying for the reopening of mines and mills in the four-corner region.[61] Thus, the nuclear renaissance could lead to a third uranium boom. Due to the fact that most of the mines are on Navajo land, company representatives have been sent to convince tribe members to lease their land. GNEP faltered with the Obama administration, but the latter nonetheless pledged support for the nuclear

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[59] Eichstaedt, *If You Poison Us*, 163.
[60] See *Dii'go To Baahane, Four Stories About Water*, Dir. Deborah Begel and David Lindblom, Sponsored by Eastern Navajo Diné Against Uranium Mining, Sierra Club Environmental Justice Office, Southwest Research and Information Center, UNM Community Environmental Health Program, and Connecting Higher Education Indigenously, Prod. Deborah Begel, 2012. This documentary film featured in several uranium film festivals.
[61] These corners are the northwestern corner of New Mexico, the northeastern corner of Arizona, the southeastern corner of Utah, and the southwestern corner of Colorado.

industry though the International Framework for Nuclear Energy Cooperation (IFNEC)[62] and the Blue Ribbon Commission for America's Nuclear Future to reflect on nuclear waste management. Five companies currently have projects to reopen mines and mills in New Mexico: Energy Fuels & Strathmore Minerals, Uranium Resources Incorporate, Uranium International Corporation, Cotter Corporation, and Laramide Resources Limited. Strathmore Minerals, which was taken over by Energy Fuels in 2013, had submitted a mining permit application in October 2009 for Roca Honda in the Grants mineral belt. A decision is expected in 2016. The company also has exploration projects in Marquez, Church Rock, and Nose Rock. Uranium Resources Incorporated (URI) sought to buy Rio Algom Mining in 2007 with uranium properties and a licensed mill site at Ambrosia Lake where it planned to build a new mill, but the deal was aborted in 2008. URI subsidiary Hydro Resources Incorporated was licensed in 1994 to mine the Crownpoint and Church Rock In Situ Leach (ISL)[63] sites in New Mexico, and, after years of opposition, the license was validated by the Nuclear Regulatory Commission in 2006 and reactivated in 2011. Cotter Corporation, a General Atomic subsidiary, expected to treat ore from Mount Taylor at the rebuilt Canon City mill by 2014. Laramide Resources Limited has the La Jara Mesa project in the Grants mineral belt.[64]

Eastern Navajo Diné Against Uranium Mining (ENDAUM) started in 1994 in response to Hydro Resources Incorporated's proposed ISL uranium projects that would contaminate the waters of Crownpoint and Churchrock. Leona Morgan, coordinator of ENDAUM, explained the tactics of uranium companies to enter their lands. In eastern Navajo lands, individuals

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[62] IFNEC's agenda is the "global expansion of nuclear power in a safe and secure manner," "reducing the threat of proliferation of nuclear materials and the spread of sensitive nuclear technology for non-peaceful purposes," "the efficiency of the current nuclear fuel cycle," "address cost issues associated with the development and expansion of nuclear power in developing countries," and cooperation between the participants at both enrichment and recycling ends. "International Framework for Nuclear Energy Cooperation," *World Nuclear Association*, London, UK: World Nuclear Association, http://www.world-nuclear.org/info/inf117_international_framework_nuclear_energy_cooperation.html, accessed December 25, 2014.

[63] "In situ leaching (ISL), also known as solution mining, or in situ recovery (ISR) in North America, involves leaving the ore where it is in the ground, and recovering the minerals from it by dissolving them and pumping the pregnant solution to the surface where the minerals can be recovered. Consequently there is little surface disturbance and no tailings or waste rock generated. However, the orebody needs to be permeable to the liquids used, and located so that they do not contaminate groundwater away from the orebody. Uranium ISL uses the native groundwater in the orebody which is fortified with a complexing agent and in most cases an oxidant. It is then pumped through the underground orebody to recover the minerals in it by leaching. Once the pregnant solution is returned to the surface, the uranium is recovered in much the same way as in any other uranium plant (mill)." Definition "In Situ Leach (ISL) Mining of Uranium," *World Nuclear Association*, London, UK: World Nuclear Association, http://www.world-nuclear.org/info/Nuclear-Fuel-Cycle/Mining-of-Uranium/In-Situ-Leach-Mining-of-Uranium/, accessed March 25, 2015.

[64] "U.S. Uranium Mining and Exploration," *World Nuclear Association*, London, UK: World Nuclear Association, http://www.world-nuclear.org/info/Country-Profiles/Countries-T-Z/Appendices/US-Nuclear-Fuel-Cycle-Appendix-1--US-Uranium-Mining-and-Exploration-/, accessed December 25, 2014.

have received land allotments through the Dawes Act,[65] and they are allowed to lease that land. The Uranium companies target these individuals, using a "divide and conquer tactic," promising riches and monetary gains to poor individuals and communities. Their work, however, would only last a few years and would be followed by restoration work. ENDAUM do not believe in restoration work because In Situ Recovery (ISR) has not succeeded in cleaning the water to its original state, according to Crownpoint resident Mitchell Capitan who originally organized ENDAUM and worked as a groundwater technician for the MobilOil pilot-scale ISL uranium mine. He saw, at the time, that MobilOil was not able to clean the polluted water using ISR. There currently are 520 clusters of abandoned mines that include over 1,000 sites where conventional, tailing-producing mining occurred on Navajo land in northwestern New Mexico. Instead of referring to a nuclear fuel *cycle*, ENDAUM refers to a nuclear fuel *chain* because of the lack of solution to treat or recycle the waste. Another organization, the Multi-Cultural Alliance for a Safe Environment (MASE), is calling for Comprehensive Health Studies to evaluate the impact of contaminants in the water, air, soil, and animals on Navajo people.[66] This is how uranium mining represents a junction between impacts of the past and ambitions of the future. Companies touting new, "clean" mining methods are using economic incentives to expand their projects in the region, while the physical remnants of past exploitation are still taking their toll on local residents.

b. The Waste Isolation Pilot Plant

As demonstrated by the issues mentioned above, since the Cold War and the advent of nuclear energy, one major and growing concern has been the treatment of nuclear waste generated by both peaceful and military uses of nuclear energy. The U.S.—among other countries—has produced mountains of highly-dangerous, indestructible, and non-recyclable waste without giving sufficient thought to ways of safely getting rid of it. One only needs to look at the way Manhattan Project scientists disposed of radioactive material substances during the War to measure how low the issue was on the scale of immediate concerns. Waste

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[65] The Dawes General Allotment Act of 1887 provided for the distribution of Indian reservation land to individual tribe members to encourage them to become self-reliant farmers in the white man's image. The Indians who received land became U.S. citizens.

[66] Leona Morgan, "ENDAUM Statement to the New Mexico Indian Affairs Committee," Gallup, NM: Eastern Navajo Diné Against Uranium Mining, 27 October 2011, http://www.nmlegis.gov/lcs/handouts/IAC%20110111%20Statement%20Leona%20Morgan%20ENDAUM.pdf, accessed January 02, 2015.
Amy Goodman and Juan González, "After Decades of Uranium Mining, Navajo Nation Struggles With Devastating Legacy of Contamination," *Democracy Now!*, New York, NY: Democracy Now! 11 October 2012, http://www.democracynow.org/2012/10/11/after_decades_of_uranium_mining_navajo, accessed January 02, 2015.

management long remained furthest on the agenda as national security was rated top priority. With half-lives amounting to tens of thousands of years, the radionuclides contained in these by-products of weapons production now have to be stored so long as no other way is found to treat them. One of the methods for permanent storage (for at least 10,000 years) that was put forward by scientists was geologic repository. The Waste Isolation Pilot Plant (WIPP) project near Carlsbad gave life to the theory. I choose to end this dissertation with this issue for two reasons. First, the project has been dividing New Mexicans for over four decades and thus embodies the political and cultural crisis generated by the presence of nuclearism in the state. The social and political tensions that have centralized on WIPP boil down to the very core of the Devil's bargain; i.e., the pressure of economic anxieties leading populations to enthusiastically welcoming industrial and economic opportunities that involve a high risk level. Second, WIPP is an ongoing event and recent developments have shown that the site duly represents the future challenges of nuclearism. According to Jennifer Richter, in her doctoral thesis "New Mexico's Nuclear Enchantment: Local Politics, National Imperatives, and Radioactive Waste Disposal," WIPP is central in today's debate over the legacy of the Cold War and the future of nuclear energy; she writes,

> While many concerns regarding nuclear practices stemming from past historical experience remain central to these narratives, including mistrust in government science and the motives of the nuclear industry, new concerns about climate change debates and environmental justice discussions are also contributing to how nuclear energy is presently being shaped in national narratives and at local levels like Carlsbad. By examining these narratives more closely, it becomes evident that the nuclear waste issue is central to all of these discussions, *which necessarily puts Carlsbad at the center of this nuclear web*.[67]

Dubbed WIPP in 1976, the nation's repository for defense-related waste from thirty defense facilities in the country,[68] was meant to dispose of transuranic (TRU) waste in ancient underground salt beds[69] 26 miles (42 kilometers) east of the town of Carlsbad, at a depth of

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[67] Richter, "New Mexico's Nuclear Enchantment," 16. Italics added by Lucie Genay.

[68] These facilities include LANL, the Rocky Flats Plant in Colorado, Idaho National Engineering Laboratory, the Hanford Site in Washington, Lawrence Livermore National Laboratory in California, the Nevada Test Site, Argonne National Laboratory in Illinois, Mound Laboratories in Ohio, Oakridge National Laboratory in Tennessee, and the Savannah River Site in South Carolina.

[69] The idea of using salt beds dates back to scientific recommendations from 1954 by the National Academy of Sciences. Scientists found out that salt beds were ideal protective covering. The salt formations in Carlsbad's region were stable and would cover the nuclear waste and keep it from entering the environment. Here are the

2,150 feet (655 meters). TRU are the waste containing over 100 nanocuries of alpha-emitting transuranic isotopes per gram with half-lives greater than twenty years. Most of these are plutonium-contaminated debris, rags, protective clothing, laboratory equipment, tools, soils, residues, and other materials used in the research, development, and fabrication testing of nuclear weapons. Therefore, High-level radioactive waste, waste that the DOE and the EPA have determined does not need such degree of isolation, and waste that the NRC has approved for disposal on a case-by-case basis are excluded from storage at WIPP. Only waste produced since 1970 is shipped to WIPP.

Carlsbad locals played a role in the selection of the site in New Mexico. Kansas was originally under considerations, but several issues including public opposition undermined the project. The *Albuquerque Journal* featured an article on Kansas's opposition to radioactive waste experiments at Project Salt Vault near Lyons in November 1971. The article was read by New Mexico Senator from Carlsbad, Joe Gant. When hearing about those difficulties, residents of Carlsbad became interested in having the repository near their town to generate economic activity. They persuaded state officials to go along and lobbied the Federal Government to look at their region known as "Little Texas." Gant and Walter Gerrells, city mayor at the time, worked together to promote the area. The community had already showed its support to nuclear science in 1961 when it had enthusiastically welcomed the Gnome test in the hope that it would boost the local economy. In the 1970s, the need for a new influx of capital and investment was dire, since one of the pillars of the region's industry, potash extraction, was struggling under the pressure of Canadian imports. These economic concerns provided unwavering, committed allies to the project in local boosters. According to a DOE booklet, the local benefits of WIPP would go beyond the hiring of personnel:

> While the obvious economic impacts are home purchases, groceries and services, WIPP also has a more subtle impact. As WIPP employees settle into neighboring communities, the tax base supporting schools, roads and other public services increases. In addition, the dollars that WIPP has brought to southeastern New Mexico

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advantages of salt: "vast deposits of salt are found in stable geological areas with little earthquake activity," they "demonstrate the absence of circulating ground water," and "salt is relatively easy to mine and it has the ability to heal fractures because of its plastic quality." The idea is that a hundred years after the last barrel is brought down into the cavern, the waste will be encapsulated by the salt. On the surface, signs bearing warnings in English and in symbols will indicate the danger of what is underneath. This solution has won widespread endorsement and was preferred to other solutions such as burying the waste beneath the ocean or shooting them into outer space. United States Department of Energy, "Waste Isolation Pilot Plan," 5; 14, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Energy—NM—Nuclear—WIPP.

have created jobs in such areas as office supplies, printing services, and provisions for visitors who come to tour the project.[70]

The local leaders of the movement in favor of WIPP emphasized the future job opportunities and presented the project as a patriotic duty to convince the rest of the population. According to Chuck McCutcheon in *Nuclear Reactions: The Politics of Opening a Radioactive Waste Disposal Site*, "Carlsbad's local power structure has consistently supported the project since then, offering an interesting twist on the NIMBY[71] syndrome. The plant, which employs around 800 people on-site, has given the city of 27,000 the financial stability its leaders desired: the Energy Department estimated that it contributed $161 million to the local economy in 1998."[72]

The project's biggest challenge was public resistance. After decades of secrets and unilateral decision-making on the part of government officials, and years of frightening revelations on the environmental and health dangers of radioactive materials, convincing the public of the viability of building an underground landfill for radioactive nuclear waste seemed bound to be an ordeal. The rise of public activism against WIPP began in 1977. The controversies that accumulated since are proof of how distrustful New Mexicans have become and how much procedures have evolved since World War II as a result of this scrutiny. Secrecy no longer gave carte blanche to the government to build sites whenever and wherever they were deemed necessary. Furthermore, the increase in the number of actors and parties eager to give their opinions and aggressively push for decisions that would serve their interests made the proceedings much longer and more complex. Over several decades, scientists at SNL, who had been given the technical responsibility for developing the repository, toiled on the many challenges presented by the project, debating over all speculations.[73] Throughout this period, facts and findings were manipulated by all parties to serve their purpose, whether it was to keep the project rolling or to stop it altogether: "since the conflict involves the prediction of behavior of materials over time periods almost

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[70] *Ibid*., 16. In the end, 65 % of the 625 employees were hired locally and the employment level after completion is to be maintained at approximately 500 positions. Building cost about $2 billion and it costs $200 million a year to operate.

