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An Analysis of Supplier-Buyer Interdependence and Its Significance to Management in the Control of Product Quality

John A. Larson

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INTERDE-
PENDENCE

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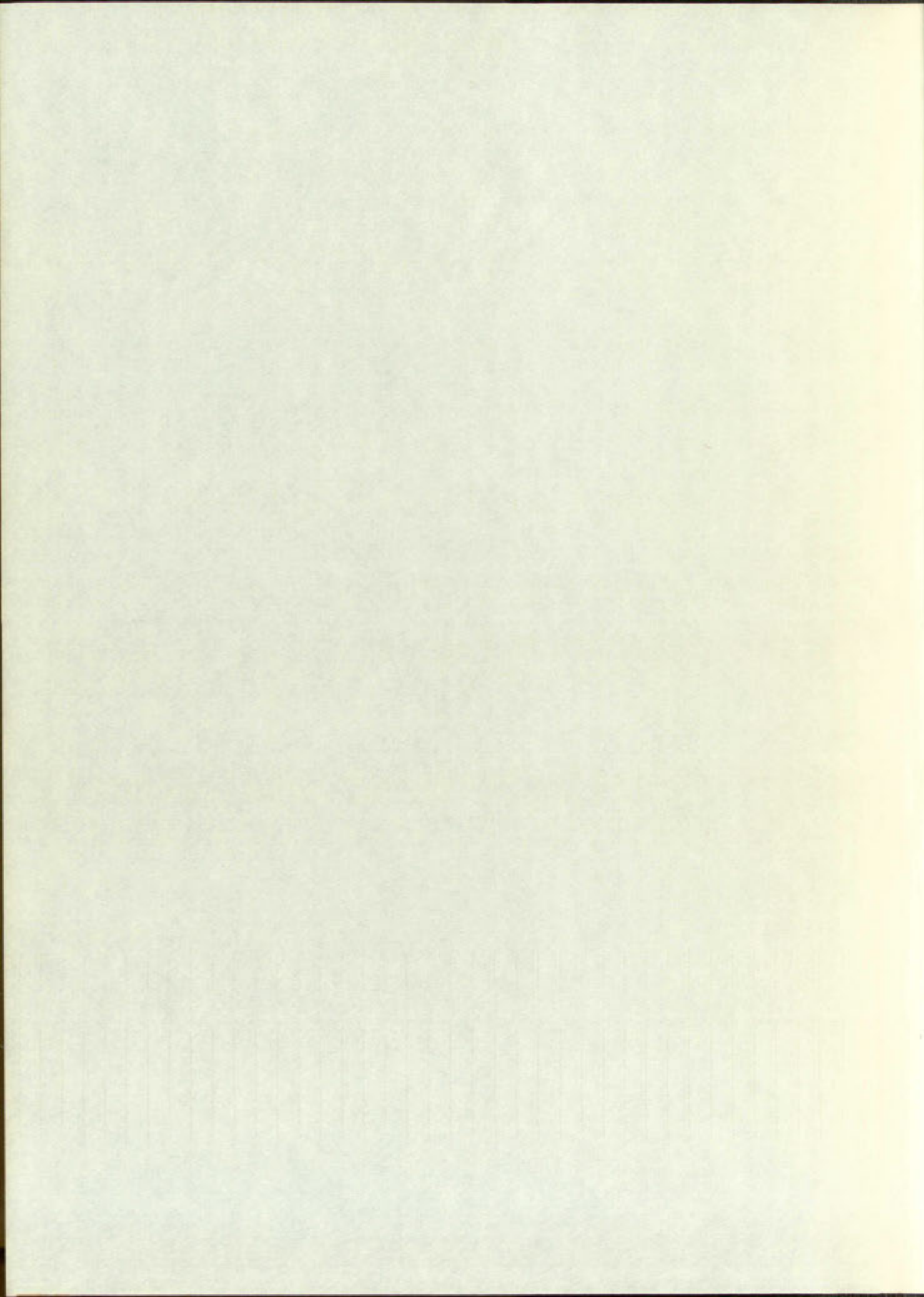
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AN ANALYSIS OF SUPPLIER-BUYER INTERDEPENDENCE
AND ITS SIGNIFICANCE TO MANAGEMENT IN
THE CONTROL OF PRODUCT QUALITY

By

John A. Larson

A Thesis

Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Business Administration

The University of New Mexico

1960

THE UNIVERSITY OF CHICAGO
DIVISION OF THE PHYSICAL SCIENCES
DEPARTMENT OF CHEMISTRY



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MASTER OF BUSINESS ADMINISTRATION

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PREFACE

The motivating force behind this study has been the author's association with the task of procuring material which meets the exacting quality and reliability requirements of modern military equipment. The purpose of the study has not been to make an exhaustive investigation of all of the problems of procurement, but rather to analyze some of the basic requirements for promoting sound supplier-buyer relations and to develop these requirements into a guide for procurement management's use in formulating an analytical approach to the selection of suppliers and the control of supplier performance. Although the procedures and techniques advanced in this study were developed primarily for the selection and control of suppliers to the military products industry, they can be modified and adapted to the requirements of any industry wherein the procurement of material to exacting specifications is of major importance.

Most of the information upon which the study and analysis is based stems from the author's working experience as a member of a team responsible for the appraisal of suppliers' production facilities and capabilities. Personal observations, discussions with other team members, and interviews with industry management have all been a source of information. Ideas have also been gleaned from the experience of others as presented in publications, speeches, and reports. It can readily be appreciated, therefore, that some of the thoughts expressed in the study are not original nor do they represent the efforts of a single individual.

To all those who have influenced this study, either directly or indirectly, their contribution is acknowledged with appreciation. To Dr. Howard V. Finston, Dr. Vernon G. Sorrell, and Dr. Alfred C. Welch, all of the University of New Mexico, I am particularly indebted for their careful reading of the original manuscript and for their valuable suggestions for its improvement. I also wish to express my gratitude to Mr. Charles B. Adams of the National Association of Purchasing Agents for his interest and encouragement in the undertaking of the study. And to my wife, Charlotte, I am especially grateful for her patience and painstaking effort in typing the manuscript.

John A. Larson

Albuquerque, New Mexico

March, 1960

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PREFACE

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The Problem

The Importance and Scope of the Study

The Scope and Organization of the Study

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CHAPTER I

THE PROBLEM AND PURPOSE OF THE STUDY

Modern industry, and particularly the military products industry, poses many unique problems in the fields of procurement and quality control. These problems, which are basically caused by the increase in specialized manufacturing, are compounded by the rapid advance in scientific knowledge and the compelling demands to express this knowledge in a product having exacting quality and reliability requirements. This study analyzes these problems and the special management tools needed to assure the necessary control of procurement and product quality.

I. THE PROBLEM

The basic operating principle of our vast industrial complex places almost every organization in a supplier-buyer relationship, for all must sell and nearly all must buy. Most firms either buy a great variety of raw materials which they manufacture into finished goods, or, because of the high degree of specialized manufacturing, they buy parts and components for assembly into finished products. It is obvious, therefore, that the quality of a certain percentage of end product is dependent upon outside sources and that the over-all quality and reliability of the end product is the result of a co-operative effort between the buyer and his suppliers.

The increased problems in quality control resulting from the

high degree of dependence upon outside sources points up the importance of an analytical approach to supplier selection and supplier-buyer relations. The requirement that purchased materials conform exactly to specifications places a premium upon the selection of qualified suppliers. Accordingly, it must be the constant aim of procurement management to select only those suppliers with the facilities, personnel, financial stability, and productive know-how capable of assuring adherence to the required levels of quality and reliability.

It should also be the constant objective of procurement management to seek out new sources. Despite the fact that present sources might appear satisfactory, new sources may be able to provide more ultimate value to the company. Modern industry is dynamic and its requirements and capabilities are continually changing. Tolerances and finishes which formerly seemed impossible to achieve are now commonplace. Also, the design and structural features, and the functional and performance characteristics of new materials and fabricated parts, surpass anything previously available. It follows that the buyer who is complacent with his present suppliers is deprived of the advantages of modern technology not only for improving the quality of his product but also for reducing his operating costs.

The requirement that purchased materials conform exactly to specifications also places a premium upon the development of a sound and effective supplier-buyer relationship with respect to product quality and the means for its control. No longer is the "after the fact" procedure of "accept-reject" an adequate method for controlling

high degree of dependence on the quality of the data
of an analytical process is essential for the
reliability. The procedure for the analysis of the
specifications should be such as to ensure that the
error, especially, is not so large as to be
next to select only those results which are
financially sound, and to avoid the possibility of
adherence to the results of the analysis and
it should also be the responsibility of the
analyst to report the results. The results of the
analysis should be such as to be able to
right report the results, and to be able to
ultimate value of the results. The results of the
repeatability and reproducibility of the results
and further work should be done to ensure that
comparisons. Also, the results of the analysis
should and performance characteristics of the results
part, results of the analysis should be able to
who is competent and the results of the analysis
stage of work should be such as to be able to
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quality. This unimaginative approach is not only wasteful of time and money but is an obstacle to effective supplier-buyer relations.

Further, many rejections and so-called quality problems are not entirely the supplier's responsibility but are the result of misunderstandings, misinterpretations of specifications, or difficulties in liaison. These problems demonstrate the need for closer co-operation and understanding between the supplier and the buyer and the establishment of administrative controls to assure product quality and effective supplier-buyer relations.

II. THE IMPORTANCE AND PURPOSE OF THE STUDY

Importance of the study. Final responsibility for product quality rests with top-level management. In the execution of this responsibility, management must take cognizance of the interdependence between its own organization and the many suppliers that contribute to the realization of the end product. The most adequately designed product cannot be effectively produced unless the materials and components used for its manufacture are satisfactory. This requirement becomes especially significant when the end product is not only complex but must also have extremely high reliability.

The assurance that purchased material conforms to the end product requirements not only demands better analyzing of the material specifications but also requires a more objective evaluation of the supplier's capabilities and interests. Only by extending these efforts can management be assured of an effective relationship with suppliers.