[71] Two major anti-WIPP arguments became known as NIMBY—not in my backyard—and BANANA—build absolutely nothing anywhere near anything. These arguments are not restricted to the WIPP issue but have been used in other debates concerning the building of potentially dangerous sites near inhabited areas.

[72] Chuck McCutcheon, *Nuclear Reactions: The Politics of Opening a Radioactive Waste Disposal Site*, Albuquerque, NM: University of New Mexico Press, 2002, 12.

[73] These speculations included the gases produced by the waste, the slow-moving underground river that flows above the storage rooms and empties in the Pecos River, and the fear that a driller searching for oil or gas might puncture the site somehow in the future.

inconceivable, it is not surprising that the way the facts are put together is flavored at least in part by the philosophies of the participants."[74]

On the opponents' side, the northern Pueblos, despite their being far away from Carlsbad, declared their hostility toward the site from the beginning because of the route that the waste would take from LANL to WIPP. In 1982, the Eight Northern Indian Pueblos Council—composed of members of the Nambe, Picuris, Pojoaque, Santa Clara, San Juan, Taos, Tesuque, and San Ildefonso Pueblos—adopted a resolution stating its unanimous opposition to the waste disposal for health and safety reasons. Gerald Nailor, Governor of Picuris Pueblo declared, "they have other areas where they could do this," adding that he thought a nuclear waste disposal site should be outside New Mexico. Nailor said he was also concerned about transportation of nuclear waste because "many NM highways go through tribal lands and the nuclear industry hasn't demonstrated a reliable or safe method of transportation of the waste."[75]

In 1991, the New Mexico Alliance, a network of grassroots, environmental, economic, and social justice groups, whose purpose was to eliminate the harmful effects of military activity in the state, organized gatherings named "Hands united to stop WIPP." This initiative was in reaction to the designation of Highway 84 as one of the routes because the road winds through "rural indigenous, land-based communities such as Anton Chico,[76] El Pueblo, Las Vegas, and Villanueva." They argued that WIPP was a way for the production of nuclear weapons to continue, alleging that 70% of the site's capacity would be reserved for future waste. Their belief was that they did not "need or want jobs that sacrifice the Earth and future generations," and that New Mexico should commit to "the pursuit of wiser alternatives for economic development." They insisted that the waste was already "safely stored in sealed

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[74] Douglas W. Clark, ed., "The Hot Topic of WIPP," *Quantum*, Albuquerque, NM: University of New Mexico, Vol. 7, No. 1, Spring 1990, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Energy—NM—Nuclear—WIPP. Jennifer Richter identified a dichotomy opposing two kinds of science: government science and local science outside of the federal system. In the case of WIPP, scientists independent from the government have argued that "the knowledge of nature is not fully known in the Carlsbad area, and that other variables, including the nature of aquifers, brine pools, and karst rock formations that lie near the site, must be part of the calculations of WIPP." She contends that "the creation and assertion of local expertise over nuclear waste storage is a crucial but overlooked aspect of debates" over nuclear projects in New Mexico but that this aspect is fundamental to "WIPP's acceptance in the region." Growing mistrust in government science gave increasing support to local science, which was often commissioned by non-profit organizations. Today, New Mexicans are still confronted with these contradictory sources of information. Richter, "New Mexico's Nuclear Enchantment," 34.

[75] "Northern Pueblos Council Adopts Anti-WIPP Resolution," *Albuquerque Journal*, 30 March 1982, Center for Southwest Research, University Libraries, University of New Mexico Vertical Files, Energy—NM—Nuclear—WIPP.

[76] Anton Chico is a former Mexican land grant.

containers atop concrete slabs and does not pose an immediate threat," so it should not be moved.[77] Patsy Jojola of Isleta Pueblo declared, "let it be known that to transport this waste through our land is disrespectful, inhuman, and interfering with the laws of nature."[78] In 1999, the first three shipments inadvertently took a shortcut along N.M. 4, across pueblo sacred land. DOE officials had to apologize to the San Ildefonso tribe, on whose land the sacred areas are located for taking the wrong route. Don Hancock, WIPP opponent with Southwest Research and Information Center in Albuquerque used the story to mock the escort's incompetence, saying, "They say they have the best transportation system in the world, and then they can't even find the right route? […] Give me a break. This is another reason they shouldn't be shipping at all," he said.[79]

Throughout the 1980s and 1990s, aside from the complex scientific considerations that seemed inaccessible to the layman, the nub of the matter was indeed transportation, despite the affirmation by the National Academy of Science in a July 1989 report that "the system proposed for transportation of TRU waste to WIPP is safer that that employed for any other hazardous material in the U.S. today and will reduce risk to very low levels."[80] Anticipating the transportation problems, the DOE had begun giving millions of federal dollars to New Mexico for road improvements in 1983. Bypass roads were built to divert the trucks away from heavily-populated areas with a lot of traffic. However, Don Hancock and the Southwest Research and Information Center, argued that it would have been safer for the DOE to leave the waste where it was for the foreseeable future and concentrate on other more pressing problems such as cleanup of TRU buried in trenches and more highly radioactive problems.[81] Moreover, the record of the DOE in terms of safety on the road was not the most convincing at the time; New Mexico had had the greatest number of transportation accidents involving DOE waste.[82] New Mexicans worried about convoys of nuclear waste on their interstates and crossing their towns because of the terrorist and accidental spill risks that they represent.

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[77] "Hands United To Stop WIPP" Flyer, Ferenc M. Szasz Papers, 1894-2005, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Collection MSS552BC, Box 4, Folder 80, Waste Isolation Pilot Plant (WIPP), 1991.
[78] McCutcheon, *Nuclear Reactions*, 116.
[79] Shonda Novak and Barbara Ferry, "WIPP waste inadvertently crossed sacred tribal land," *The New Mexican*, Lindon, UT: Newspapers.com, 8 December 1999, http://www.newspapers.com/newspage/26732747/, accessed March 25, 2015.
[80] "WIPP," *New Mexico Department of Homeland Security and Emergency Management*, Santa Fe, NM: New Mexico Office of Emergency Management, http://www.nmdhsem.org/wipp.aspx, accessed March 25, 2015.
[81] "WIPP Route Goes Through Heart Of City," *Albuquerque Journal*, Albuquerque, NM, 1 March 1998, A-10, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Energy—N.M.—Nuclear—WIPP.
[82] "Report: LANL contaminating nearby areas," *The New Mexican*, A-2.

Some added that "motorists caught in traffic next to WIPP trucks could be exposed to very slight levels of radiation."[83]

Santa Feans were particularly reluctant to see trucks driving through town, and when the DOE wanted to begin shipment, despite the incompletion of the bypass roads, the City Council withdrew its agreement to let the shipments from Los Alamos pass through the heart of the city, arguing that it did not make any sense to build roads for safety reasons and then act as though they were not needed.[84] Both in Albuquerque and Santa Fe, residents felt like they were to share the burden and risks of WIPP without receiving any of the benefits. The most well-known group of activists in Santa Fe called Concerned Citizens for Nuclear Safety based their argumentation against WIPP trucks on tourism, which was the economic base of the town and would be put at risk by the convoys. Owners of restaurants, galleries, and stores joined in because their businesses depended on the abundance of visitors, who would stop coming if there were to be any accident.

The opposition of some state politicians to the project even led to New Mexico Attorney General Jeff Bingaman filing suit against the government in 1981 because the New Mexico offices of the DOE and Bureau of Land Management went ahead with the exploratory work without addressing the state's concerns. It became a federal-state battle. Congress gave New Mexico the right to review and comment, but not to veto. Governor Bruce King[85] argued that the Federal Government owed New Mexico the final say over WIPP in view of its historic contributions to nuclear weapons development and research. The decision to keep WIPP as a military-only facility by Congress saved the project. In exchange for dropping the lawsuit, the DOE agreed "to consider and address the state's concerns before deciding to proceed with construction or bringing waste" and "acknowledged the state's right to seek judicial review of departmental actions regarding the project."[86] Then, the 1982 Nuclear Waste Policy Act[87]

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[83] "WIPP Route Goes Through Heart of City," *Albuquerque Journal*.
[84] Mike Taugher, "WIPP Bypass Roads Remain Incomplete," Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Energy—NM—Nuclear—WIPP.
[85] King was three-time governor of New Mexico in 1971-1975, 1979-1983, and 1991-1995.
[86] McCutcheon, *Nuclear Reactions,* 71; 79.
[87] "The Nuclear Waste Policy Act (NWPA) supports the use of deep geologic repositories for the safe storage and/or disposal of radioactive waste. The Act establishes procedures to evaluate and select sites for geologic repositories and for the interaction of state and Federal Governments. It also provides a timetable of key milestones the federal agencies must meet in carrying out the program. The NWPA assigns the Department of Energy the responsibility to site, build, and operate a deep geologic repository for the disposal of high-level waste and spent nuclear fuel. It directs EPA to develop standards for protection of the general environment from offsite releases of radioactive material in repositories. The Act directs the Nuclear Regulatory Commission to license DOE to operate a repository only if it meets EPA's standards and all other relevant requirements." "Summary of the Nuclear Waste Policy Act 42 U.S.C. §10101 et seq. (1982)," *United States Environmental*

established the necessity of finding a national permanent underground repository for high-level waste by the mid-1990s and gave the states a right to veto the establishment of a repository site within its borders. This necessity kept the debate over possible shipments of high-level wastes to WIPP on the table, when it had been settled from the beginning that only low-level wastes would be stored there. The other option was Yucca Mountains in Nevada, where animosity was just as great against receiving waste it did not produce. While Governor Toney Anaya (1983-1987) fought this possibility, his successor Garrey Carruthers (1987-1991), a Republican close to the New Mexico business community, saw the economics of high-level storage as a way of diversifying the state's ailing economy in keeping with its nuclear legacy. In the end, WIPP proponents maintained that too much work, time, and money had been invested in the project for it to stop.

Although it was completed in 1989, WIPP received its first shipment of non-mixed TRU waste on March 26, 1999. The DOE hired Westinghouse Electric Corporation, the world's biggest manufacturer of nuclear reactors, which also managed the Hanford Site, to operate the plant. The opening of the site had taken twenty years longer than expected. Polemics, however, did not end with its opening. Two years after the first shipments, critics such as Don Hancock, had not given up on their anti-WIPP crusade, especially once the DOE announced that the site would ultimately not store only low-level plutonium wastes, but also "hard-core nuclear waste, shipped from power plants around the country and from bomb shops and labs." To transportation risks, Hancock added the flaws of the site itself such as the 500 natural and oil holes that had been drilled within six miles (10 kilometers) of the WIPP site over the preceding decade.[88]

Nonetheless, the push for sending more dangerous waste did not fade. Since the late 2000s, negotiations have been under way between the Department and New Mexico to introduce a new type of waste at WIPP: Greater-Than-Class C (GTCC) low-level radioactive

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Protection Agency, Washington, DC: United States Environment Protection Agency, 12 November 2014, http://www2.epa.gov/laws-regulations/summary-nuclear-waste-policy-act, accessed March 28, 2015.

[88] Price explains, "Drilling often involves pumping brine into the holes to stimulate production. Independent scientific studies have shown it is possible for injected brine to travel from drill holes to the WIPP salt chambers. There, it might cause structural damage that would allow highly pressurized brine pools below the repository to flood into WIPP's chambers, corroding metal waste containers and sending radiation to fresh-water aquifers above or to the surface through wells." Vincent B. Price, "A new battle of rival beliefs is brewing over WIPP," 16 February 2001, D1, Albuquerque, NM: Center for Southwest Research, University Libraries, University of New Mexico, Vertical Files, Energy—NM—Nuclear—WIPP. In 1978, geologist Roger Anderson had already submitted a report to Sandia in which he mentioned the brine problem. In 1988, Congressman Domenici appealed to the National Academy of Science to settle the matter and the academy assured water would not be a problem.

waste. They are the most hazardous of the low-level radioactive wastes. The method for their disposal remains undetermined but is under consideration by the Environmental Impact Statement (EIS), and WIPP is one of the potential sites for disposal. In order to communicate locally on this project, meetings have been held throughout the state. During her research, Jennifer Richter went to the GTCC meeting at the Pecos River Conference Center in Carlsbad on April 26, 2011. She notes that the opinions expressed at the meeting were indicative of a strong local support for the storage of these wastes at WIPP: "while a few members of the public expressed concerns over transportation and environmental impact, most public commenters expressed ardent and enthusiastic support for GTCC waste. Notably, almost all of these were local politicians and business leaders, who seemed to speak representatively for the whole community." She argues that, by using public meetings, the Department transfers responsibility to the public, "making them complicit in the process and also the end result." The public is then "expected to make informed decisions based on the information in public documents and at hearings." But this push for a more democratic procedure is flawed because it is "fraught with risks that in an attempt to democratically site a nuclear facility, it may not ensure the appropriate conditions environmentally, and may exacerbate political and social differences across local, regional, state, and national scales of governance."[89]

In order to build more facilities with consultation of the public, the industry can also rely on the deep implantation of nuclearism in the region; and not only in Carlsbad, as other projects are under way at other locations. On February 2, 2012, a public meeting was held by the NRC in Hobbs to present the conclusion of its draft on a proposed fluorine extraction process and depleted uranium deconversion plant there.[90] Twenty miles (32 kilometers) to the south, east of Eunice, NM, a National Enrichment Facility for the enrichment of uranium began operating in 2010. The addition of these new sites in the state shows that the scientific conquest is an ongoing process. The two main differences with the postwar era are that its leaders now include local advocates of nuclearism, and its pace has been dramatically slowed down by anti-nuclear activism. The geography of nuclear communities in the state is becoming denser. Richter addresses the connections between these "seemingly disparate communities" that "have been affected disproportionately by nuclear technologies." She argues that they "are separated geographically but intimately connected by nuclear

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[89] Richter, "New Mexico's Nuclear Enchantment," 12; 16; 38.
[90] "IIFP Fluorine Extraction and Depleted Uranium Deconversion Plant Licensing," *U.S. NRC*, Washington, DC: United States Nuclear Regulatory Commission, http://www.nrc.gov/materials/fuel-cycle-fac/inisfacility.html accessed December 16, 2014

contamination." The local speakers and narratives that she analyzes make these environmental and historical connections between communities and counter "the desert-as-wasteland trope" to "raise the specter that nuclear projects never stay as localized as they are supposed to, and consistently escape the boundaries of science by creating unexpected and unpredictable nuclear geographies."[91] Small communities and their inhabitants in New Mexico are thus increasingly linked to the rest of the country and the rest of the world because of the risks and the interest presented by the facilities they host.

The heated debate on pursuing profitable and job-creating activities by accepting the risk they represent was renewed with the last development in the WIPP venture which occurred in February 2014 when "WIPP suspended operations on February 5, 2014, following a fire involving an underground vehicle. Nine days later, on February 14, 2014, a radiological event occurred underground, contaminating a portion of the mine primarily along the ventilation path from the location of the incident, releasing a small amount of contamination into the environment."[92] The objective of the WIPP Recovery Plan is to resume activities in 2016. The plan includes "strengthening safety programs, regulatory compliance, decontamination of the underground, increasing ventilation, mine stability and underground habitability, and additional workforce retraining."[93] After over twenty years of research and negotiations, the facility had finally opened. Meant to store waste for at least 10,000 years, it was only a decade before this accident occurred, providing opponents to the nuclear industry in the state with new arguments against its development.

4. Conclusion to Part 4

The most recent history of the Land of Enchantment thus remains entangled in its cycle of conquests, with the last conquering wave through nuclear science having seeped so deeply in the state's identity that it is now referred to as a land of "*nuclear* enchantment."[94] The multiple legacies of the Manhattan Project and of the Cold War in New Mexico bound the region's and its inhabitants' past with their future as they are now a major participant in the nuclear fuel cycle that some, such as Leona Morgan of ENDAUM, have argued was rather

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[91] Richter, "New Mexico's Nuclear Enchantment," 36.
[92] United States Department of Energy, "Waste Isolation Pilot Plant Recovery Plan," 30 September 2014, http://www.wipp.energy.gov/Special/WIPP%20Recovery%20Plan.pdf accessed December 16, 2014.
[93] "Path Forward," *Energy.gov*, WIPP Waste Isolation Pilot Plant Recovery, Washington, DC: United States Department of Energy. http://www.wipp.energy.gov/wipprecovery/path_forward.html accessed December 16, 2014.
[94] The expression comes from Jenifer Richter's thesis entitled "New Mexico's Nuclear Enchanment." Italics added by Lucie Genay.

like a chain at the end of which the dangerous consequences of radioactive contamination will be found. With the growing demand for nuclear energy, nuclearism ideology in New Mexico shifted from supporting the need for nuclear weapons to seeking economic opportunities in the nuclear energy business. The strife between the proponents and detractors of this philosophy is more exacerbated now that awareness, sometimes also verging on paranoia or producing financial interests, has spread through the population. On the other hand, indifference or lack of knowledge is also still widespread among New Mexicans. Nonetheless, local reactions and legal battles have revealed that resilient residents were able to use the debate on the role and power of the nuclear industry in their state to reassert traditional aspects of the New Mexican identity, such as the attachment to the land, the importance of water, the sacredness of certain places, and the people's ancestral presence in the region.

The strains of poverty have traditionally played and still play a prominent role in people's opinions concerning the nuclear industry because many of those in desperate need for a job will embrace the chance to see a new facility built in the area, while others will be able to afford prioritizing considerations about health and the environment first. This, in part, results from the mechanisms of the state's Faustian bargain with science. Clearly, the way in which the nuclear industry developed and integrated New Mexico's employment-eager populations has generated a lot of profit but the downsides include the acceleration of economic disparities, new forms of racial and gender discrimination, and environmental degradation. During and after the scientific conquest, improvements in material gains and modernization of households were evident as people were able to afford a higher standard of living.

Many families, however, never caught up with the national standards of income. Rather, the long-standing trend of growing income inequality has led New Mexico to be the state with the widest income gap between rich and poor. With a ratio of incomes of the richest to the poorest fifths of households at 9.9 in 2008-2010, the state ranked number one in income inequality according to a report by the Center on Budget and Policy Priorities and the Economic Policy Institute. The most important factor the authors identified was the growth in wage inequality, followed by government policies.[95] Considering the statistics mentioned earlier, one can readily make the connection between this ratio and the striking inequalities

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[95] Elizabeth McNichol, Douglas Hall, David Cooper, and Vincent Palacios, "Pulling Apart: A State-by-state Analysis of Income Trends," Washington, DC: Economic Policy Institute and Center on Budget and Policy Priorities, 15 November 2012, http://www.cbpp.org/cms/index.cfm?fa=view&id=3860, accessed March 28, 2015.

between employees in the nuclear industry's facilities and other, less fortunate New Mexicans. A blend of environmental and economic disparity thus maintains New Mexico's status as an internal colony of the United States where wealthy, highly-educated scientists work in the sterile atmosphere of the Laboratories, where dangerous uranium mining is being developed and its toxic refuse left in place, and where energy waste is being transported to be stored in a supposedly permanent underground repository.

GENERAL CONCLUSION

1. Intent and purpose

The original intent of this dissertation was to view the legacy of the Manhattan Project in a new light through the insofar almost absent voices of local New Mexicans who participated in the Project from its earliest moments, and for whom the changes induced by the arrival of atomic science in New Mexico were most extreme. The history and impact of the atomic project have been explored from varying angles which have focused on the scientific, strategic, political, diplomatic, ethical, cultural, and revolutionary aspects of the bomb. My approach to the Project, however, was first and foremost socio-economic, since my intention was to evaluate the changes in social and economic conditions for the New Mexican population—particularly New Mexicans who had been living in the state for several generations before World War II. Logically, this selection steered my research toward the Native American and Hispanic inhabitants of the state. Yet, the Anglo immigrants who had built a life in the region and had come to call it their home ought not to be excluded. Rather than addressing the consequences of the bomb on a global scale, my purpose was to examine its most immediate and confined legacy within the borders of its birthplace that led it to be renamed the land of "Nuclear Enchantment" by researcher Jennifer Richter. Previous research on the scientists who had partaken in the Manhattan Project led me to reflect on their interactions with locals, which involved much patriotism and stereotypical representations. The documented points of view were unidirectional and hence the question arose: what were the experiences and subsequent opinions of the local workforce who participated in and were directly impacted by the secret work conducted at site Y? What were the points of view of those "smaller" participants in one of mankind's most significant enterprises?

In the early stage of information-gathering, it became instantly obvious that the local impacts of the Manhattan Project extended far beyond its chronology and spread over the postwar years, affecting a swelling number of New Mexicans. And so the hypothesis of a scientific conquest of the state germinated. More material about the area's colonial past and its current situation seemed to evidence a pattern of continuity despite the scientific revolution of the New Mexican economy. That was a second hypothesis. For more genuine results, I sought sources that would provide testimonies of New Mexicans who had experienced the various phases of the developing nuclear economy such as oral histories, newspaper articles, and surveys. Each finding helped establish a generational timeline of Laboratory workers; a timeline that showed an evolution in sentiments and relation toward their employer and the

role of the industry in the state. In parallel, for a more solid argumentation, I resorted to economic reports, previous research, theoretical and historical secondary sources, all of which pointed to both rupture and continuity. Rupture because World War II has been depicted as having revolutionized the American West, and reports on New Mexico's economic development showed that the state underwent phenomenal transformations due to the new activities that were introduced in the wake of the Manhattan Project; and continuity because poverty, dependence, and a conspicuous military presence remain prime characteristics of the state to this day. My research led me to emphasize continuity and pursue the matters of inequality and racial relations.

One major observation has been a particularly helpful guide during this research: New Mexico's chronic poverty. Barely industrialized, largely self-sustaining, and damaged by drought and economic depression in the 1930s, New Mexico was a poor state before World War II. The Manhattan Project was the beginning of a new economic era for the state when job and business opportunities multiplied in large part due to public and private investment, the building of new facilities, and immigration. Yet, in spite of this phenomenal boom proven by remarkable figures, the poverty problem endured. The state has consistently ranked among the top five for poverty among all other fifty states. And now (2015) it also ranks first for inequality. To understand this phenomenon of stagnation despite economic benefits, a thorough analysis of the development of New Mexico's nuclear complex was the key. My approach, therefore, was not only a comparative study of pre-World War II and post-World War II New Mexico but also an examination of the mechanisms behind the transformation and of how these mechanisms produced such inequalities.

Upon examining the relations of the state with the national scientific-military-industrial complex and with the government agencies that have managed this complex, the first observation to be made was that the relation was one of dependence. Having connected this notion to New Mexico's past, the repetition of certain patterns confirmed. This is how it appeared necessary to link New Mexico's nuclear history to its earlier colonial history. Its past as a long-term territory made it the perfect candidate for its transformation into a nucleus of America's atomic power. In addition, this past also shaped both the resilience of the Native population against these conquering efforts and their disposition to accept federal support and risky industries in their quest for economic stability. Since the end of the Cold War, although the state no longer holds a bystander role regarding the fate of its military and nuclear sites, challenges have multiplied. As the state's colonial and nuclear past blur into a complicated

future, some New Mexicans have chosen to support a turn-back to land-based traditions or to become anti-nuclear activists while apologists of the nuclear industry call for more sites, more funding, and more nuclear jobs. A spectrum of opinions ranging from radical hostility to unconditional support of the local nuclear complex is now identifiable among New Mexicans. These opinions have been shaped by their experiences and stories from within the nuclear complex. My objective, thus, was to document these experiences and stories so as to build a wholly New Mexican history of the Manhattan Project and its consequences.