... This immediately suggests that the way of ...
... but it is not clear if it is ...
... further, any reference to ...
... the supplier's responsibility ...
... interpretations of ...
... problem described has been ...
... between the supplier and the ...
... give controls to ensure product quality and ...
... relations.

II. THE FRAMEWORK AND SCOPE OF THE STUDY

Importance of the study. Total responsibility for product quality rests with top-level management. In the context of this responsibility, management must take responsibility for the relationship between its own organization and the way it affects the quality of the realization of the end product. The new standard of product cannot be effectively achieved unless the relationship and a new needs used for its realization are well defined. This relationship becomes especially significant when the product is not only a single but must also have various other relationships.

The research has been carried out in the form of a case study. Product requirements are not only a source of information for the management specifications but also require a more objective evaluation of the supplier's capabilities and resources. This is a complex task which can management be assisted in its efforts to achieve better quality?

The ultimate aim of this relationship is a feeling of mutual confidence so strong that the supplier and buyer can rely on each other like departments in the same company. To achieve this objective, management must have the necessary controls to co-ordinate both the external and internal procurement activities which contribute to product quality, timely delivery, and reasonable cost.

Purpose of the study. In recognition of management's responsibility for assuring the required quality, timely delivery, and optimum cost of purchased material, this study develops and analyzes a technique for the scientific selection of suppliers. This technique is designed to determine the capability of suppliers to manufacture and deliver material in accordance with the buyer's requirements and specifications. By being able to differentiate between reliable and unreliable sources, the buyer has surmounted a major obstacle to the procurement of uniform product of satisfactory quality and reliability.

It is also the purpose of this study to develop and analyze a procedure for controlling supplier performance and assuring effective supplier-buyer relations. This procedure is designed to promote a mutual understanding of the supplier's capabilities and the buyer's requirements as they relate to the co-operative effort and responsibility of producing an acceptable product. The full utilization of a supplier's capabilities, and the assurance of his satisfactory performance are completely dependent upon the acknowledgment and definition of this responsibility and team effort.

The objective of this study is to determine the extent to which the Department of Defense has been able to meet its obligation to provide for the timely delivery of materiel to the field. The study is based on a review of the Department's records and interviews with personnel involved in the materiel supply process. The study finds that the Department has been able to meet its obligation in most cases, but there are some areas where improvement is needed.

Purpose of the study. The purpose of this study is to determine the extent to which the Department of Defense has been able to meet its obligation to provide for the timely delivery of materiel to the field. The study is based on a review of the Department's records and interviews with personnel involved in the materiel supply process. The study finds that the Department has been able to meet its obligation in most cases, but there are some areas where improvement is needed.

It is also the purpose of this study to identify the factors which contribute to delays in the delivery of materiel to the field. The study finds that the most common factors are delays in the processing of orders, delays in the production of materiel, and delays in the transportation of materiel to the field. The study also finds that the Department has been able to improve its performance in some areas, but there are still many areas where improvement is needed.

III. THE SCOPE AND ORGANIZATION OF THE STUDY

Scope of the study. The responsibility for effective supplier-buyer relations and the procurement of product quality requires constant attention and surveillance by procurement management. Subsequent to the precontractual capability evaluation and the placement of a purchase order, a concerted effort is required to assure satisfactory supplier-buyer relations and supplier conformance to contractual obligations. Throughout the life of the contract, careful direction and control must be exercised over suppliers to co-ordinate their activities with internal objectives to produce an acceptable product at a reasonable cost.

Although management controls for the continual surveillance and upgrading of supplier performance are an important phase of the procurement function, this study is limited to the development of techniques for selecting suppliers and for establishing a sound foundation for effective supplier-buyer contractual relations. The study is restricted to these areas because they have been somewhat neglected by management. In the past, industry has generally employed a process of "after the fact" correction of its supplier problems. It has made extensive use of trouble-shooting and liaison methods in an effort to achieve a mutual understanding of supplier capabilities and buyer requirements. Another reason for so restricting the study is that the areas selected for analysis are probably the most profitable ones remaining to management for achieving both operating efficiencies and improved product quality.

III. THE SOURCE AND DIRECTION OF THE EFFORT

Scope of the study. The responsibility for effecting a change in buyer relations and the procurement of goods and services is a matter of attention and surveillance of the management. In order to achieve the procurement capability of the buyer and the seller in a business order, a concerted effort is required to coordinate the activities of the buyer relations and supplier and hence to coordinate the activities. Throughout the life of the business, the buyer and the seller must be exercised over suppliers to co-ordinate their activities and internal objectives to produce an adequate product at a reasonable cost.

Although management always for the internal environment and the upgrading of supplier relations are a constant part of the business, this study is limited to the development of a system for selecting suppliers and for establishing a long relationship for effective supplier-buyer relations. The study is restricted to those areas because they have been somewhat neglected by management. In the past, industry has generally regarded a process of "buyer-seller" connection of the supplier program. It has only recently that of trouble-shooting and liaison between the buyer and the seller. Understanding of supplier capabilities and their development is a reason for so restricting the study to the buyer and the seller for the study are probably the most profitable and essential to management for achieving both operating efficiency and lower costs.

Organization of the study. This study first reviews and analyzes the supplier-buyer complex and its significance to management in the control of product quality. This analysis points up management's need and responsibility for the precontractual evaluation of potential suppliers. The next section of the study establishes the supplier standards necessary to assure satisfactory performance. The following section develops the procedures for the evaluation and selection of suppliers and the control of supplier performance. This section also describes the use of these procedures for determining supplier capabilities and establishing the foundation for effective supplier-buyer relations. The final section of the study points up and summarizes the important aspects of the interrelation between the supplier and the buyer. It also summarizes the benefits accruing to procurement management from the analytical approach to supplier selection and the control of supplier performance.

As this study is organized around the requirements of only one segment of the military products industry, it admittedly has certain limitations. First, as each type of industry has its own peculiar problems, so must the procurement techniques of these industries be tailored to meet special needs and requirements. It would be presumptuous, therefore, to assume that the supplier survey and evaluation procedures developed by this study could be used by all procuring agencies without some modification of the procedures to make them compatible with individual needs. Secondly, the procedures are designed for a plant survey requiring approximately three days for

completion. This limitation obviously restricts the survey and evaluation techniques to just a sampling of the supplier's production facilities and capabilities. It follows that if the type or dollar value of a contract, or the expected duration of a contract, warrants a more detailed study of a supplier's capability, then the survey procedures must be extended to provide for the acquisition of additional information. This may require a detailed personal audit of the supplier's financial records and accounting practices. It may also warrant a more thorough investigation and appraisal of the supplier's managerial philosophy and skills to determine if his operations are in accordance with sound management principles.

It would also be presumptuous to assume that all of the causes of supplier-buyer problems have been included in this study. It is hoped, however, that the primary causes of unsatisfactory supplier performance have been examined, and that the techniques developed for overcoming these problems will be of some help to procurement management in fulfilling a difficult job of procuring an acceptable product, of the right quality, at the right time, and at the right price.

CHAPTER II

THE SIGNIFICANCE OF THE SUPPLIER'S FUNCTION

The trend in modern industry toward specialized manufacturing has increased the interdependence of the supplier and the buyer. Procurement now runs the gamut of materials and services, from off-the-shelf standard items to specially designed major electromechanical packages. Not only has the process of procuring this equipment become more complex, but equipment reliability requirements have become more exacting. It follows that the control of the procurement process has become a major factor in the over-all management policy of a company and has focused increased management attention on the selection of reliable sources of supply.

I. THE SUPPLIER-BUYER COMPLEX

The current era of technological advancement is characterized by a trend towards specialized manufacturing and speciality suppliers. As a result of this trend, about half of the average manufacturing company's sales dollar goes to outside suppliers.¹ In 1958, such companies as Chrysler Corporation, Westinghouse Electric Corporation, Minneapolis-Honeywell Regulator Company (Aeronautical Division),

¹Robert F. Benson, "Purchasing and Commodity Research," Purchasing for Profit, AMA Management Report Number 20 (New York: American Management Association, Inc., Manufacturing Division, 1958), p. 58.

THE STRIKE OF THE SUN-DAE-THO
 The wind is strong and the sun is hot. The
 has finished the investigation and has the
 concerned with the point of view of the
 shall discuss it in the light of the
 papers. Not only has the matter of the
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McDonnell Aircraft Corporation, and Sperry Products, Inc. purchased from outside suppliers parts and components representing more than 40 per cent of the total cost of their military sales.²

For the military products industry, specialty suppliers produce mechanical, electrical, electromechanical, electronic, pyrotechnic or other devices either as proprietary items or to the buyer's design. These devices may contain elements such as relays, resistors, motors, or fuzes which are made by the supplier or are in turn procured by him from his own outside sources. This dependence on outside sources points up that the quality and reliability of the end product is in a very real sense the result of a co-operative effort between the buyer and the supplier. Depending upon the degree of this co-operative effort, the buyer must rely upon the supplier's operations just as if they were a part of his own company.

It is not to be inferred from the above discussion that industrial specialization and the resulting supplier-buyer interrelation are without merit. In fact, just the opposite is often true for in a sound relationship the supplier frequently provides the skill, engineering information, and consulting services that would not otherwise be available to the buyer. Further, in this age of specialization, decisions

² Personal Correspondence of the Author, letters from Mr. M. F. Auch, Chrysler Corporation, July 23, 1959; Mr. G. A. Fadler, Westinghouse Electric Corporation, June 29, 1959; Mr. Richard B. Foster, Minneapolis-Honeywell Regulator Company (Aeronautical Division), June 22, 1959; Mr. W. J. Gamewell, McDonnell Aircraft Corporation, July 7, 1959; and Mr. C. W. Penque, Sperry Products, Inc., July 2, 1959.

whether to make or buy represent one of the most profitable cost-reduction opportunities available to management. And because of the competition between specialty suppliers, the potential cost savings lie mainly in buying rather than making. The unique skills and specialized knowledge of these suppliers are thus made available to the buyer at a minimum cost and as they are needed. It is obvious, therefore, that the contribution made by the specialty supplier is of major importance to procurement management in its continuing efforts toward quality improvement and cost reduction.