2. Findings and concluding remarks

A first step in my demonstration was the assessment of the social, economic, and cultural situation of New Mexico before World War II. This first step revealed that the state was particularly predisposed to embrace the arrival of atomic science, not only for patriotic reasons that would enable New Mexico to better connect with the rest of the nation, but also because it would alleviate the severe chronic poverty that struck many people in the region. The people were divided into three cultures that had different ties to the area. Native Americans and Hispanics are often joined together and identified from the outside as the ancestral people of New Mexico. Tensions and struggles over land with Anglo immigrants after the Treaty of Guadalupe Hidalgo in 1848 reinforced the image of the two groups being opposed to the same invading, land-grabbing enemy. Yet, although the three groups were culturally dissimilar, I focused of their principal point in common which was a distinctive relation to the land. Be they Indian Pueblo dwellers, Hispanic villagers, or Anglo ranchers, land was their way of sustenance, and, when some of them later lost their land to the government at Los Alamos or in White Sands, their reactions of resistance and claim for recognition were similar as a result of this common trait. Because of the closeness to the land and relatively slow industrialization and urbanization, the pre-World War II New Mexican lifestyles were primarily rural. In the main city of Albuquerque, the railroad was the chief pacesetter after the 1880s but despite the changes introduced by its arrival, the state's economic base largely remained agricultural. Moreover, since the Manhattan Project settled in rural, isolated northern New Mexico, I accented pre-war rural life in villages.

The evolution of lifestyles caused by the gradual influx of Anglo immigrants, the introduction of a cash economy, sluggish industrialization, the damage of droughts and of the Great Depression, the depletion of soils, and the increased federal presence through the New Deal policies consisted in the reasons why the state and its populations were ideally positioned and eager for a consequential transformation. The testimonies of early Lab

employees, who had experienced the atmosphere of the 1940s in New Mexico, confirmed this readiness. Beyond the nostalgia of former days, relief and gratefulness were expressed at being liberated from the physically demanding work in the fields and from the strain of having to leave one's home to find employment far away. According to the first generation of workers at site Y, the Manhattan Project at Los Alamos actually bolstered their attachment to the land of New Mexico by putting an end to the migratory cycle to find work outside of the state. The necessity to go as far as California to find employment was an indicator of how depressed some areas were after the hardships of the 1930s, which had severely affected the agro-pastoral and extractive economy. In his Master's thesis in 1955, Richard A. Bittman addressed the issue of dependency in New Mexico's agricultural areas in the 1940s and 1950s. He wrote that "dependency is the very highest in the depressed agricultural regions where the activity is followed along cultural rather than commercial lines." The Bureau of Agricultural Economics of the Department of Agriculture computed levels of living indexes in the state and since the beginning of the series of statistics in 1930, for all but a few counties, the index consisted of items such as the percentage of farms with electricity, cars and phones, and value of marketed products all of which were lower than the national and regional averages and comparable only with the indexes of the exhausted farming counties in the Deep South.[1]

The second most important characteristic of the region following its desperate need for an economic renewal and that turned out to be its major asset to attract Manhattan Project officials was its isolation. The solidarity that interviewees described, the traditions, and the rhythm of life were shaped by the long-lasting isolation in which the communities had lived, sometimes for centuries. Originally a cause for rejection, this isolation and timeless atmosphere became more fashionable after statehood in 1912 and the discovery of the curing properties of the New Mexican climate for tuberculosis. The Land of the Enchantment's appeal to tourists, artists, and other travelers—who sought to escape from the industrial hubs of the East—principally stemmed from the results of isolation such as the cultural preservation of the region's ancestral inhabitants, the untouched landscape, or the "simpler" way of life that were all romantically portrayed in tourist adverts. It was also the prime criterion in Ashley Pond's selection of the Pajarito Plateau for establishing his boy school that would tout the benefits of living in the great outdoors, far from the noxious urban

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[1] Bittman, "Dependency and the Economy of New Mexico," 46-47.

environment. Isolation was both New Mexico's burden and blessing. It was a burden as the state was cut off from the nation's economic and political centers and, conversely, a cultural asset that allowed the perpetuation of languages and traditions. During World War II and the Cold War, the definition of isolation shifted from confinement to strategic remoteness. New Mexico was a place that seemed so far-off, a place where secrets could be buried and risky enterprises undertaken in safety from prying enemy eyes as well as from the public's eye. The local population's plight combined with the physical characteristics of the small Pajarito Plateau to make New Mexico the best candidate for the construction of a top secret government project. Part one of this thesis established this fact as the foundation for the rest of my argumentation because how could one explain the magnitude of the changes that occurred after the War or the relation of New Mexicans with the nuclear economy, without depicting the state of eagerness and desperation for prosperity in which the region was in the early 1940s? These conclusions offered solid ground on which to build the rest of my demonstration; that is, the swift spread of the scientific conquest.

Although my approach was geographically limited to New Mexico because my purpose was to set off the local perspective in its various configurations around the state, I found it necessary to acknowledge New Mexico's belonging to the broader geographical entity that is the American West, especially when neighboring states have shared several aspects of its nuclear history. Addressing the role of the West in the nation permitted me to sharpen my use of the colonial framework and make better sense of the relations between the scientific immigrants and the local workers. Thanks to the theoretical support of the works by historians such as Gerald D. Nash, Richard White, and Patricia Nelson Limerick, I was able to strengthen my argumentation that the arrival of atomic science and its subsequent development in the state were a third conquest after the Spanish and the Anglo-American conquests. Nash's thesis provided arguments in favor of considering the American West as an internal colony—an American domestic empire according to Bernard DeVoto. White and Limerick's take on the legacy of the conquest centered on continuity and on the capacity of the Frontier myths to regenerate, thus imparting Western history with a cyclic dimension. Indeed, New Mexico's status as an internal colony of the United States, that was founded on its role as supplier of raw materials to the industrialized East, did not cease, but was renewed after World War II through the construction of the "atomic West." During the War, the colonial relation was magnified by the region's militarization, a colonial tradition, and that too eased the spread of the military-industrial complex during and after the Manhattan Project.

The condemnation proceedings at the Alamogordo Bombing and Gunnery Range in 1941 and at Los Alamos in 1942 have often been reported. For this work's purpose, though, focus was not solely on the selection of the site, on the procedure, on the exceptional circumstances of the War, and on secrecy, but on the experience of these areas' displaced inhabitants. Most of these locals were New Mexican families who had been in the state for several generations. What has been repeatedly presented as the ultimate patriotic sacrifice in the media and later in the museums dedicated to the nuclear era was a violent disruption in the life of these families. It took up to fifty years for some of the testimonies of displaced inhabitants on the Pajarito Plateau or in the Tularosa Basin to surface. They depicted the hurried departure, the meager compensations, the broken promises of land being returned after the War, and sometimes the mistreatment they received from the Army. A lot of nostalgia for the homestead and ranching eras was also involved in the testimonies and interviews, but it is difficult to quantify to what extent some interviewees might have come to idealize their lives prior to the scientific conquest. For it was a form of conquest; the Army coveted land, acquired it, emptied it, and peopled it with new settlers. The installations were not meant to be permanent and yet, they transformed into communities and small towns populated with military personnel and scientists.

Even though my aim was to analyze the conquest from the New Mexican point of view, these pioneers' mind frame was particularly interesting insofar as it was influenced by the narratives, the myths, and the fantasies that non-Westerners entertained about the American West. The newcomers' perception of the West and of Westerners was a starting point to address the issue of stereotypes. The imagery they brought with them came from tourist advertisements, western movies, the western literary genre, and from the national experience of Manifest Destiny craftily kept until this day by Americans—elected officials and ordinary citizens alike. Images and ideas about the West and especially about the local people these atomic pioneers encountered, i.e. New Mexican Native Americans and Hispanics, lay the foundations for relations between scientist and valley dwellers at Los Alamos. On the scientists' side, locals were often viewed as needed manpower and exotic entertainment. The scientists' paternalistic approach combined with economic and educational superiority created a wide gap between the two groups. Meanwhile the locals' opinion of the invasion concentrated on the economic advantages of the new source of employment in the vicinity. Their testimonies underscored the material and comfort benefits they obtained from working for the Project. Cultural exchanges—such as invitations to dances and fiestas—occurred, but

they sometimes also turned into commercial transactions through the sale of rugs and pottery to satisfy the new tourists' crave for souvenirs of their time spent at the Pueblos. The invaded therefore perceived the atomic laboratory and the new colonizers in terms of economic opportunity that could save them from the hardships they had known for decades back. Meanwhile, the invaders perceived the invaded in terms of social and cultural diversity that could distract them from the hectic work they were conducting on the Hill—and sometimes from the boredom of being scientist's wives and children in a small, isolated, and secret military camp.

The Alamogordo Bombing and Gunnery Range turned out to be even more useful than expected to the war effort when atomic science spread southward. The ties between Los Alamos and the military reserve began at that time and extended during the Cold War when White Sands became a missile range. One crucial point that the two facilities have in common from the locals' point of view is that both sites were not meant to last but were supposed to be returned to the original owners of the land once the War was over. Similarly to the establishment of the Los Alamos Laboratories, the Trinity test has been widely documented and examined from varying technical and historical angles. Here, however, the impact of the test on New Mexicans was under examination. Celebrated historian Ferenc Morton Szasz's comprehensive work on the Trinity test and on New Mexico was valuable to understand the role locals played in the event. In order to select information precisely and offer a personal interpretation of the local witnesses' stories, I explored his paper collection as well as other historians' and newer sources such as the LAHDRA report which also addressed the Trinity test and its consequences in detail. My research led me to conclude that the portrayal of New Mexican witnesses in newspaper articles was often humorous, providing a comic relief of sorts to the fear-inspiring notion of an atomic blast, and that this portrayal was sometimes exaggerated, such as in the story of the blind girl who "saw" the explosion, so as to heighten the magnitude of the bomb. The second paramount aspect of the Trinity bomb was the effect of radioactivity in the area and how officials of the MED asserted risks and made evacuation plans weighing concerns of local safety against those of national security. Plants, animals, and inhabitants of the Tularosa Basin were the first victims of the nuclear age. The story of the Ratliff family on Chupadera Mesa exemplifies how the MED prioritized operations at Trinity. Protection of locals from radioactivity, though considered as important, did not rank first. Both the testimonies of witnesses and the consideration of risks for local residents after the blast show some casualness due to a lack of scientific information and to the need for comic

relief. Their experience was lightly portrayed in the newspapers and their exposure to radioactivity was deemed inconsequential.[2]

The end of the War was a pivotal period because it was the moment when many New Mexicans became aware of their state's full involvement in the war effort. While a wave of patriotic pride spread through the population, hard negotiating took place in government to determine what the future would hold for the Los Alamos Laboratory and the Trinity site. The premises of what later became nuclear tourism occurred then: one school of thought believed Los Alamos should be abandoned to be turned into a museum town dedicated to the birth of the atomic age, and the Alamogordo Chamber of Commerce asked for a national park to be established at Trinity. These ideas reflected the tendency to associate the West with tourism and view the region as a stop in a traveler's expedition—as a place where remnants of past pioneering adventures and tokens of America's greatness get fixed in time rather than being turned into symbols of progress. The new beacon of national defense, a sophisticated deadly new technology was not seen fit to remain in the desert once the War was over and some degree of secrecy could be lifted. The state's isolation, which had been its greatest asset in attracted industries during the War, resumed its drawback quality in 1946. The scientists' exodus from New Mexico, motivated by professional and personal commitments or a simple desire to get back to "civilization," and the difficulty to replace the dwindling staff was a clear sign of rejection of Los Alamos. However, through the efforts of General Leslie Groves and Director Norris Bradbury, who argued the facility was too valuable to the country to be abandoned, the Laboratory remained in northern New Mexico and even expanded by exporting its production division to Albuquerque.

The postwar transformation of New Mexico and its effects on the state's population are the core of my research work. A first phase in the process was to assess how phenomenal the alterations were, and a second phase was to uncover the mechanisms through which these changes were made possible. Although the state and the population largely embraced

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[2] Descendants of families who suffered from the effects of radioactivity resulting from the Trinity blast now want the country to know about their suffering and, "As the 70th anniversary of the test approaches, residents are pressing for acknowledgement and compensation. They say the test caused long-term health problems, including rare forms of cancer, for many Hispanic, white and Native American ranching families living in the area at the time." Co-founder of the aforementioned Tularosa Basin Downwinders Consortium Tina Cordova, whose father—three years old in July 1945—died from a third battle with cancer, stressed that "The history of the bomb is always told through the eyes of scientists and industry […] We've been left out of the narrative." Russell Contreras, "Trinity Test Site Opening to Face Protest From Residents," *ABC News*, Albuquerque, NM: ABC News Internet Ventures, 1 April 2015, http://abcnews,go.com/Travel/wireStory/trinity-test-site-opening-face-protest-residents-30052427, accessed April 9, 2015.

nuclearism during the Cold War, its benefits were reaped in unequal ways. Enthused by the prospect of more and more nuclear jobs at the Labs, at White Sands, at the military bases, in the research centers, in the uranium mines, or later at WIPP, New Mexico and New Mexicans entered something of a Faustian bargain in which they saw the immediate economic benefits without knowledge or foresight of the risks involved and of the negative socio-economic and environmental costs their enthusiasm could entail. By the end of the twentieth century, despite the economic boom, the longed-for prosperity had not been attained; the state was more populated and wealthier but also more unequal and still among the poorest states in the country. This phenomenon can be explained by a correlation between economic growth and immigration. The higher-paying positions at the defense-oriented facilities were taken by Ph.D.-holders recruited from other states while locals were hired on the lower-paying positions (often maintenance and technical jobs). This trend is one of the social legacies of the Manhattan Project as the Lab started with this work organization—because the local population consisted mostly in unskilled labor—and hardly changed it in the following years. The habit of looking to other states for highly educated scientists and engineers, who came out of the best schools in the country, made it more difficult for graduates of local institutions to be hired or promoted. Consequently, in spite of the level of education among New Mexicans being higher one generation to the next, their efforts did not guarantee they could access the top jobs. Social reproduction was a key factor in the creation of new inequalities within the nuclear economy. Families of Lab scientists for instance could afford to send their children out of state to the best schools and the best universities, and these children would then come back for a position at the Labs.

Yet, first, in the 1940s and 1950s, the Labs' difficulty was to attract these sophisticated, cosmopolitan scientists. Both Los Alamos and Sandia looked for ways to be more appealing to the cream of the crop living close to the great institutions for science and education on the East and West coasts. Their recruitment difficulties were due to the reputation of New Mexico as an isolated, desert region. The improvements made at Los Alamos by the Zia Company, for instance, showed the government's eagerness to please the elite of atomic science with recreational facilities, excellent schools, and a pleasant suburban environment to raise a family. Meanwhile, local New Mexicans were hired by Zia to build and maintain the town which was meant to attract the new wave of immigrants. Testimonies of Zia workers emphasize memories about commuting to the Hill every day, their gratefulness for the Lab's presence in northern New Mexico, the satisfaction of staying with their families, new

comforts in homes such as televisions, appliances and vehicles, and the inspiring culture of the Lab that motivated them to advance themselves. Conversely, there were testimonies of the first signs of discriminatory treatment, of the jealousies, and of the growing tensions among those who had jobs there and those who did not.

In Albuquerque, a similar phenomenon took place with the development of the Sandia Corporation. For lack of a company town exclusively designed for them, the atomic immigrants conquered the neighborhood called "The Heights" on the northeastern side of the city. This colonization created a clear polarization between the poorer valley neighborhoods, which were predominantly Hispanic and democratic, and the Heights, where the population was wealthier, Anglo, and republican. According to urban historians such as Marc Simmons, the Duke City's expansion was tremendous and unbridled because of a vision based solely on the search for economic prosperity rather than on long-term urban planning. Transformations and improvements were undertaken at White Sands for the same purpose of attracting new recruits. As a result of the influx of new employees at the military reserve, the town of Alamogordo underwent changes comparable—proportionally—to Albuquerque. At the same time, New Mexicans from the increasingly depleted rural areas of the state also joined the growing numbers of migrants who left for the city to find work. When uranium was first discovered in Grants in the 1950s, the boom that propelled the carrot capital to its new status as the "uranium capital of the world" was spectacular. The area became a magnet for prospectors, extraction companies, and local residents in dire need for employment, including many Navajo and Laguna Native Americans. The addition of uranium to the nuclear economy in New Mexico transformed the state's new economic pillar into a cradle-to-grave industry (from raw material to stockpile maintenance and waste management) but also became the most ostensible illustration of economic colonialism—as I argued further in the thesis. By 1960, New Mexico had a new and productive "golden goose." The economic boom was unprecedented, immigration numbers were incredible, and the new nuclear jobs paid salaries insofar unheard of. This period of prosperity was the first face of the Faustian bargain; that is, the immediate profits of an industry in full swing.

Although, according to the Nash thesis of the "federal landscape," the West was revolutionized and became a pace-setting region thanks to the war industries and to the Federal Government, the last decades have shown that, in the case of New Mexico, the former dependence the state had on outside markets in the East was merely transferred to the Federal Government through the development of the nuclear industry and federally-funded, defense-

oriented facilities. The boom and bust history of uranium extraction in the northwestern part of the state is an adequate example of this relation since the companies, and therefore their workers depended on the government's demand as long as it used the mineral to build more nuclear weapons. The uranium history of Grants proves that the town and the people were tributaries of the ups and downs in the government's need for the amassing of resources to win the armaments race with the Soviet Union. When the public monopsony ended, competition from foreign producers took its toll on the New Mexican industry, which left the area in a state of utter neglect with its abandoned mines and mills. Not only Grants and uranium mining, but the whole production chain relied on the government whether it was for funding or for selling its products. The country's foreign policies during the Cold War sent repercussive waves that primarily affected states as New Mexico because of the extent of its military-industrial-scientific complex, which had become a mainstay of the local economy. As the prime employers in the region, it became crucial for DOE facilities to maintain their levels of funding because individuals and businesses relied on their activities for economic stability. The state's newfound autonomy, like others in the West, was somewhat deceptive because of this relation that bonded them to government decisions and to the necessities of the Cold War. As long as new weapons were needed for deterrence, the industry was working at full capacity, and budgets kept being reformed to higher levels. When research shifted focus to ground war in Vietnam, for instance, or when test-ban negotiations were underway, the budgets were equally impacted and they were cut back. This mechanism meant that the New Mexican economy swayed with events occurring on a global scale.

Economists realized the problem and as early as the 1960s, they urged for more diverse applications of the science and technology that were conducted at New Mexico's research centers. They anticipated that in case DOE expenditures dropped, the layoffs and loss of business would be severe. Two peaceful ventures were undertaken in the 1960s as part of the Plowshare Program in an effort to diversify the uses of nuclear weaponry and create other branches of the industry that could be taken over by the private sector. The Gnome and Gasbuggy tests were relevant to my research because they produced varied reactions among New Mexicans mixing patriotism, excitement, and hope. The tests also mirrored the politics of convincing the public of the economic advantages such experiments would have in the vicinity. Therefore, expectations ran high for the tests to be a success because substantial benefits might result from the outcome. Both tests, however, failed to deliver on their promises. Despite the failure, the experiments underscored another aspect of the dependence

relation between New Mexico and the Federal Government: the role of local boosters and politicians to attract more public spending, more experiments, more nuclear-related activities, and more immigrants. City boosters and businessmen in Albuquerque, Grants, Alamogordo, and later in Carlsbad were active in promoting their agglomeration's nuclear assets. However, they also became aware that their business basis was made fragile by its reliance on federal funds, so they organized in groups and associations to promote diversified economic development. Meanwhile, New Mexican congressmen used their new influence to push for legislation that would support the nuclear complex and support their state's economy. Dependence on the Federal Government carried on New Mexico's colonial situation within the U.S. despite the postwar economic boom. The state was still regulated by outside economic forces, and prosperity was determined by decisions made in Washington. Most New Mexicans fully embraced the promises of the nuclear complex and continued to ask for more, extending the scope of the Faustian bargain.

The last mechanism I identified as key in the bargain was secrecy, which had grave repercussions on New Mexicans and their environment. One observation concerning secrecy was its evolution from the fascination of atomic mysteries to the fear and anger produced by the rising awareness that information on the harmful effects of the nuclear industry had been systematically concealed. I first centered on Los Alamos's special aura since the town was where the secrets began in New Mexico. Secrets and secrecy were an aspect favored by reporters in the stories they wrote about on the Manhattan Project. So much so, that they often centered on the anecdotes of the wartime era and on the top secret atmosphere inside the gated community. Testimonies of Los Alamos dwellers revealed a paradox between the general feeling of security—due to the omnipresent security checks, guards, fences, clearances, and procedures—and the dangers that this secrecy obscured, such as living next to an installation which was testing the deadliest weapons on earth, releasing radioactive products in the vicinity, and leaving unexploded devices for children to play with. Along with secrecy, the philosophy of nuclearism, which promoted the effectiveness of deterrence in guaranteeing national security, was diffused in New Mexico via the defense-oriented installations. New Mexican workers at these installations integrated a world in which secrets were part of the strategy to win the Cold War. Their adherence to nuclearism helped them unquestionably support secrecy as well. Many were proud of having a job that enabled them to fulfill a patriotic duty.

The greatest and most problematic secret was one that created a sense of betrayal and revolt among certain employees. The effects of radioactivity on humans, animals, and plants had been an issue since the end of the nineteenth century. A lack of knowledge combined with reckless practices under the cloak of secrecy caused irreparable damages on people and the environment of New Mexico. First, it was essential to retrace the great steps in the history of radioactivity in order to fully comprehend the way safety standards have evolved and the part that scientific understanding of radioactivity played in the gradual changes that were made or not made in safety measures. This chronology demonstrated that progress was made in ignorance and using unknowingly inappropriate standards until new research proved how dangerous previous dosages were. During the Cold War, each wave of revelations on the effects of radiation—the effects on fetuses or on the consequence of atmospheric testing on downwinders, for instance, as well as accidents such as the Lucky Dragon incident—sharpened the scientists' knowledge about radioactive particles and compelled them to redefine safety regulations. Because all these developments occurred under virtually no public scrutiny, affected people were at a loss to explain some of the health problems they developed and later believed they were treated unfairly. Interviews of former LANL workers who mentioned their working conditions and how they gained from taking more risks indicate that the most dangerous jobs were often maintenance jobs—janitors who cleaned up contaminated places and heavy equipment operators for example. And these jobs were occupied by workers from the valley. While some said the risk was worth it, that was part of the job, and that contamination was the result of ignorance, others felt they had been cheated and used to do the dirty work. More have spoken up since 1980s once more files were declassified and more rational, scientific explanation for health effects of exposure to radioactivity were provided. The matter remains topical today as people are still being affected or believe themselves to be affected by the nuclear complex. Part three of this thesis was thus an analysis of the mechanisms behind the scientific conquest which introduced a Faustian bargain in New Mexico; this bargain was based on three pillars: immense growth creating ever higher expectations and hope for the poverty-stricken population, dependence upon a system of federal sponsoring, and the almighty secrecy that protected the nuclear complex not only from enemies but also from public scrutiny.

The last part of this work was the most complex, for it deals with controversial issues that still divide the public and politics today. These issues are, therefore, a way to connect the Manhattan Project with its long-term implications and the ultimate argument to support my

thesis that New Mexico accepted a deal to reap immediate major benefits at a heavy long-term cost. The most effective symbol of this cost is the environmental legacy of the Manhattan Project and of the nuclear industry as a whole. Rather than addressing all the environmental issues in depth, which has been done by journalist and author Vincent B. Price, I put an emphasis on the effects on people and on matters of environmental discrimination. Vincent B. Price, Valerie Kuletz, and anthropologist Joseph Masco have extensively contributed to defining the notions of environmental discrimination, colonialism, and injustice. And they have used New Mexico as an example, arguing that economic minorities are disproportionally affected by the dangerous industries that are often installed close to their communities and sometimes on their land. In the case of affected New Mexicans, the sentiment of being expandable or invisible has often been expressed in testimonies. Media coverage or the lack thereof plays an important part in creating such concerns—the example of the Church Rock accident is relevant. Environmental discrimination added up to the state's enduring colonial status. When looking at the state as a whole—its poverty levels and its population as a majority-minority state—one cannot help but notice the correlation between poor minorities and hazardous enterprise. The increased awareness concerning the dangers of nuclear weapons production and of nuclear waste generated a lot of anxiety and sometimes paranoia when the number of cancers seemed abnormally high in certain areas adjacent to nuclear installations. Past practices of dumping liquid waste in the surrounding canyons and burying solid waste in trenches on the mesas around Los Alamos exposed inhabitants on the Hill and in the valley to toxic substances. The first instances of allegations against the Lab occurred then. People started associating their health issues with playing in the canyons as children or with their jobs working near contaminants and turned to LANL for blame.