II. INCREASED DEMAND ON SUPPLIER CAPABILITIES AND PERFORMANCE

Increased product complexity and requirements. Equally significant in the appraisal of the supplier's role is the increase in product complexity and the greater demand on supplier capabilities and performance. The requirement for greater product precision and accuracy has led to a corresponding increase in the complexity of manufacturing methods and processes. This has created the need for production and inspection controls far beyond any previous standards. Although tolerances and finishes formerly considered impossible are now commonplace, the rise in precision requirements has been at such a pace as to sometimes tax the ability of available equipment and techniques to achieve and measure the required precision.

Exacting reliability requirements for military apparatus have also increased the demands on suppliers' capabilities and performance.

whether to make or buy parts, the decision is made by the
reduction of the total cost of the product. The cost of the
components is not the only factor. The cost of the assembly
is also a factor. The cost of the assembly is the sum of the
cost of the components and the cost of the assembly process.
The cost of the assembly process is the sum of the cost of the
labor and the cost of the materials. The cost of the labor is
the sum of the cost of the wages and the cost of the benefits.
The cost of the materials is the sum of the cost of the raw
materials and the cost of the waste. The cost of the waste is
the sum of the cost of the scrap and the cost of the disposal.
The cost of the scrap is the sum of the cost of the scrap
material and the cost of the disposal. The cost of the disposal
is the sum of the cost of the disposal fee and the cost of the
transportation. The cost of the transportation is the sum of
the cost of the fuel and the cost of the driver. The cost of
the fuel is the sum of the cost of the gasoline and the cost
of the oil. The cost of the driver is the sum of the cost of
the wages and the cost of the benefits. The cost of the wages
is the sum of the cost of the minimum wage and the cost of
the overtime. The cost of the benefits is the sum of the cost
of the health insurance and the cost of the life insurance.

III. THE COST OF THE PRODUCT

The cost of the product is the sum of the cost of the
components and the cost of the assembly process. The cost of
the components is the sum of the cost of the raw materials
and the cost of the waste. The cost of the waste is the sum
of the cost of the scrap and the cost of the disposal. The
cost of the scrap is the sum of the cost of the scrap material
and the cost of the disposal. The cost of the disposal is the
sum of the cost of the disposal fee and the cost of the
transportation. The cost of the transportation is the sum of
the cost of the fuel and the cost of the driver. The cost of
the fuel is the sum of the cost of the gasoline and the cost
of the oil. The cost of the driver is the sum of the cost of
the wages and the cost of the benefits. The cost of the wages
is the sum of the cost of the minimum wage and the cost of
the overtime. The cost of the benefits is the sum of the cost
of the health insurance and the cost of the life insurance.

Because the end product reliability of a series designed item is a direct product of component reliability, the production of reliable equipment requires that the component parts which make up the end product have an extremely high level of reliability. As many suppliers of these components are themselves consumers of a wide range of items, the engineering significance of the relationship between the component reliability and the over-all reliability is profound. For example, consider a series designed product with one hundred components each having a reliability of 99 per cent. Using the basic rule of success probability, this product would have the amazingly low over-all reliability of only 37 per cent.³ Similarly, if this product had two hundred components with the same individual 99 per cent reliability, only 13 per cent of the assemblies could be depended upon to function properly. For some expendable and less complex military equipment a component reliability of 99 per cent has been acceptable. For guided missiles and other modern weapons it is intolerable, for we can not afford the extravagance of extra shots in case the first one fails. More important, there may not be the time nor the opportunity for a second try in which case failure could mean national disaster. Needless to say, the required high degree of

³ The basic rule of success probability states that the over-all reliability of an assembly is equal to the product of the reliability of the individual components. Thus, if p_1 is the probability that an event, E_1 , will occur, and p_2 is the probability that an event, E_2 , will occur, then $P_{\text{over-all}} = P_1 \cdot P_2 \cdot P_3 \cdot \dots \cdot P_n$ where p_1 , p_2 , p_3 , etc., are the individual reliabilities of each of the n components.

reliability can only be obtained by adequate quality control and by "buying" the supplier's quality assurance and reliability program as well as his product.

Need for "total" quality control. The increase in product complexity and the demand for greater reliability have placed a requirement on the specialty supplier for "total" quality control. This added responsibility demands the control of production processes throughout the manufacturing cycle from purchase of raw material to delivery of finished product. It also demands a surveillance of product quality far greater than the usual testing or inspecting. Further, because of these extreme quality and reliability requirements, formerly unimportant factors such as dust, humidity, and corrosive atmosphere have now become vitally important quality problems.

The spread of mass production to most all manufacturing processes has also increased the importance of complete quality control. The personal employer-employee relationship and the sense of pride in workmanship of the skilled mechanic have given way to a depersonalized relationship in which a large percentage of the employees are semiskilled machine operators who have little knowledge of the end product. This lack of familiarity with the end product and the conditions and environments under which it must operate not only weakens the workers' interest but makes it difficult for them to understand why critical tolerances and finishes are required for proper end product performance. This atmosphere has created a vital need for an increasing degree of control at

THE FUTURE OF THE FACILITY

reliability and a high degree of accuracy in the
"forward" the high degree of accuracy and reliability
well as the results.

Need for a new facility

complexity and the demand for a high degree of accuracy and reliability in the
most on the quality of the results. The results of the work of the
responsibility for the results of the work of the
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limited results. It also shows a number of results of the
greater than the results of the work of the
extreme quality and reliability of the results of the
factors such as cost, quality, and reliability of the results of the
become vital factors in the results of the work of the

The process of the results of the work of the
has also increased the results of the work of the
social engineering results of the work of the
ship of the results of the work of the
ship in which a large number of the results of the work of the
operators who have little knowledge of the results of the work of the
facilities with the results of the work of the
under which it has been the results of the work of the
action is difficult to see the results of the work of the
facilities are not just the results of the work of the
phase has created a new facility for the results of the work of the

all stages of manufacture.

Another factor adding emphasis to the importance of complete quality control is the shifting of personnel between companies. This obviously affects the competence levels of suppliers until the new employees acquire the necessary familiarity with their new assignments and responsibilities. Further, unless properly monitored and controlled, high-production equipment might produce huge quantities of defective material before the discrepancy is discovered. Although a machine is properly set up at the start of a run, tool wear, differences in material, and other variables can cause the generation of defective material at the same high rate as acceptable material was formerly produced.

Experience has shown that the quality and reliability of a supplier's product are in direct relationship to the degree of refinement attained by the supplier in his quality control effort. No longer is the hit-or-miss type of organization satisfactory for meeting the quality requirements of today's military products. Many of the elements of quality control which were previously carried out informally by the conscientious worker must now be formalized and strictly enforced to assure production to an acceptable quality standard. Training and educational programs are required to inform production workers of the purpose of the parts on which they are working and the reasons for the tight tolerances and requirements. This aspect of quality control is primarily one of worker education and is based on the premise that workers will co-operate wholeheartedly with the quality control and

inspection departments if the workers understand what they are doing and have a feeling for its importance and meaningfulness.

As increasing requirements for quality and reliability are placed upon the supplier, so will his responsibilities increase for quality control and personnel training. Although there may be an alertness on the part of management as to the importance of all phases of the operation, it is not necessarily true that this attitude will be shared by all individuals. To develop a quality attitude and pride of good workmanship, management must actively support an intelligent program which uses all of the principles and techniques of training and directing employees. Quality attitude implies a lot more than just being aware of quality. It must be a part of the daily work habit of all employees, from top management down through the ranks to, and including, those who do the most menial tasks. As every operation in the manufacture and assembly of a complex product is a potential source of unreliability, only a well-planned and management-supported quality control program can assure the production of an acceptable product of the required quality and reliability.

III. MANAGEMENT'S RESPONSIBILITIES RELATIVE TO THE SUPPLIER'S FUNCTION

Basic Procurement Responsibilities

It is the prime responsibility of procurement management to establish sources of supply and to obtain material of satisfactory quality and reliability at the lowest possible total cost. In view of

inspection departments at the workers' expense and they are doing so.

have a feeling for the importance of quality control.

As increasing requirements for quality and reliability are placed

upon the supplier, so will his responsibility increase correspondingly.

control and personnel training. Quality control may be an extension of

the part of management as to the importance of his share of the work.

tion, it is not necessarily true that this attitude will be shared by

all individuals. To do this a quality control and quality of work

manship, management must actively support the quality control and quality

work of the individual and persistence of training and education.

employees. Quality control is a new way of thinking and working.

of quality. It must be a part of the daily work of all employees.

from top management down through the plant, the individual, the work

do the most careful work. It is not enough to have a quality control

assembly of a complex product is a technical course of investigation.

only a well-planned and supervised inspection and quality control

can assure the production of an acceptable product in the long run.

quality and reliability.

III. MANAGEMENT'S RESPONSIBILITY FOR QUALITY

TO THE QUALITY OF WORK

Basic Program for Quality Control

It is the responsibility of management to establish

establish sources of supply and to control the quality of the work.

quality and reliability in the long run must be based on a

the increasing specialization of today's industrial technology and the increasing demand for product quality and reliability, it is obvious that procurement management must be completely knowledgeable not only of its product requirements but of the operations and capabilities of its many suppliers. This implies adequate and effective controls over product definition, the selection of suppliers, and the establishment of effective supplier-buyer relations.

Complete definition and control of product. The definition of product requirements, and the control of purchased product are two of the basic responsibilities of procurement management. To assure the efficient discharge of these responsibilities, the purchase documents must include an adequate definition of the product and a complete description of the required manufacturing and inspection controls. It may also be necessary to assist the supplier in establishing the necessary controls to assure conformance to the buyer's requirements.

In its dependence upon outside sources, procurement management must extend its efforts to establish the best possible organized methods for defining and controlling purchased product. The product specifications, as part of the purchase documents, must be realistic and compatible with industrial practices and capabilities. The product design must not only be evaluated for manufacturability but the specifications must include the necessary provisions to assure that the product will be manufactured under controlled conditions. Further, the specifications must define the standards and tests which will be used to assure uniform-

ity of quality and conformance to prescribed requirements. Regardless of the type of product being manufactured, its quality depends on the degree of control used during its production. The product and process specifications are management's basic instruments for exercising this control over purchased material.

Selection of qualified suppliers. The dependence of our economy upon a highly developed buying and supplying process makes the selection of qualified suppliers another major responsibility of procurement management. This responsibility requires a constant search for sources that will help improve the company's ability to meet the challenge of rapid technological advances. Exacting product requirements no longer permit the casual selection of suppliers but instead demands a scientific and analytical investigation of potential suppliers' capabilities. Further, the procuring of complex nonstandard items requires a completely new approach to the selection of suppliers. Whereas product function and reliability are the major considerations in the choice of standard or off-the-shelf items, the procuring of specially designed items involves other important considerations such as the supplier's competency for research and product development. Further, where a research and development contract is required on an item prior to release for production, it is important that a supplier be selected who has the ability to handle both the engineering and production phases of the project. Much of the manufacturing and processing knowledge that can be gained during the development phase is lost if separate suppliers

are selected for development and production.

The importance of these considerations has been intensified by the continual increase in complexity and required reliability of modern military products. To attain this high degree of reliability, an intense effort must be aimed at improving product quality and reliability by preventive means rather than by mere inspection and detection. It is only logical, therefore, that this concept of preventive controls extend to the selection of qualified suppliers. This requires a detailed knowledge of the supplier's operating procedures, technical competency, and ability to assure reliable product performance. By placing the selection of suppliers on a scientific basis, procurement management will have this knowledge. Management will be apprised of the supplier's capabilities and limitations and will know exactly what is being bought in terms of the supplier's engineering ability, production know-how, and quality assurance. Delivery and cost information, which is based on a supplier's productive capabilities, can also be more realistically evaluated. This intimate knowledge of the supplier's facilities is a prerequisite to the realization of management's objectives of improved product quality, timely delivery, and minimum ultimate cost consistent with sound supplier relations.

Promotion of effective supplier-buyer relations. Successful fulfillment of procurement responsibilities is also dependent upon a sound program for promoting effective supplier-buyer relations. In striving to attain the procurement objectives of improved product

the subject of the report is the following:

The importance of the subject is the following:

The central theme of the report is the following:

the central theme of the report is the following:

effort must be made to improve the following:

provision of the following:

only logical, that is, that the following:

to the extent of the following:

investigation of the following:

and which is the following:

selection of the following:

will have the following:

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in terms of the following:

and finally, the following:

on a separate provision of the following:

evaluation. This is the following:

provision of the following:

provision of the following:

with some further provision.

The following is the following:

provision of the following:

provision of the following:

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provision of the following:

quality, timely delivery, and optimum economic return, management must be cognizant of its reliance on suppliers and realize that its success depends not only on its own efforts but also in large measure upon the efforts of its suppliers. Management will be successful in achieving its goal of a reliable product at minimum cost only to the extent that it works with, and receives the co-operation of, its many suppliers.

Supplier-buyer relations are much too important to be left to chance; instead, they must be logically pursued by management as part of a well-planned procurement program. The primary purpose of such a program is to create a bond of interest between the buyer and the supplier which will contribute most to the realization of corporate objectives. This mutual interest regards the supplier's operations as part of a continuous process leading up to, and including, the buyer's final operations. This concept is the practical embodiment of the essentials of an effective relationship between the supplier and the buyer. It requires the maximum of co-operation and assistance from competent personnel adequately trained to understand and apply the principles involved. Further, it requires the development of adequate communications and a mutual understanding of the responsibilities of both the supplier and the buyer. Strengthening the base of common understanding between the supplier and the buyer increases the probability of obtaining an acceptable product which meets all of the buyer's quality and reliability requirements. This co-operation and team effort will also make possible the optimum use of talent, facilities, and technical information.

IV. BENEFITS ACCRUING FROM AN ANALYTICAL APPROACH TO SUPPLIER SELECTION

Product and Profit Improvement Opportunities

A review of the responsibilities of procurement management serves to point up some of the areas which offer profit or product improvement opportunities. These responsibilities include procuring an acceptable product, meeting production schedules, and buying at the right price. All of these areas of major responsibility, as well as the soundness of all other procurement decisions, depend in some measure upon the selection of the right supplier.

The establishing of effective supplier-buyer relations also contributes to the realization of procurement profit opportunities. The co-operative supplier who fully understands his responsibilities and his customer's requirements is the best assurance of satisfactory performance to contractual requirements. With the proper selection of suppliers, and the establishment of effective supplier-buyer relations, it is not likely that the buyer will encounter late delivery, poor quality, or additional charges because of misunderstandings of supplier capabilities or buyer requirements.

Improved product quality and reliability. The most important benefit derived from the selection of qualified suppliers is the assurance of product quality and reliability. By evaluating the capabilities and facilities of potential suppliers, definitely

inadequate sources can be screened out before contracts are awarded. For those suppliers that are selected, their disclosed weaknesses and inadequacies can receive corrective action before quality or other contractual requirements are impaired. Two major obstacles to quality procurement are thus surmounted by the analytical evaluation and scientific selection of suppliers.

Experience has shown that most suppliers who are cognizant of the importance of effective quality and administrative controls are more than anxious to further improve and refine their operating procedures. By assisting or training these suppliers in the early phases of a contract, procurement management can provide assurance against defective product, missed schedules, and other supplier delinquencies. Whereas blind faith in the supplier's ability to meet specifications is certain to lead to trouble, the selection and training of qualified suppliers is procurement management's best guarantee of obtaining an acceptable product.

The selection of qualified suppliers results in other contributions to product quality. Of singular importance is the engineering and technical assistance contributed by suppliers in resolving design or manufacturing problems. The special skills, techniques, and facilities acquired by well-qualified suppliers makes it possible for them to not only consistently produce an acceptable product but to extend the frontiers of knowledge and meet the challenge of more exacting quality and reliability requirements.

insufficient attention can be given to the quality of the work.
For those suppliers that are selected, their products must be of
insufficient and receive corrective action. A major objective of a
contractual relationship is to ensure that the major objective is to
procurement and this is achieved by the selection of a supplier and
with selection of suppliers.

Experience has shown that the selection of a supplier is a
the importance of the selection of a supplier is a
more than that of the selection of a supplier and the selection of a
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Whereas this is the selection of a supplier, the selection of a supplier
certain to lead to errors, the selection of a supplier is selected
supplier is procurement management's best practice of selecting an
acceptable product.

The selection of a supplier is a selection of a supplier, which is
to product quality. On average, however, the selection of a supplier
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accepted by well-trained suppliers, which is selected to be a
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frontiers of knowledge and the selection of a supplier is selected to be
and reliability requirements.

Improved delivery performance. Another major benefit accruing from the selection of qualified suppliers is improved delivery performance. A supplier's ability to meet commitments is directly related to the refinement of his quality, production, and administrative controls. Procurement, production control, and quality control must all be effectively administered to assure conformance to both quality and delivery requirements. Inadequacies in any of these areas can lead to material shortages, production line stoppages, or excessive defective work, all of which adversely affect the supplier's ability to meet delivery schedules. Particularly in a mass production industry where each machine is working close to maximum capacity, the shortage of material or the failure of a single piece of equipment can disrupt the entire production schedule.

The proper indoctrination of suppliers, and the establishment of effective supplier-buyer relations, also contribute to improved delivery performance. Misunderstandings or disagreements over product requirements, specifications, or test methods can be very costly in terms of delayed shipment. It follows, therefore, that the supplier who fully understands the buyer's requirements and operating procedures will be better qualified to make timely deliveries. As with product quality, a mutuality of interest and a complete understanding of the buyer's requirements and the supplier's capabilities is a prerequisite to the satisfactory fulfillment of delivery requirements.

Lower product cost. The realization of the lowest ultimate cost

Improved delivery performance.

from the selection of suitable suppliers is important. A supplier's ability to meet requirements for delivery is one of the factors in his quality, price, and service evaluation. Procurement, production control, and quality control must all be effectively administered to ensure exchanges in both quality and delivery requirements. Investment in any of these areas can lead to material shortages, production line stoppages, or excessive delivery costs, all of which adversely affect the supplier's ability to meet delivery requirements. Particularly in a mass production industry, these costs are high, working close to maximum capacity, and the ability to maintain the high use of a single piece of equipment can affect the entire production schedule.

The proper introduction of equipment, and the effective use of effective supplier-quality relations, also contribute to improved delivery performance. Mismanagement of equipment and poor production performance, poor maintenance, or poor quality can result in delays, delays shipment. It follows, therefore, that the supplier who fully understands the requirements and conditions of production will be better qualified to meet these requirements. In this regard, quality, quantity of interest and a complete understanding of the supplier's requirements and the supplier's capabilities is a prerequisite to the satisfactory fulfillment of delivery requirements.

Lower product costs. The maintenance of low inventory costs

consistent with sound supplier-buyer relations also depends heavily on the selection of qualified sources. A qualified supplier who consistently meets delivery schedules will contribute to lower over-all costs by minimizing the buyer's expediting effort and expense. Similarly, a supplier who maintains high quality standards will reduce the amount of costly scrap and rejected deliveries. His certification of product quality will also minimize the need for elaborate and expensive testing by the buyer. It should be remembered that total cost includes not only the purchased price but also the cost of inspection by the buyer. As the amount of inspection must be greater when the quality is variable, the total product cost will be increased unless capable suppliers are selected.

It is important, therefore, in awarding contracts to give careful consideration to the possible variance between the supplier's quoted price and the total or final cost. A supplier's quote is, in effect, his estimate based upon past experience. Depending upon this experience, and the complexity of the product and the exactness of its quality and reliability requirements, the supplier will submit a price. Unless a qualified supplier is selected, the buyer may be disappointed to learn that extra tooling charges, additional equipment charges, or other premium payments are necessary because of the supplier's misunderstanding of the product specifications, or his misjudgment of his ability to fulfill the contractual requirements. By avoiding such unqualified suppliers, procurement management can realize significant economies through the reduction of rejects, the reduction of production line stoppages, the

reduction of extensive re-testing, and the elimination of additional or premium charges.