The rest of the state has had its share of environmental and health concerns as well, including contamination of water and waste management in Albuquerque, cleanup for uranium mines and mills in the Grants uranium belt, the catastrophic Church Rock spill in 1979, depleted uranium shells in Socorro, the remains of radioactivity from fallout of the Trinity test, cleanup of the Gnome and Gasbuggy sites in Carlsbad and Farmington, and the dangers of living close to WSMR or to WIPP. What is striking about the map of New Mexico's environmental legacy of the Cold War, and, by extent, of its nuclear complex, is that the poorer areas such as the South Valley neighborhood or the Navajo and Laguna Pueblo Indian reservations are disproportionally affected in comparison to the wealthier areas. This confirmed the environmental discrimination thesis and showed that inequality in terms of

exposure to health-threatening substances appear on the map of the country as whole, with states such as New Mexico being overly affected but also within the state itself, with more vulnerable people being more exposed to danger. Moreover, societies who use natural water sources, gather plants, farm the land, and have livestock are consequently more likely to be harmed as a result of their proximity to nature. As a result of this overexposure, New Mexicans have reacted with growing activism led by organizations that have been getting more powerful, that conduct their own research, and publish their own results as to the risks for the population. Their research is all the more significant as the poorer segments of society do not necessarily have access to information or the luxury to be selective about where they live or about the produce they consume. Because of this, many rely on organizations to guide them in the choice they can make. The insidiousness of radioactivity and its capacity to permeate soil, water, and air created particular anxiety among societies who depend on the land and also among all those who are traditionally attached to the land due to former lifestyles as described in part one. Interestingly, interviewees were divided between those who had faith in the Laboratories' and the DOE's ability to clean up contaminated areas and to protect citizens from harm, while others were concerned about the different variants of the same stories they heard depending whether the account came from opponents or proponent of the nuclear industry. Voices with agency have multiplied since the beginning of the antinuclear activist movement, because they attract an increasing number of people looking for information and protection.

The environmental impact is closely linked to the social, economic, and cultural impacts of the nuclear complex. The combination of corporate, political, and military interests built up the nuclear hierarchy within the industry with the masses at the bottom and the triumvirate of power at the top. The new social and economic order became geographically visible through the concentration of stark inequalities around the main centers of the industry, and the most evident illustration remains the town of Los Alamos and its relation to the surrounding area. In this part, I addressed more directly the issue of having one of the richest counties in the country in one of its poorest states. The geography of the Manhattan Project's socio-economic legacy presents us with pockets of wealth juxtaposed to poor or even depressed regions. Even though all benefited from the growth, benefits were distributed unequally among the population with a correspondence between wealth and out-of-state origin as degree-holding immigrants congregated to form these wealthy communities. From the point of view of Hispanics and Native Americans in the Española valley, Los Alamos has been, in turn, a

symbol of hope, a goal, an enemy, an ally, and an abnormality. The interviews of former employees and other testimonies, such as the point of view of the Española Valley High School, students made it possible to identify the recurring sentiments and experiences among these New Mexicans who, for the most part, came from families who had been living in the area for generations. These include feelings of discrimination (especially regarding promotions), of pride in working for the Lab and in the traditions and culture of the valley, of disconnection from the culture of Los Alamos, and of inspiration to better one's educational attainment and encourage children to pursue a higher education. Some have also become politically active and have participated in legal actions against LANL. Culturally, the long-term impacts of the Manhattan Project were similar to the introduction of any new economy in traditional, self-sufficient societies; it changed gender relations, created new aspirations among the young, and widened the schism between modernists and traditionalists. Both in the Hispanic and Native American communities, groups were opposed on the issue of adaptation and preservation of their cultural heritage. The cultural dilemma was underscored at the end of the 1990s by the struggle of the Hispanic homesteaders who showed their attachment to the land through their legal action to get fairly compensated for the sacrifice they had made during the War. Their action followed previous attempts by White Sands ranchers in the Tularosa Basin to fight the government on the grounds that officials had promised to return the land.

The first characteristic of the local legacy of the Manhattan Project is its longevity and its role in determining the future for the state of New Mexico. Current controversies center on the nuclear industry's newest developments and on the seemingly perpetual problem of cleaning up the toxic remnants from the last seventy years. Aside from the collective action to get compensation for the condemned lands, LANL and SNL have been under the pressure of isolated or class action lawsuits for discriminatory treatment since the first layoff waves in the 1990s, due in part to the end of Cold War, budget cuts, and the need to redirect the Labs' role to peaceful applications of nuclear science. Hispanic and women employees who were riffed denounced the fact that minorities had been disproportionally affected by the lay-offs. Settlements were reached to put an end to the conflict, but these scandals tarnished the Labs' image, further antagonizing its opponents and proponents. The legal developments also proved the determination of local employees to force the Labs to do away with discriminatory ways inherited from the earlier eras when local workers would get hired and fired seasonally as a flexible workforce.

After making substantial progress in getting jobs and attaining a higher education level, New Mexicans had gained in confidence, organization, and power. The last two topics I developed are the subject of ongoing debate and mobilization on the part of activist groups. The nuclear renaissance has rekindled the interest in U.S. uranium deposits, and companies have endeavored to obtain authorization and target residents in northwestern New Mexico, the Navajo community in particular, to get access to the land. The region around Grants still bears the signs of its boom and bust uranium economy, and thousands of mines have been abandoned without proper cleanup while other cleanup operations are still underway. Tribal representatives, indigenous activist groups, and grassroots organizations are fighting against further exploitation of uranium in the area and for more efficient decontamination solutions. They face the lure of profit which is all the more forceful when poor individuals are targeted and confronted with enticing promises by the uranium companies. The number of participants in the debate has grown. No longer are the Federal Government and the companies the only decision and policy makers. New Mexicans voice their support or their opposition to projects, and they have increasingly done so in the past decades. Yet, the situation of the state still resembles, in many aspects, its pre-war situation of dependence on outside forces and, as a result, the need for more employment still weighs heavily on the scale.

For over twenty years, the heated debate over WIPP in Carlsbad has caught the attention of all New Mexicans—supporters and detractors of the nuclear industry alike. With the possibility of depositing higher-level radioactive waste and the first release of radioactivity following a leak in February 2014, the plant symbolizes more than ever the dilemma between risky installations and job guarantees as well as a reminder of the role imparted on the West as a dumping zone for the nation's refuse. Much has been gained from the high-technology developed in the research centers of the nuclear-scientific complex. Many businesses and contractors have prospered thanks to defense contracts. Social improvements such as health care, hospitals, and schools are a direct result from the economic development which took place consequently to the scientific conquest. On the other hand, inequality growth, poverty, discrimination, conflicts, environmental degradation, and health concerns are the long-term fallout of this third conquest, which followed the path of the first two in many ways. The local perspective of New Mexico's nuclear history through the long unheard voices of New Mexicans reveals a multi-faceted experience of the Cold War in New Mexico. This experience mixes feelings ranging from relief and happiness to bitterness and disillusionment, depending on which side of the fence one stands; within or without the nuclear complex.

3. Nuclear tourism: remembering the bomb where it was born

One constant in New Mexico's economy for the past century and a half has been the role of tourism. The sector is extremely varied across a spectrum of activities ranging from UFO sightings to prehistoric sites; it includes themes such as the "Wild West," Native American and Hispanic arts and crafts and history, neo-pueblo architecture, hot springs, or natural beauties. On top of the tourist industry, New Mexico has long been a favored destination for moviemakers and Hollywood productions, including famous franchises such as *The Terminator*, *Indiana Jones*, *Transformers*, or *The Avengers*.[3] Over a hundred years, more than six hundred films were produced in New Mexico. The sets of certain movies, especially westerns, have been turned into tourist attractions, and themed tours are organized to retrace the cinematographic history of the state. Aside from many Western movies, a number of the films and series shot in New Mexico actually are about the themes of nuclear science and nuclear secrets or science fiction film that focus on the consequences of the nuclear era. The *Breaking Bad* series from 2008 to 2013 also largely contributed to the fame of the Land of Enchantment in the entertainment industry. Interestingly, the show is fraught with symbols of the nuclear era: first, the main protagonist's occupation as a chemist; second, his alias "Heisenberg" which references a leading Nazi German physicist, Werner Karl Heisenberg, who was at the forefront of Nazi atomic research during World War II; third, his diagnosis of cancer; and fourth, the socio-economic effects of a toxic substance—methamphetamine—that Walter White, aka. "Heisenberg," releases into the public of Albuquerque. It introduces a reflection on the profit that White makes from a destructive substance and business that breed violence and havoc.

Since World War II, a new kind of tourism has emerged in the state and is still attracting visitors. Nuclear tourism is yet another legacy of the Manhattan Project and a fascinating object of research. This kind of tourism consists in visiting landmarks of the nuclear area. Cold War bunkers, missile silos, sites of nuclear disasters, such as Chernobyl, and sites linked to the Manhattan Project all attract explorers. Even Hanford, which is dubbed "the most contaminated place in North America," has its tourists. According to Nathan Hodge and Sharon Weinberg, authors of *A Nuclear Family Vacation: Travels in the World of Atomic Weaponry*, this nuclear tourism is "fueled by a mix of Cold War nostalgia and morbid curiosity." In New Mexico, whose modern geography has been shaped by the weapons

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[3] For the exhaustive list of films shot in New Mexico see the Economic Development Department, *New Mexico Film Office*, Santa Fe, NM, http://www.nmfilm.com/, accessed April 4, 2015.

complex and where DOE is the biggest employer, they went on a tour of the bomb's birth sites. They describe how, in Los Alamos, "nuclear scientists sometimes hang pictures of their favorite tests above their desks; they can describe, in loving detail, the very personal reasons for their choices." They report that one of them "admitted that he named his son after Ivy Mike, the 1952 hydrogen bomb test." In Albuquerque, they visited the National Atomic Museum[4]; they note how the exhibit on radiation in the lower hall was meant to "demystify radiation" and that "the museum had to balance two almost contradictory goals: showing that nuclear weapons weren't at all that scary, while also demonstrating that nuclear weapons were terrifying enough to make anyone think twice about using them."[5] Museums presenting the state's nuclear history are indeed numerous, and they all aim at balancing the positive and negative aspects of nuclear science while promoting the state's involvement in the national nuclear complex. They include the Bradbury Science Museum, the Los Alamos Historical Society Museum, the National Museum of Nuclear Science and History, Grants' Uranium Mining Museum, the White Sands Missile Range Museum, and the Trinity site. Another standard in many museums is to display replicas of Fat Man and Little Boy; they can be seen in Albuquerque, in Los Alamos, in White Sands and at Trinity. In White Sands, a missile park outside the museum enables the visitor to take a stroll amidst replicas of all the rockets and missiles that were tested at the range, measuring their colossal size to one's height.

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[4] Now renamed the National Museum of Nuclear Science and History.
[5] Nathan Hodge and Sharon Weinberger, *A Nuclear Family Vacation: Travels in the World of Atomic Weaponry*, New York: Bloomsbury, 2008, 2; 31; 35; 40; 50-51.

Fig. 50: Missile Park at the White Sands Missile Range Museum. Source: Personal picture by Lucie Genay, October 2013.

These sites are the places where the memory of the atomic bomb and its legacy has been created. Visiting them is a unique experience for those who have been directly affected by the bomb. One example is specifically riveting because it highlights certain unsettling aspects of nuclear tourism. Kyôko Hayashi found a novel way to come to terms with her *Hibakusha* identity by travelling to the bomb's birthplace. She, like others of her fellow survivors in Nagasaki, felt compelled to put her story into written words to confirm through writing that what had happened on and immediately after August 9 had been real. In *From Trinity to Trinity*, she writes of her atomic pilgrimage through New Mexico to Los Alamos and to the Trinity test site. She describes her disturbing emotions as she discovers how, in these places, the museums have capitalized on nuclear tourism by selling t-shirts with mushroom clouds on them and pins of "fat man," the Nagasaki bomb. She calls Trinity the *Hibakushas*' birthplace because of the kinship she can feel with the animals and plants that died on the day of the first atomic blast; she write, "Standing on the land that speaks no words, I shivered, feeling its pain."[6] With irony and humor, she wonders how the other visitors would react if she took the Geiger counter that was used by one of the officers to show the level of radiations emitted by

[6] Kyôko Hayashi, *From Trinity to Trinity*, Trans, Eiko Atake, New York, NY: Midpoint Trade Books Inc., 2010, xxiii; 51.