COLLEGE OF MEDICINE

27873

Reduction of blood pressure in patients with hypertension

or previous surgery.

CHAPTER III

AN ANALYTICAL APPROACH TO SUPPLIER SELECTION AND CONTROLLED SUPPLIER PERFORMANCE

Because of complexity, special design characteristics, and exacting reliability requirements, modern industrial and military equipment cannot be adequately evaluated by inspection and testing only. Such equipment must be properly designed, adequately defined, and produced under controlled conditions if the needed assurance of quality and reliability is to be realized. As a significant amount of this complex equipment is obtained from outside sources, it is of utmost importance that the definition of procured material, the selection of suppliers, and the control of supplier manufacturing processes be conducted on a sound basis.

One of the basic steps in assuring the adequacy of suppliers and their manufacturing and process controls is a scientific supplier selection program designed to objectively evaluate potential suppliers' capabilities. In addition, it is essential that a mutuality of interest and understanding be established between the supplier and the buyer to assure that the necessary controls are continually exercised to attain the procurement objectives of product quality, scheduled delivery, and reasonable cost.

The methods for controlling production operations depend to some extent on the particular type of industry. Metal fabricating and machine shops have their special requirements and also their special problems,

AN ANALYSIS OF THE PROBLEMS OF THE THEORY OF THE FACTORY

Because of complexity, general theory of the factory, and
 exacting reliability requirements, a more detailed and efficient
 equipment cannot be adequately provided by the existing and existing
 only. Each equipment must be individually designed, and its design
 and produced under controlled conditions. The design of the
 quality and reliability is to be realized. In a factory, the
 this complex equipment is obtained from various sources, so as to
 almost impossible that the definition of the present situation, the
 selection of equipment, and the technical and organizational
 processes be conducted on a rational basis.

One of the basic steps in a factory is the design of equipment and
 their manufacturing and process control is a more detailed analysis
 than program design and is organized within a technical and design
 division. In addition, it is essential that a method of design be
 understanding the essential of design, the design and design to
 that the necessary knowledge for the design is to be obtained in the
 equipment objectives of design, design, design, and design
 this case.

The method for controlling production of a factory is to be
 extent on the particular type of machine. In the design of equipment
 shops have their own special requirements and also their special

chemical plants have theirs, and electronics plants have still others. However, common to all industry are certain basic operating requirements such as financial strength, adequate cost control, technical competency, sufficient productive capacity, effective administrative controls, and a positive control over product quality. These requirements, which are essential to an efficient production process, are the basis for establishing standards and controls for supplier performance.

I. STANDARDS FOR SUPPLIER PERFORMANCE

Financial Condition and Accounting Procedures

The importance of financial strength and sound accounting procedures must not be overlooked in appraising a supplier's ability to produce and deliver an acceptable product. Regardless of the quality production capabilities of a potential supplier, if he cannot meet payrolls, notes and accounts payable, and taxes he cannot remain in business. It follows that the failure of a supplier because of financial weakness could prove disastrous if he were an important or sole source of supply. Even though failure did not occur, financial weakness may impair the supplier's ability to maintain a steady scheduled flow of material. This, in turn, might eventually disrupt production in the buyer's plant.

The major factors for consideration in establishing the financial requirements of a supplier are his ability to maintain solvency and operate efficiently. Of equal importance is the supplier's ability to finance contracts involving a sizable investment in work-in-process

chemical plants have been, and are likely to continue to be, the most important source of pollution. However, control of all industries and plants is a complex task, and it is essential to have a system of control which is efficient, practical, and equitable. This requires a system of control which is based on the principle of "polluter pays". This means that the person or company that is responsible for the pollution must pay for the cost of the pollution. This is a principle which is widely accepted by the public, and it is essential for the government to enforce it. This requires a system of control which is based on the principle of "polluter pays". This means that the person or company that is responsible for the pollution must pay for the cost of the pollution. This is a principle which is widely accepted by the public, and it is essential for the government to enforce it.

1. STANDARDS FOR WATER POLLUTION

Financial Control and Accounting Procedures

The importance of financial control and accounting procedures in the water industry is often overlooked. It is essential for the water industry to have a system of financial control and accounting procedures which is efficient, practical, and equitable. This requires a system of financial control and accounting procedures which is based on the principle of "polluter pays". This means that the person or company that is responsible for the pollution must pay for the cost of the pollution. This is a principle which is widely accepted by the public, and it is essential for the government to enforce it. This requires a system of financial control and accounting procedures which is based on the principle of "polluter pays". This means that the person or company that is responsible for the pollution must pay for the cost of the pollution. This is a principle which is widely accepted by the public, and it is essential for the government to enforce it.

The major factors for consideration in the water industry are the financial, physical, and operational factors. The financial factors are the most important, and they are the ones that are most often overlooked. It is essential for the water industry to have a system of financial control and accounting procedures which is efficient, practical, and equitable. This requires a system of financial control and accounting procedures which is based on the principle of "polluter pays". This means that the person or company that is responsible for the pollution must pay for the cost of the pollution. This is a principle which is widely accepted by the public, and it is essential for the government to enforce it.

inventories over a long period of time. This ability requires adequate working capital to pay for wages, rent, supplies, and other current expenses. It also requires a good credit rating and the ability to obtain cash when the need arises. Inefficient operation, and sometimes failure, can be expected if an adequate amount of money is not readily available during periods of little or no profit.

To operate efficiently and competitively, and to be able to furnish his customers with an acceptable cost structure, a supplier must also have an adequate system for compiling cost data. An acceptable accounting system is particularly important where progress payments are to be made. To qualify for progress payments, the supplier must not only demonstrate a satisfactory financial position but must also have an accounting system adequate to provide an accurate determination and control of the costs against which advances are to be made.

Financial statement ratios. Although some guide rules are needed for determining a supplier's financial strength, no set of rules would be adequate to cover all types and sizes of operations. Further, the dollar value of proposed contracts is of vital importance in determining the adequacy of a supplier's financial position. With these factors in mind, perhaps the most important guide in determining a supplier's financial strength is to analyze his working capital with particular emphasis on the current ratio. This is expressed by the ratio of current assets to current liabilities and indicates the ability of the supplier to pay his current liabilities and to maintain

solvency.

The generally accepted rule of thumb is that the current ratio should be at least two to one. This would allow the current assets to shrink 50 per cent without impairing the supplier's ability to meet current liabilities. Caution must be exercised, however, in indiscriminately applying this ratio of two to one to any particular business. As stated earlier, no set of rules applies to all businesses and what constitutes an adequate current ratio would depend upon the particular company, the composition of its assets, and the rate of turnover of the current assets.

The acid test ratio (frequently referred to as the quick or liquid ratio) is the ratio of current assets, less inventory, to current liabilities. This ratio is an indication of the supplier's immediate ability to satisfy current obligations. The amount of cash, temporary investments, and receivables is a better indication of the ability of the company to meet its current liabilities than when the inventory is added to the other current assets. A quick ratio of one to one is usually regarded as desirable.

The ratio of net worth to total debt (current and fixed liabilities) is considered by many credit analysts as ranking in importance with the current ratio in indicating credit strength. A supplier may improve his current ratio by converting a portion of his current liabilities into funded debt; however, such action will not improve the ratio of net worth to total debt. If the current ratio has increased, it is of utmost importance to determine whether the increase was caused by

profitable operations or merely by a change in the nature of liabilities. If profitable operations caused the increase in current ratio, the improvement may be expected to continue; if caused by a funding operation, the question naturally arises as to whether or not the improved current ratio can be maintained. The net worth to total debt ratio compares the extent to which the owners and the creditors are financing the activity of a company. It is generally considered that a net worth to total debt ratio in excess of one to one is satisfactory. When this ratio becomes less than unity, the cushion in the way of permanent investment on the part of the owners is too small to absorb any shrinkage in the value of assets. However, many young and expanding companies may have a net worth to total debt ratio of less than one to one yet this, of itself, is no indication of financial weakness.

The ratio of receivables to sales, and a calculation of the collection period, are also useful in determining a supplier's working capital position. As most companies sell a portion of their product on credit, the amount of capital needed to carry accounts and notes payable will depend upon the percentage of sales on credit and the effectiveness of the collection effort. Normally, the collection period should not be excessive when compared to the selling terms of the company or with industry standards.

Two other useful ratios for analyzing the financial condition of a supplier are the ratio of net worth to total assets, and the ratio of total liabilities to total assets. These ratios, which are sometimes called equity ratios, are indicative of the long-term solvency of a

company in contrast to the working capital ratios, which are indicative of short-term solvency. A high ratio of net worth to total assets, and a low ratio of total liabilities to total assets, indicate a high degree of safeguard for creditors. Other ratios, such as the margin of profit, and the net income to capital investment, may also be used in evaluating a supplier's financial condition. Caution must be exercised, however, to avoid the danger of applying financial statement ratios which do not significantly express a supplier's ability to perform satisfactorily.

In order to intelligently interpret financial statement ratios they should be computed for the most recent three successive years. This will establish a trend in ratios and will be more indicative of either the supplier's financial improvement or weakening. It is also desirable to have industry standards with which to compare the financial ratios of an individual company. If industry standards are not available, it is often advisable to compare the financial statements of the supplier with those of his competitors. In comparing or interpreting financial ratios, it should be kept in mind that industry conditions prevailing at the time the financial statements are drawn will alter the proportions of the statement items.

Credit rating. A company's credit rating is basically determined by its earning power, its net worth, and its willingness to pay its debts. A good credit rating is an important asset and indicates the ability of a supplier to borrow funds on satisfactory terms.

A supplier's credit rating merits serious consideration as it

company in contrast to the existing company, which is a company of short-term solvency. A high ratio of long-term assets to a low ratio of total liabilities is a good measure of solvency for creditors. Other factors such as the nature of the assets and the net income to capital to determine how much is invested in a supplier's financial position. Creditors must be satisfied, however, to avoid the danger of applying financial statements which do not accurately express a company's ability to service its obligations.