Trinitite and put it against her body, because it would start screaming as it would pick up the radiation emanating from her.

The morality of transforming Trinity into a tourist site had already been at issue right after the War when it was suggested the site be made into a national monument. That was a discussion on how significant the site was but also on how appropriate it would be. A *Denver Post* reporter suggested in 1969 that "Trinity was America's guilt symbol, similar to a German concentration camp."[7] In 1965, Trinity became a National Historic Landmark and then a National Historic Site in 1975. The site opens its gates to visitors twice a year. A lava obelisk sits imposingly in the middle of the desert where the steel tower stood before the blast. Upon visiting the site, one can observe the attitudes of visitors who sometimes show patriotic pride or mourning. New Mexican anti-nuclear protesters or descendants of families affected by the blast have also used the site and its opening to the public as a means to draw attention to their causes.

Fig. 51: Lava obelisk at the Trinity Site. Source: Personal picture by Lucie Genay, October 2008.

The construction of memories of the atomic bomb in America has produced many polemics, especially when that memory was to be staged in exhibits. For instance, the Smithsonian Enola Gay exhibit of 1995 at the Smithsonian National Air and Space Museum

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[7] Szasz, *The Day the Sun Rose Twice*, 167.

in Washington divided veteran and anti-nuclear crowds to the point where the project was aborted and replaced by a simple display of the B-29 Enola Gay. At one end of the spectrum, veteran organizations asked for a balanced portrayal of Japanese atrocities and the atomic bombings, and opposed the use of victims' pictures which showed the bombing as a vengeful and racist act, and at the other end were those who believed the exhibit's primary goal should be to encourage the public to re-examine the bombings in view of the political and military factors which led to the decision—actions which brought suffering to Japanese civilians and had long-term implications including the heavy physical and psychological impact of nuclear denial and secrecy on Americans, as well as worldwide environmental and health consequences.[8]

Similar debates have taken place in Los Alamos where memory of the town's role in the nuclear era is staged in two museums. The Bradbury Science Museum, named after the Laboratory's second director, is meant to appeal to adults and children with interactive colorful exhibits that promote the role of LANL. A few panels in a corner deal with the environmental issues of nuclear research; they are entitled "What does the Lab do to protect its workers and the public from radiological hazards?" or "Restoring contaminated sites."[9] Two anti-war posters focus on the debate over the Japanese bombings next to an impressive billboard, bearing the heading "Why the bomb?," which provides the well-known answer "because it saved many lives." And in another corner of the museum, visitors can give their opinion in a public forum. A few interesting comments are from visitors who express how thankful they are for the bomb and how much fun they have had in the museum while others are more introspective: "This is a hard place to visit but I felt I had to. Something dreadful happened here."[10]

Personalities of the Manhattan Project are commemorated on a wall of fame of sorts alongside local workers who played a significant part in the success of the undertaking. These local workers include Beatrice Dasheno Chavarria of Santa Clara Pueblo, who was among the schoolgirls from St Catherine's Indian School in Santa Fe who were taken to the Hill in 1944 to work as housekeepers in the dorms. She is quoted saying, "When I found out about the

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[8] Mary Palevsky, *Atomic Fragments: A Daughter's Questions*, Berkeley, CA: University of California Press, 2000, 13.
[9] Personal visit of the Bradbury Science Museum on November 23, 2012.
[10] "Report from the Hilltop: Highlights of the Los Alamos Bradbury Science Museum," *National Toxic Land/Labor Conservation Service*, 31 May 2013, http://www.nationaltlcservice.us/2013/05/los-alamos-bradbury-science-museum/, accessed March 1, 2014.

atom bomb after Hiroshima, I really felt sorry for the poor people who died or were hurt during the bombing. I was disappointed to learn that making a bomb was what was being done at Los Alamos." This comment is counterbalanced by that of Consuelo "Connie" Fulgenzi who came from Las Vegas, NM, with five other women to work at the pass and badge office. She talked about her husband and said, "I was glad the war was over and Larry was coming home safely. He wouldn't be killed in the invasion of Japan." Julia Dasheno Roybal, another schoolgirl from St Catherine's, is associated with the imports of Anglo culture in Los Alamos. The sign reads, "She enjoyed going to the PX to get a Coke and ice cream with the other girls after work and liked going to the movies on weekends." The Hispanic homestead era is also represented with Severo Gonzales, son of Bences Gonzales, whose grandfather was the original homesteader at Anchor Ranch which became a testing site. And the Pueblo culture is represented by Angelita Vigil Martinez, niece of potter Maria Martinez, who worked as a housekeeper and child care. She is quoted describing the responsibilities she had to teach many young wives on the Hill how to clean and take care of a home and depicting the dances on Friday and Saturday nights at Fuller Lodge or at San Ildefonso Pueblo. To illustrate the drastic secrecy measures, the story of Ramon Sanchez, jackhammer operator, bus driver, and delivery truck driver, is presented. Sanchez was subjected to many hours of interrogation after his best friend, Rafael Aguilar, also a truck driver, died in a truck accident. Aliguar had lost control of the loaded vehicle and rolled down the hill. Project officials wanted to know if Aguilar had been drunk. When Sanchez insisted he personally knew nothing about it but could not get them to believe him, he was laid off.[11] New Mexican testimonies are thus present in the exhibit to reinforce the official story and the anecdotes of the Manhattan Project. They also strengthen the paradoxical image of a high-tech laboratory and internationally famous scientists installed in such a place as northern New Mexico.

Meanwhile, the Los Alamos historical museum, managed by the Los Alamos Historical Society, retraces the successive settlements on the Pajarito Plateau from the first Keres Pueblo Indians to the atomic scientists. The Historical Society brought memory onto the streets of the town as well by creating the "Homestead Tour" to restore a few signs of the initial inhabitants of the area whose land was condemned by the government in 1942. Almost nothing except the

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[11] Personal visit of the Bradbury Science Museum on November 23, 2012. These testimonies and pictures of each person, which were framed and hung in the museum, are extracted from Aj Melnick, *They Changed the World: People of the Manhattan Project*, Santa Fe, NM: Sunstone Press, 2006.

pond and a few log buildings, including Fuller Lodge, remain from that period, so the tour was made to tell the story of the homesteaders and of the LARS. One stop on the tour is at the Romero Cabin, which became a symbol of Hispanic Homesteading on the plateau. The whole town thus appears as a memorial for the Manhattan Project from the very entrance sign that reads "Los Alamos: where discoveries are made!" to the names of streets such as Bathtub Row[12] or Trinity Lane. Some had wished for such an outcome at Los Alamos after the War. The continuance of the Laboratory eventually did not prevent that wish from becoming true. Rather, the memory of the Manhattan Project has become a support for the Lab's existence.

Memory is a malleable substance that is influenced by time, space, and people. The birth of the nuclear age in New Mexico is a compelling example of this malleability for the significance of these events constantly shifts depending on what perspective or whose memory is chosen. The construction of memory depends, therefore, on whose memories are taken into account and considered as an important addition to history. In New Mexico, both collective and individual memories have been staged in an effort to connect the state with national history and promote the scientific successes that were achieved there. Yet, many memories and much of the Manhattan Project's local legacy are missing in the collective perspective on the nuclear age. Some of these missing voices have brought life to this research and have permitted to shed a new, different light on New Mexico's history with science.

[12] The name "Bathtub Row" was given to the street during the Manhattan Project as a reference to the fact that the houses on that street were the only ones equipped with bathtubs. Scientists at the top of the project's hierarchy were housed there.

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GLOSSARY

Acequias	The ditches of the irrigation system used in New Mexican villages.
Adobe	Building material traditionally used in the Southwest, referring to the sun-dried bricks made of mud (sand and clay), water, and organic materials (straw or dung).
Anglo	*Anglo* or *Anglos* refer to white Americans who are not of Spanish descent.
Arroyo	Natural ditches dug by flows of water which are usually signs of an imbalance between nature and human activity. The soil can no longer retain rainwater as it did before human overexploitation, and this gives the impression of a deficit in moisture when the water levels are actually not lower than before.
Cerro Grande fire	The Cerro Grande fire occurred on May 10, 2000. A fire that began as a prescribed fire to reduce some of the vegetative buildup in Bandelier National Monument burned into Los Alamos. It was the largest, most destructive wildfire in the state's history. More than 18,000 residents of Los Alamos and White Rock were evacuated. The fire burned about 48,000 acres and destroyed or damaged several hundred homes and Laboratory structures. It swept across forested acres in Bandelier National Monument, the Santa Fe National Forest, Los Alamos National Laboratory, Los Alamos County, and the Santa Clara and San Ildefonso Indian Reservations, causing about $1billion in property damage.
Chile	Red and Green hot peppers.
Chili Line	The Chili Line went from Antonito, Colorado, to Santa Fe and stopped in Tres Piedras, Taos, Embudo, Alcalde and Española. The official name of the line, which was operated by the Denver and Rio Grande Railway, was the Santa Fe Branch, but it was nicknamed after the *ristras* hanging on the front porches along the route. It was built in 1880, first to Española and later to Santa Fe in 1886 with the Texas, Santa Fe and Northern Railroad. It was closed in 1941 because of competition from road transportation.
Cholo	Term used to refer to young Chicanos who can be distinguished by the way they dress (white sleeveless tee shirts, khaki pants, flannel shirt buttoned at the top, sunglasses, derby hat or bandana, and tattoos), their speech, gestures, and urban culture. They may be gang members or just influenced by the *cholo* lifestyle.
Conchas	Meaning "shell" in Spanish, *conchas* are oval pieces of jewelry usually in silver and turquoise attached to braided leather to form a belt. It has become a well-known item of Navajo jewelry.
Cultural ecology	A term coined by anthropologists to refer to the reciprocal influence between people and their environment
Cyclotron	Particle accelerator invented by Ernest Lawrence and M. Stanley Livingston in 1932 that accelerates charged atomic or subatomic particles in a constant magnetic field.
Dawes Act	The Dawes General Allotment Act of 1887 provided for the distribution of Indian reservation land to individual tribe members to encourage them to

	become self-reliant farmers in the white man's image. The Indians who received land became U.S. citizens.
Downwinders	During the atmospheric testing era (1951-1962), the U.S. conducted 100 above-ground nuclear tests at the NTS. Over this period, effects were observed on livestock and increases in cancer rates (leukemia, thyroid diseases) were reported downwind from the NTS in communities in Utah, Nevada, and Arizona. The affected persons became known as downwinders. They, or their families, were eventually compensated for their health issues related to exposure to radioactive particles, after years of legal battle, with the Radiation Exposure Compensation Act (RECA).
Employment Act	The Employment Act was signed into a law on February 20, 1946. It was part of President Harry Truman's liberal domestic reform program called the Fair Deal and was stimulated by two elements: the concern that a peacetime economy would not be able to achieve full employment and the influence of Keynesian ideas on the necessity of government stimulus to push the economy toward full employment. The act recognized government responsibility in promoting maximum employment, production, and purchasing power.
Fee simple	A legal form of ownership under which the owner has absolute ownership of the whole property and is free to make additions or alternations to it without having to get the consent of neighboring property owners.
Four-corner region	These corners are the northwestern corner of New Mexico, the northeastern corner of Arizona, the southeastern corner of Utah, and the southwestern corner of Colorado.
Freedom of Information Act	Enacted on July 4, 1966, and taking effect one year later, the Freedom of Information Act (FOIA) provides that any person has a right, enforceable in court, to obtain access to federal agency records, except to the extent that such records (or portions of them) are protected from public disclosure by one of nine exemptions or by one of three special law enforcement record exclusions.
Gadget	The plutonium bomb tested at Trinity in July 1945 was dubbed the "Gadget"; it was an implosion plutonium bomb like the one later used at Nagasaki. Its detonation system was more complex than the gun-type uranium bomb used in Hiroshima and, therefore, required testing.
Gasbuggy	Third nuclear test in New Mexico and first joint Federal Government-private industry experiment in 1967, near Farmington. The test was part of the Plowshare program (the development of techniques using nuclear explosions for peaceful purposes) and was meant to stimulate natural gas production from low-permeability formations by using a nuclear explosion.
Gnome	Second nuclear test in New Mexico on December 10, 1961, near Carlsbad. The test was part of the Plowshare program (the development of techniques using nuclear explosions for peaceful purposes). The plan was to use the explosion to create an underground heat reservoir that would vaporize in the salt bed and the steam could be transformed into a power source.
Greater-Than-Class C waste	This is the most hazardous kind of low-level radioactive waste, which will be dangerous to inadvertent intruders beyond 500 years and must be