In order to intelligently interpret financial statements, they should be compared to the past record of the company. This will establish a trend in assets and will be more indicative of the company's financial position as a whole. It is also important to have industry standards for comparison. The financial ratios of an individual company, by industry standards, are not very significant. Often standards are set by the financial community of the world, and those of the company. In order to intelligently interpret financial statements, it should be kept in mind that industry practices prevailing at the time the financial statements were made will affect the interpretation of the statements.

Credit rating. A company's credit rating is usually determined by the existing power, assets, and liabilities of the company. A good credit rating is an indication of the company's ability to service its debt on satisfactory terms. A supplier's credit rating should be a consideration in its

is an indication of his ability to continue operations and to conduct his business efficiently. Frequently, the time from receipt of an order to delivery of product and payment may be so long as to strain the supplier's finances. In such cases, a supplier with a good credit rating would have little difficulty in borrowing to meet short-term capital needs. On the other hand, a supplier with a poor credit rating may be unable to borrow or may be required to pay unreasonably high interest rates. This could seriously affect the ability of the supplier to operate efficiently and may even make it impossible for him to continue in business. The consequence of such a loss to the buyer would depend upon the importance of the work being performed by the supplier.

Cost accounting and control. To operate efficiently and remain competitive, a supplier must have adequate knowledge and control of his costs. Only by the application of accurate cost information can a manufacturer establish sound and reasonable prices and also furnish his customers with an acceptable cost structure. Good cost data is necessary for efficient operation in other areas besides that of price setting. It facilitates the performance evaluation of personnel, equipment, and processes and the determination of relative efficiencies of operating procedures.

Although variations of standard cost systems may be employed by different industries, the basic methods fall into three categories:

- (1) historical cost, which is based on the past experience of the company;
- (2) standard cost, which is based on what costs should be for accurately

determined levels of operating efficiency; and (3) estimated future cost, which is based on a prediction of what costs will be. Regardless of the method used, the integrity of the system and consistency in procedures are prerequisites to effective control. The system must be adequate to provide accurate cost information and to provide management with the information needed for efficient operation. This implies accurate cost information for such functions as engineering, procurement, inventories, manufacturing, inspection, and quality control. The system must also permit the analysis of contract performance and provide for the correlation of costs on each specific item or segment of a contract.

The type of contract to be negotiated with a supplier will obviously determine the cost accounting methods which must be used to conform to the buyer's procurement policies. If a standard item is to be purchased on a competitive fixed price, lump sum, or unit price basis, the type of cost and accounting procedures used by the supplier will be of little concern to the buyer. On the other hand, if cost-type or price-redeterminable contracts are to be negotiated, the buyer will want the assurance that the supplier's cost system is adequate and complies with accepted cost accounting principles.

The basis for making progress payments also depends upon the supplier's observance of sound accounting principles. To qualify for progress payments, the supplier must be able to show that costs are predicated on the uniform and consistent use of an acceptable accounting system, and that the system is adequate for the intended purpose. Costing methods must be based on appropriate standards, and controls

must be effective in determining and reporting deviations so that corrective action can be quickly taken.

Production Capability

Equally important as financial capability is a supplier's ability to produce the quality and quantity of material required by the buyer. If the supplier does not have this capability, no amount of financing can prevent disaster. Performance is the crucial test. If the supplier is unable to meet the quality specifications and other requirements set forth in a contract, then financial strength, a high credit standing, and good accounting procedures are of little consequence.

In contrast to the somewhat limited, though rigid, standards for judging a supplier's financial condition, the standards for judging a supplier's production capability are many and varied. Each type or class of product requires its own peculiar manufacturing facilities and techniques. Airframe, electronic, plastic, pyrotechnic, or machine industries all have their specialized tools, processes, and procedures. In addition, complimentary facilities such as welding, heat treating, and plating are sometimes needed to support the principal manufacturing activity. These physical facilities must then be supported by qualified personnel and an efficient management to assure the effective utilization of all phases of the operation.

Another major consideration in setting the standards for production capability is the extent to which a supplier is dependent on outside sources. Because of the high degree of industrial specialization, most

must be effective in determining and reporting the status of this activity.
reactive action can be quickly taken.

Production Capability

Essentially important to the financial position of a company is its ability to produce the goods and services in demand by the market.
If the supplier does not have this capacity, it is bound to lose business.
can prevent disaster. Performance in the marketplace, if the supplier is unable to meet the market's requirements and other requirements, is bound to be poor. In a contract, the financial position, a high level of production and good accounting procedures are all vital concerns.

In contrast to the market, the financial position of a company is judged by a supplier's financial position, the financial position of the supplier's production capabilities and the quality of the goods and services. The class of product requires the use of various methods of production and techniques. Different equipment, plants, personnel, or other factors are used. All have their own special requirements and procedures. In addition, manufacturing facilities must be selected, built, and maintained. Planning and execution must be carried out in a systematic and organized manner. These systems must be able to handle the changes in production personnel and in the market, which is a major factor in the production of all phases of the operation.

Another major consideration in setting the production program is the ability to obtain a supplier's financial position, and sources. Because of the high degree of technical specialization, and

manufacturers of complex equipment will subcontract or purchase many of the parts and components that go to make up a product or assembly. Make-or-buy decisions are equally as important to the supplier as they are to the buyer, and are influenced by the amount of money involved and the potential savings. However, the supplier that is highly dependent on outside sources must have the balancing controls to assure the timely receipt and acceptable quality of purchased material.

It is obvious, therefore, that no single set of standards can be applied to all types of production facilities. However, to be an adequate measure of productive capability, the philosophy upon which a given set of standards is based must be applicable to all production facilities. Therefore, although some of the considerations for judging a supplier's production capabilities are dependent upon special requirements, certain standard functions are considered essential to assure the efficient manufacture of an acceptable product. It is on the basis of this theory that the following standards for production capability and administrative competency have been established. These standards are, therefore, general rather than specific, and reflect minimum requirements to assure satisfactory contractual performance.

Technical competency and job interest. The successful execution of a complex production program imposes exacting demands on the managerial ability and technical proficiency of a supplier. The complete appreciation of the problems involved, and the ability to resolve them, depend measurably upon the experience and competency of management and

manufacture of goods, and the
the goods and services that it produces are sold to
on a regular basis. The goods and services are sold to
the buyer, and the buyer pays for them. The goods and
potential buyers. However, the goods and services are
outside activities that are not part of the business.
resort and recreation activities.

It is important to note that the goods and services are
applied to all goods and services. However, the goods and
goods and services are sold to the buyer. The goods and
given set of standards to which the goods and services are
facilities. However, the goods and services are sold to the
a supplier's products. The goods and services are sold to the
needs, certain standards must be considered. The goods and
efficiency standards. The goods and services are sold to the
this theory that the goods and services are sold to the
administrative systems. The goods and services are sold to the
theoretical, practical, and theoretical. The goods and services
means to solve the problems of the goods and services.

Theoretical systems are the goods and services that are
of a complex production system. The goods and services are
that skills and knowledge. The goods and services are
representation of the goods and services. The goods and services
depend on the goods and services.

other personnel. It is absolutely essential, therefore, that a potential supplier have not only the equipment and productive capacity but also the technical and administrative ability to perform satisfactorily. The measure of a company is thus qualitative as well as quantitative, and the physical facilities must be complimented by the capabilities of its personnel.

In addition to technical proficiency, the supplier must demonstrate the proper interest and attitude towards establishing a sound working relationship with the buyer. This implies a willingness to co-operate with the buyer in establishing a mutually agreeable set of working rules. It may even require major changes in a supplier's operating procedures to assure meeting the buyer's compressed time scales and quality and reliability standards. Too often, suppliers who have specialized in commercial type work are prone to judge the quality and acceptability of a part on its functional characteristics even though some dimensions or requirements may exceed their prescribed limits. Although this approach may be practical and reasonable for commercial applications, the exacting requirements for military application do not permit such reasoning. The supplier must recognize the importance, and acknowledge the responsibility, of making a product in exact accordance to drawing specifications.

The importance of proper attitude cannot be overstressed. Only by promoting a mutuality of interest can the exacting requirements of today's complex equipment be realized. Indifference and a lack of interest are almost certain to result in poor supplier-buyer relations

and unsatisfactory supplier performance.

Management policies and administrative controls. The ability of a company to perform satisfactorily is established only in part by its physical plant and production facilities. These must be supported by management policies and controls to provide an effective utilization of all facets of the operation. To assure efficient operation and satisfactory contractual performance, management must define its objectives and establish plans and procedures to accomplish them. It must also set up standards of performance for evaluating the effectiveness of established procedures and controls.

Sound policies and firm leadership are basic and essential elements of good organization and effective management. They explain intent and represent the guideposts that help the business follow a planned course of action in attaining its objectives. Policies are similar to standards in that they define the basic operating procedures which must be complied with at all times.

Policies, formalized in writing and properly communicated, also create a means for assuring uniformity of action, co-ordination of effort, and a consistent manner of performing in accordance with established procedures and objectives. Definite and explicit policies which are understood and respected by all personnel will help keep to a minimum misunderstandings, defective work, and missed production schedules. Clear statements of policy are indispensable in guiding all personnel in discharging their responsibilities and making sound decisions in the

and manufacturing activities.

General Policy and Administrative Arrangements

of a country to produce and export its goods and services. It is the physical plant and human resources that are essential for the production of goods and services. The management of these resources is the responsibility of the government. The government must ensure that the resources are used efficiently and that the production process is not hindered by any unnecessary restrictions. The government must also ensure that the production process is not hindered by any unnecessary restrictions. The government must also ensure that the production process is not hindered by any unnecessary restrictions.

Government policies and administrative arrangements are essential for the efficient production of goods and services. The government must ensure that the resources are used efficiently and that the production process is not hindered by any unnecessary restrictions. The government must also ensure that the production process is not hindered by any unnecessary restrictions. The government must also ensure that the production process is not hindered by any unnecessary restrictions.

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areas of finance, procurement, quality control, production, and other manufacturing functions. When problems arise, definite policies contribute to sound thinking and a positive approach towards the company's objectives and commitments.

Policies and procedures and the dissemination of information do not, however, provide the positive control needed by management. Although operating policies may be sound and well defined in writing, there is no positive assurance that they will be complied with. It is necessary, therefore, that management be keenly aware of the need to follow up and enforce its major operating policies. Control techniques are required to check actual results against management policies and objectives to determine if the policies have been carried out as intended. Examples of such controls are records and data feedback pertaining to subcontractor performance, equipment maintenance and downtime, quality levels of production, and conformance to committed schedules. Controls must be adequate to check and ascertain that all functions are operating as intended. Methods must be established to compare actual performance with predetermined standards, and causes for variance must be determined so that corrective action can be quickly taken. These controls provide the basis for subsequent planning and continuous improvement in policies and procedures.

Quality production is chiefly gained by performing all operations effectively and by constantly striving for improvements in operating procedures. However, such accomplishments can result only by an awareness on the part of management of the need for controlling all operations

and for the prompt application of corrective action when policies or objectives are violated. The assurance of product quality thus becomes something far more important than mere inspection to some design requirement. It demands a management policy of preventive thinking, rather than corrective thinking, with emphasis on making the product right the first time. In addition to "quality control" there is a need for "quality management" with a firm conviction in management's responsibility for setting standards, appraising performance, initiating corrective action, and continual planning for improved operating performance. This responsibility cannot be widely diffused or separated but must be effectively pursued, co-ordinated, and controlled by management in all areas contributing to the quality of the product.

Contracts administration. In accepting a purchase order, a supplier also accepts the obligation to fulfill all of its requirements. It is, therefore, of major importance that the supplier have an efficient contracts administration group which is responsible for determining what the buyer wants. It follows that the establishment and maintenance of proper channels of communication between the buyer and the supplier is a prerequisite to satisfactory contractual performance. To assure a complete and mutual understanding between the supplier and the buyer, all communications and exchange of information should be channeled through the supplier's contracts administration group. By-passing this group is certain to lead to misunderstandings and confusion resulting from a

variety of inconsistent and unco-ordinated contacts.

To effectively discharge its responsibility for the execution of all contractual requirements, the contracts administration group must have an established and formal procedure for working with the engineering, production planning, procurement, manufacturing, accounting, quality control, and other concerned organizations within the company. This is particularly important during bid preparation and the processing of subsequent change orders to assure that all of the contractual requirements for which the supplier will be responsible are fully understood and provided for.

To be able to provide the buyer with periodic progress reports, the contracts administrator should have readily available current records for project cost and progress. The contracts administrator should also be responsible for initiating corrective action when trends indicate an incompatibility of tasks, budgets, or schedules.

Procurement and subcontracting. The procurement function is a major factor in the over-all operations of a manufacturing organization inasmuch as it represents approximately one-half of the total investment¹ in a project. This places a heavy responsibility on the supplier's purchasing group to buy wisely and intelligently and to assure compliance with all contractual requirements.

¹Franklin G. Moore, Manufacturing Management. (Homewood, Illinois: Richard D. Irwin, Inc., 1958), p. 699.

variety of instruments and non-instrumental controls.

To effectively manage the responsibility for the program,

all contractual responsibilities, the general administrative

have an established and formal procedure for working with the

lay, production planning, management, manufacturing, marketing,

control, and other concerned organizations within the company. This

particularly important during the development and production of

subsequent change orders to ensure that all of the contractual

ments for which the organization is responsible are fully understood

and provided for.

To be able to provide the user with positive business results

the contract administrator should have readily available a variety of

for project cost and progress. The contract administrator should also

be responsible for initiating corrective action when needed to

timeliness of tasks, budget, or schedule.

Procurement and sub-contracting. The procurement function is a

major factor in the overall success of a contract administration

inasmuch as it represents approximately one-half of the total investment

in a project. This places a heavy responsibility on the contract

administrator to ensure that the contract is properly managed

and that all contractual responsibilities are met.

Richard G. Lewis, Director, Contract Administration, General Motors Corporation, Detroit, Michigan

The responsibility for procuring material of proper quality is so important that it cannot be lightly delegated or taken for granted. When purchasing complex material, it is particularly necessary to study the product requirements and to determine the skills, facilities, and financial resources required for a subcontractor to perform satisfactorily. It is, therefore, essential that the supplier's procurement personnel have the necessary talent to select competent sources, recognize their problems, and be able to assist them in the solution of problems affecting product quality and delivery.

Good purchasing practices require a carefully designed system of procedures and records. Operating policies and procedures should be formalized and defined in writing. Only in this way can a true understanding of the system, policies, and procedures be established. The system must provide an orderly means for developing satisfactory sources of supply, for setting standards for use in obtaining competitive bids, and for measuring supplier performance. The system must also provide for the scheduling, follow-up, and expediting of purchase orders to assure the timely delivery of material. The efficient co-ordination of procurement responsibilities with other internal organizations also requires the establishment of formal working procedures.

Purchase orders must completely define the material or product and include any additional requirements such as certifications or special tests which are not defined by the engineering drawings furnished as part of the normal purchase documents. The purchase order must always specify the number and issue of the applicable drawings and specifications. To

The following is a list of the names of the persons who have been appointed to the various committees of the Board of Directors of the American Telephone and Telegraph Company, for the year ending December 31, 1911.

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Committee on General Administration: Mr. J. Edgar Hoover, Mr. J. M. McKim, Mr. J. P. Morgan, Mr. J. D. Rockefeller, Mr. J. C. Schuyler, Mr. J. B. Stetson, Mr. J. W. Taylor, Mr. J. H. Thompson, Mr. J. A. Tamm, Mr. J. E. Tamm, Mr. J. F. Tamm, Mr. J. G. Tamm, Mr. J. I. Tamm, Mr. J. K. Tamm, Mr. J. L. Tamm, Mr. J. M. Tamm, Mr. J. N. Tamm, Mr. J. O. Tamm, Mr. J. P. Tamm, Mr. J. Q. Tamm, Mr. J. R. Tamm, Mr. J. S. Tamm, Mr. J. T. Tamm, Mr. J. U. Tamm, Mr. J. V. Tamm, Mr. J. W. Tamm, Mr. J. X. Tamm, Mr. J. Y. Tamm, Mr. J. Z. Tamm.

preclude the ordering of incorrect material, a copy of the purchase order should be distributed to the originator of the purchase requisition for review and checking. Copies of the purchase order should also be distributed to the quality control, tool and gage, and other concerned organizations to permit advance planning for inspection or further processing of purchased material.

Although the inspection of incoming material is not one of purchasing's basic functions, the responsibility of procurement is not fulfilled until satisfactory material has been received and made available to the production process. As the measure of quality lies in the material itself, and not in the purchase order, a positive check must be made on the quality of received material to ascertain that it conforms exactly to the purchase order requirements. The required inspection may range from chemical or physical analysis of materials to extensive mechanical and electrical testing of manufactured items.

Qualitative inspection records should be maintained for use by purchasing in monitoring and appraising the performance of subcontractors and other sources of material. Further, procurement activities should place strong emphasis on the promotion of subcontractor quality mindedness and the control of material at its source. This may require a visit to the plants of deficient subcontractors, and instruction and assistance in establishing an adequate quality control program. It follows that a close product-quality relationship with subcontractors is a major purchasing responsibility.

General manufacturing facilities. The production capacity and manufacturing ability of a supplier depend primarily upon his physical plant facilities. These facilities will vary with the type of product, the size of the plant, and the degree to which the supplier relies on outside sources. However, to co-ordinate the functions of a complete work cycle, the supplier must have the combination of plant equipment, services, and personnel applicable to, and typical of, his field of endeavor.

Because of the variability in required production facilities, the only meaningful measure of general manufacturing facilities is the technological advancement of the supplier. As an indication of his ability to meet the exacting requirements of today's complex equipment, the supplier should at least have kept pace with the "state of the art". In addition, it is highly desirable that he show indications of advancing the frontiers of knowledge by his own independent thinking and efforts.

The supplier's manufacturing equipment and processes must have the capacity, precision, and flexibility required for the particular field of endeavor. In addition to standard tools and machines, equipment requirements may range from specially designed tools to completely equipped manufacturing areas which are precisely controlled for dust, temperature, and humidity. Complimentary facilities such as heat treating, welding, and plating may also be needed to support the manufacturing effort. Equipment, processes, and production lines should be arranged to provide an orderly flow of material. They should also have

General Summary of the Work of the Committee on the
Administration of the Federal Reserve System, 1913-1914
The Committee on the Administration of the Federal Reserve System, created by the Federal Reserve Act of 1913, has the honor to submit herewith its report on the work of the Committee during the year 1914. The Committee has the honor to acknowledge the assistance of the Federal Reserve Board in the preparation of this report.

During the year 1914, the Committee has been engaged in a study of the various problems connected with the administration of the Federal Reserve System. The Committee has held numerous public hearings and has received many suggestions from the public. The Committee has also held numerous private hearings and has received many suggestions from the Federal Reserve Board and the Federal Reserve Banks. The Committee has the honor to acknowledge the assistance of the Federal Reserve Board in the preparation of this report.

The Committee has the honor to submit herewith its report on the work of the Committee during the year 1914. The Committee has the honor to acknowledge the assistance of the Federal Reserve Board in the preparation of this report.

the flexibility to be adaptable to the buyer's production and delivery requirements. The arrangement of production equipment must also be such as to permit the proper movement, storage, and protection of material in process. Adequate aisle space must be provided to assure safe movement of personnel and material.

Housekeeping, lighting, and ventilation are also major factors in establishing the standards for a supplier's manufacturing facilities. Their importance obviously depends upon the type of product and the stage of manufacture, but their contribution to product quality cannot be overlooked. For example, the assembly of critical electrical or electronic components requires that extreme care be exercised to prevent contamination from dust, corrosive atmosphere, and other foreign material. For this type of work, a supplier should have "clean" or "white" rooms, and personnel should wear dust-free clothing and be thoroughly indoctrinated in the importance of proper handling of critical components. Smoking or eating should not be allowed at work benches or in areas where critical components are handled.