	disposed in a geologic repository unless an alternate method is proposed by DOE and approved by NRC.
Hibakushas	Name given to the survivors of the Japanese atomic bombings of Hiroshima and Nagasaki on August 6 and 9, 1945.
Hogan	Houses made of logs and earth that the Navajo build.
Homestead	Homestead comes from the Old English term *hamstede*, meaning home (*ham*) and place (*stede*). President Abraham Lincoln signed the first Homestead Act in 1862 which stated that any U.S. citizens over twenty-one could file a claim for 160 acres and receive the deed to that land if they completed the requirements for ownership.
In Situ leaching	In situ leaching (ISL), also known as solution mining, or in situ recovery (ISR) in North America, involves leaving the ore where it is in the ground, and recovering the minerals from it by dissolving them and pumping the pregnant solution to the surface where the minerals can be recovered. Consequently, there is little surface disturbance and no tailings or waste rock generated. However, the orebody needs to be permeable to the liquids used, and located so that they do not contaminate groundwater away from the orebody. Uranium ISL uses the native groundwater in the orebody which is fortified with a complexing agent and in most cases an oxidant. It is then pumped through the underground orebody to recover the minerals in it by leaching. Once the pregnant solution is returned to the surface, the uranium is recovered in much the same way as in any other uranium plant (mill).
Joe-1	Codename for the first Soviet atomic bomb in 1949.
Jornada del Muerto	The name of the desert means “journey of the dead man” in reference to the Spanish explorers and travelers who died of thirst or Apache Indian attack on that particular track of *El Camino Real* (the King’s Highway), which connected Spanish missions in the Southwest.
Jumbo	Huge steel cylinder planned to be used during the Trinity test to protect the area in case the plutonium sphere failed to explode and spread. In the end, it was not used but was left near Ground Zero.
Kiva	Underground circular ceremonial room of a Pueblo village, which is accessible from the roof with a ladder.
Lincoln County War	The Lincoln County War occurred in 1878 and lasted until 1881 when the Kid was killed by Sheriff Pat Garret. Rival business factions fought for economic domination of the county using murder, back-and-forth revenge, and gunfight. The conflict began with accusations of cattle rustling and led to a five-day gun battle at the courthouse. The most famous partakers were bankers, merchants, cattlemen, sheriffs, and outlaws including Billy the Kid, Pat Garret, William Brady, John Chisum, Alexander McSween, John Tunstall, James Dolan and Lawrence Murphy**.**
Long-term Environmental Stewardship Program	Long-term stewardship refers to all activities necessary to ensure protection of human health and the environment following completion of remediation, disposal, or stabilization of a site or a portion of a site. Long-term stewardship includes all engineered and institutional controls designed to contain or to prevent exposures to residual contamination and

	waste, such as surveillance activities, record-keeping activities, inspections, groundwater monitoring, ongoing pump and treat activities, cap repair, maintenance of entombed buildings or facilities, maintenance of other barriers and containment structures, access control, and posting signs.
Love Canal scandal	The worst environmental disaster involving chemical waste in the U.S. occurred in the Love Canal neighborhood in Niagara Falls, New York. In the 1940s and 50s, the Hooker Chemicals and Plastics Corporation used the unfinished waterway to dump nearly 22, 000 tons of chemical waste. The site was then filled in and sold to the local school district to build a school and to the city to build a suburban neighborhood. Leakage of contaminants in basements was detected in 1978. 239 families evacuated the area, which was purchased by the state of New York, after a high incidence of chromosomal damage was established among residents, leading to illnesses, miscarriages, and other effects.
Low-level waste	Low-level waste includes items that have become contaminated with radioactive material or have become radioactive through exposure to neutron radiation. This waste typically consists of contaminated protective shoe covers and clothing, wiping rags, mops, filters, reactor water treatment residues, equipments and tools, luminous dials, medical tubes, swabs, injection needles, syringes, and laboratory animal carcasses and tissues.
Lucky Dragon	Name of the Japanese fishing boat, Lucky Dragon #5 which was affected by fallout from the Bravo Castle test on March 1, 1954, a hydrogen bomb exploded by the U.S. at Bikini in the South Pacific. The boat was showered with radioactive ash. The crew—23 men—became ill and were all hospitalized with radiation sickness. One of them died from acute radiation poisoning.
Mesa	A *mesa* is a mountain that has a flat top and steep sides.
Microcurie	The Curie is a former unit of radioactivity named after Marie and Pierre Curie in 1910. Other units include Becquerels, Rads, the Roentgens, and Rems.
Moja'o	Spanish for "wetback," a pejorative expression used to refer to Mexican-American that describes their experience of crossing the Rio Grande illegally to come to the U.S.
Monopsony	A market on which one buyer (instead of a seller in a monopoly) is in control of a large proportion of the market and can thus act on the prices. It is also sometimes referred to as the buyer's monopoly.
Nuclearism	The faith in nuclear weapons as the mean for maintaining national security.
Pajarito	*Pajarito* means "little bird" in Spanish because it was the location of an ancient village called *Tsirege* (also spelled Tshirege): the Place of the Bird People.
Pinto bean	This variety is a staple food in the southwestern United States and northwestern Mexico. They are called pinto (painted in Spanish) because of their reddish brown spots. A traditional ingredient in Hispanic and Native American cuisine, they are the fifth most important crop in the state of New Mexico and Mountainair in the Estancia Valley is actually dubbed

	the Pinto Bean Capital of the U.S.
Private Ownership of Special Nuclear Materials Act	The Act requested by the AEC and passed in 1964 made it legal for uranium companies to sell yellowcake directly to nuclear power plant customers because it permitted private ownership of fissionable materials. It also introduced protectionist measures to make sure the domestic market would not be flooded by foreign producers.
Pueblo	Spanish word for "village," name that was given to the sedentary Indians of New Mexico.
Quitclaim deed	An instrument which transfers all of the right, title and interest that the conveyor has in a piece of property, but with no warranty or assurances that the conveyor has good and legal title; risk of liens or encumbrances pass to the transferee.
Ristras	Long strings of hot pepper which were left to dry in the sun under porches.
Roentgens	International unit of measurement for X-rays and gamma rays that is based on their ability to produce charged particles in the air. It was named after German physicist Wilhelm Röntgen who discovered X-rays in 1895.
Sitio	A large personal grant awarded in return for military, economic, or political services.
Strontium-90	Strontium-90 (Sr-90) is a by-product of the fission of uranium and plutonium in nuclear reactors, and in nuclear weapons. Sr-90 is found in waste from nuclear reactors. It can also contaminate reactor parts and fluids. Large amounts of Sr-90 were produced during atmospheric nuclear weapons tests conducted in the 1950s and 1960s and dispersed worldwide. Sr-90 emits a beta particle with no gamma radiation, as it decays to yttrium-90 (also a beta-emitter). Sr-90 has a half-life of 29.1 years. It behaves chemically much like calcium, and, therefore, tends to concentrate in the bones and teeth. Thus, Sr-90 is referred to as a "bone seeker." Internal exposure to Sr-90 is linked to bone cancer, cancer of the soft tissue near the bone, and leukemia.
Perro Caliente	This ranch in the upper Pecos Valley belonged to J. Robert Oppenheimer. The name means "hot dog" in Spanish.
Precipitron	Monitoring instrument developed during the War for measuring airborne alpha contamination.
Social Security Act	Responding to the impact of the Great Depression in 1935, the U.S. established legislation for a permanent national old-age (over 60) pension system through employer and employee contributions (the benefits were financed by a payroll tax on both). The Railroad Retirement Act of 1934 covered railroad employees separately. The social security system was later extended to include other groups.
Stochastic effects	These are effects associated with long-term, low-level exposure to radiation. They include various forms of cancer and genetic consequences and usually show years after the first exposure.
The Super	Nickname given to the thermonuclear bomb or hydrogen bomb, a fusion device which was developed by Edward Teller and Stanislas M. Ulam

	(with other scientists) and tested at Eniwetok Atoll on November 1, 1952 (codenamed MIKE).
Taylor Grazing Act	In 1934, the Taylor Grazing Act was meant to control the degradation of public grazing land by preventing overgrazing and soil deterioration, thus stabilizing the livestock industry that depended on those lands.
Test Ban Treaty	Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space, and Under Water signed in Moscow on August 5, 1963, by the United States, the Soviet Union, and the United Kingdom that banned all tests of nuclear weapons except those conducted underground.
Three Mile Island incident	On March 28, 1979, an accident occurred at the Three Mile Island nuclear power station in the Susquehanna River near Harrisburg, Pennsylvania. An automatic valve mistakenly closed in the reactor and shut off the coolant water supply that enabled to transfer heat. A series of technological and human errors ensued, resulting in a large accumulation of hydrogen gas in the reactor. Little radioactive gas was released in the atmosphere before the water circulation was restored, but the accident had a profound impact on the nuclear industry and on the American public, whose fear grew and fueled the anti-nuclear movement.
Transuranic waste	Material contaminated with transuranic elements—artificially made, radioactive elements, such as neptunium, plutonium, americium, and others—that have atomic numbers higher than uranium in the periodic table of elements. Transuranic waste is primarily produced from recycling spent fuel or using plutonium to fabricate nuclear weapons.
Trinitite	The Trinity blast melted the desert sand into a glassy light-green substance that was named Trinitite after the test's codename.
Yellowcake	A processed oxide of uranium, extracted and concentrated from uranium ore through milling that is used as an intermediate step in the production of nuclear weapons and as the raw material for commercial nuclear materials, especially fuel for nuclear reactors.
Zia	Zia is the name of a Pueblo tribe northwest of Albuquerque. The Zia Pueblo Indians consider the sun as guidance, as a father, and a life-giver. The Zia symbol is, originally, a religious symbol of the Pueblo and goes back to their ancestors. It could be found on pottery used for religious purposes during the solstices for instance. The rays symbolize the seasons, the cardinal directions, the stages of life (infancy, youth, adulthood, and elder) and the time of day (dawn, daylight, dusk, night). The circle represents the cycle of life. The rays are grouped by four to represent a strong body, a clear mind, a pure spirit, and devotion to the welfare of the people. The symbol was adopted to be on the state flag in 1925 after a contest that was won by physician and anthropologist Dr. Harry Mera. Mera saw the symbol on a piece of pottery of the late 1800s on display at the Museum of Anthropology in Santa Fe, and submitted a sketch of it. The symbol was painted red on a yellow background, the colors of Spain.

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ABSTRACT

On November 16, 1942, in the New Mexican desert, J. Robert Oppenheimer suggested to his military counterpart General Leslie Groves that Ashley Pond's Los Alamos Ranch School would be an ideal location for the establishment of a secret laboratory to pursue research on the design and construction of the atomic bomb. This event sealed the fate of New Mexico, dubbed the "Land of Enchantment," which acquired a new identity as the cradle of the nuclear age. The Los Alamos Laboratory paved the way to a third colonization of the area; a scientific conquest funded by the Federal Government and maintained by the arms race with the Soviet Union. Along the Rio Grande, the derivative installations of the Manhattan Project revolutionized the social, economic, and demographic order in the state while introducing environmental and cultural disruptions. And yet, seventy years later, New Mexico was still among the five poorest states in the nation despite its nuclear Eldorado.

This thesis assesses the double-edged quality and the multiple facets of the Manhattan Project's legacy in New Mexico. By evaluating the durability and distribution of the benefits entailed by the nuclear industry in terms of jobs, education, and standards of living, this dissertation focuses on the question of the extent to which local populations actually gained from this high-technology revolution, and of the environmental, socio-economic price, which has been and will have to be paid for the nuclear bonanza. Since the settlement of the first atomic pioneers in Los Alamos, the native populations of New Mexico—be they Indian Pueblo dwellers, Hispanic villagers, or Anglo ranchers—have had to adapt to the ups and downs of the new order based on a dependence on federal funds that were, in turn, determined by global politics, and to face an increasingly harsh competition with outsiders, i.e. nuclear immigrants to the state. A combination of military and government power with secrecy built up the mechanism of a local military-industrial and scientific complex, which maintained the region's status as an internal colony of the United States. Since the 1980s, growing public awareness of environmental and health consequences of radioactivity have prompted antinuclear reactions in New Mexico. Thereupon, many previously unheard voices have spoken up to shed a new light on the nuclear heritage in the state. This local perspective of the humblest, forgotten participants in the advent of the nuclear age lacks historical recognition; therefore, the purpose of this dissertation is to address the relations between New Mexicans and the local nuclear industry.