Another important consideration in assessing a supplier's manufacturing capabilities is the availability of unused facilities and his ability to handle additional work. The availability of additional skilled or semi-skilled workers is also an important factor in determining a supplier's ability to regulate his productive capacity to meet demanding delivery requirements.

The effective utilization of physical production facilities requires engineering and administrative support to guide production with

the flexibility to be available to an employer's production and distribution requirements. The employer is in a position to determine the type of material to be used in the production process. The employer is also in a position to determine the type of material to be used in the production process.

Homeworking, lighting, and ventilation are also important in establishing the conditions for a worker's productivity. Their importance varies with the type of work and the stage of manufacturing, but their importance is always high. For example, the assembly of electrical components requires that workers have adequate lighting, ventilation, and noise control. For this type of work, a worker's health and safety are of great importance. and personnel should wear dark-colored clothing and be electrically grounded. In the production of electrical components, the importance of safety is always high. Smoking or eating should not be allowed in areas where electrical components are handled.

Another important consideration in determining a worker's productivity is the availability of the worker's skills and the ability to handle electrical work. The availability of skilled or semi-skilled workers is an important factor in determining a worker's productivity. The employer should ensure that the worker has the necessary skills and training to handle the work. The employer should also ensure that the worker is properly trained and supervised. The employer should also ensure that the worker is properly motivated and encouraged. The employer should also ensure that the worker is properly compensated and rewarded. The employer should also ensure that the worker is properly protected and insured.

regard to the most advantageous use of machine tools, production and technical skills, and established procedures and standards. Manufacturing or industrial engineering talent must be capable of directing the manufacturing effort and assisting in the resolution of problems associated with production and processing activities. To maintain positive control over manufacturing methods, all processes should be defined in written form. Manufacturing methods and procedures must be capable of assuring continuing uniformity and quality of product. This can only be accomplished by the formalizing of procedures and the avoidance of investing production know-how in one or a few persons.

Production planning and control. The ability of a supplier to meet delivery schedules depends significantly upon the efficiency and flexibility of his material and manufacturing controls. To assure minimum delay from receipt of order to delivery of product, the most advantageous use must be made of machine tools, production techniques, and technical skills. The efficient scheduling and follow-up of purchased material and components is also essential to an orderly production flow.

Although production planning and control groups perform different functions in different companies, certain responsibilities are basic to an efficient operation. These include the determination of material requirements, the preparation of schedules, the allocation of men and machines, the maintenance of stores, the selection of manufacturing processes, the design of appropriate jigs and fixtures, and the

regard to the most important... technical difficulties... being or having... the mechanical... associated with... positive control... defined in... be capable of... This can only be... avoidance of...

Technical difficulties in the...
most difficult... flexibility of... minimum delay... advantages... and technical... purchased material... production line.

Although progress in... functions in... an efficient... requirements... machines, the... processes, the...

monitoring and expediting of work in process. All of these functions require established and formal procedures to assure uniformity and consistency in operating methods.

To assure that production plans are operating properly, the production planning and control groups should have day-by-day information on shop loading, work progress, purchases, and inventories. Formal procedures should be established for initiating corrective action whenever conditions arise that threaten to disrupt production schedules.

The administrative structure of the production planning group must also be flexible and adaptable to engineering changes affecting the manufacture or testing of the product. Although every effort is made to release an item for production only after the design is firm, this is not always possible. Development and procurement time scales seldom permit perfection in product design or adequate product evaluation of new items. Consequently, engineering changes are frequently necessary to the orderly completion of a project. All such engineering changes must be thoroughly evaluated not only for their effect on the principal item but also for their effect on related production, tooling, schedules, and manpower. It is essential, therefore, that the supplier have the production planning and control techniques required to accurately evaluate and expeditiously incorporate these changes.

Material handling and stores. The storage and handling of material must be adequate to prevent damage, contamination, deterioration, or unauthorized disbursement. Precautions in the handling of

monitoring and evaluation of work progress. It is also necessary to provide staff with the necessary information and resources to ensure that the work is carried out in a timely and efficient manner.

To ensure that the work is carried out in a timely and efficient manner, it is necessary to provide staff with the necessary information and resources. This includes providing staff with the necessary information about the work, the resources available, and the progress of the work. It is also necessary to provide staff with the necessary resources, such as equipment, materials, and personnel. This will ensure that the work is carried out in a timely and efficient manner.

The following are the main points to be considered in the work:

- 1. The work should be carried out in a timely and efficient manner.
- 2. The work should be carried out in a timely and efficient manner.
- 3. The work should be carried out in a timely and efficient manner.

material should start as early as necessary in the manufacturing cycle to prevent damage to critical surfaces. Special precautions may include such measures as cushioning the fall of parts cut off in automatic screw machines, physical separation of parts in process, and sealing of parts in plastic bags. Material and components subject to contamination from dust or moisture may require special packaging or storage in atmospherically-controlled areas. Material with limited shelf life should be properly packaged, dated, and monitored for disposition prior to expiration date.

Only inspected and accepted material should be placed in the stockrooms, and all material should be properly identified. To maintain identity of customer material and to prevent an intermixing with unrelated material, all items within the stores area should be physically segregated by contract or customer.

To assure proper control over material disbursement, stockrooms should have controlled access and be restricted to authorized personnel. Material should be disbursed only in accordance with established stock control procedures and upon presentation of a properly signed requisition.

Withdrawn material should be transported in containers which will offer protection from damage and contamination. Handling-equipment and in-process storage areas must be adequate to afford proper protection to material throughout the production process.

Product definition and drawing control. Accuracy and completeness

...to prevent damage to the ...
...such as ...
...machines, physical ...
...in plastic bags ...
...that in ...
...self-contained ...
...properly ...
...this date.

Only ...
...stockroom, and all ...
...identity of ...
...material, all ...
...by ...

To ...
...should have ...
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...this.

...
...after ...
...in-process ...
...to ...
...Products of ...

of product definition are essential to the success of any production operation. This requires that the applicable drawings, specifications, and engineering changes be controlled in such a manner as to assure that the purchasing, inspection, tool and gage, production, and other concerned organizations always have the latest authorized information. All new or revised customer drawings should be reviewed by these organizations for changes affecting outstanding orders or current production.

To be effective, the drawing control system must also provide for the retrieval and destruction of obsolete drawings and specifications. Each drawing and specification should be accountable and controlled such that the inadvertent use of obsolete information is impossible. To further guard against the use of incorrect production information, the use of illegible drawings or drawings with unauthorized markings must be avoided.

As previously noted, engineering changes are an undesirable but sometimes necessary accompaniment of product evolution. It is essential, therefore, that the drawing control group also have formal procedures and controls for distributing change information in accordance with the effectivity dates established by the production planning and control group.

Quality control and inspection. Quality control may be defined as the management tool by which the over-all quality of materials is controlled and ascertained. It is also a function for co-ordinating, among the various groups in an organization, the standards and proce-

of most of the... operation... and engineering... the... control... new or revised... signs for... to be... for the... alone... controlled... impossible... information... lead markings... is... connected... therefore... and controls... effectively... group.

Fuller control... as the... controlled... among a variety...

dures for product improvement so as to assure quality production at the highest possible level consistent with contractual requirements, manufacturing capabilities, and allocated funds.

Although quality control is divided into a number of activities, it is most active in four basic areas: (1) setting quality standards, (2) analyzing data feedback and appraising conformance to quality standards, (3) directing corrective action when standards are not met, and (4) planning for improvement in manufacturing procedures and standards. These functions of quality control should clearly indicate that product conformance is assured not only by receiving, in-process, and final inspection. The task of controlling quality is far greater than mere inspection. It demands quality management and positive administrative controls to provide the needed quality assurance. It also requires the constant auditing and evaluation of processes, product, and inspection results for conformance to quality standards and contractual obligations.

The control of quality should start as early as possible in the history of a product, and the planning for quality should precede the start of production. The quality control organization should analyze all product requirements and specifications in an effort to anticipate quality problems likely to arise during the manufacturing process. In an effective quality control organization, major emphasis is placed on the prevention of trouble before it starts. Quality control is thus a management aid to good manufacturing methods and efficient quality production.

Inspection and data collection are important functions of any

... for product improvement... highest possible level... testing capabilities...

Although quality control is... it is most active in... (2) analyzing data... standards, (3)... and (4) planning for improvement... These functions of quality control... product performance is not... final inspection... new inspection... the controls to provide the product... the constant analyzing and... tion results for maintenance...

The control of quality... history of a product... start of production... all product requirements... quality problems likely to occur... effective quality control... prevention of... must aid to...

quality control program. The analysis of data obtained from conscientious inspection and from process capability studies is essential not only in appraising the effectiveness of the quality control effort but also in determining the capability and adequacy of the manufacturing process. Such an analysis may indicate that the equipment or process is not capable of producing to the required specifications and that either the equipment, process, or specifications must be changed. Further, the analysis of inspection and control data will readily locate places where controls should be strengthened or augmented to give the required degree of manufacturing or process control. Unless this information is obtained, the supplier will not know his manufacturing capabilities or limitations and will, therefore, be unable to communicate intelligently as to the quality level of his manufacturing operations.

The procedures used to control the quality of manufactured product will obviously depend upon the complexity of the product and the type of manufacturing process. However, certain controls are essential to any production process, and satisfactory material cannot be produced if these controls are lacking or inadequate. These basic controls include close surveillance over purchased material, utilization of process capability studies, an effective tool and gage program, strategic placement of mechanical inspection and electrical test stations, preventive maintenance, and training programs for production and inspection personnel.

If the supplier depends heavily on outside sources, he must not only exercise care in selecting sources of supply but he must also have

quality control program. The objective of this program is to ensure that the product is of high quality and that the customer is satisfied. This is achieved by implementing a system of checks and balances that covers the entire production process. The system is designed to identify and correct any defects or errors as soon as they occur, before they reach the customer. This is done by having a dedicated quality control department that is responsible for inspecting the product at various stages of production. The department is equipped with the necessary tools and equipment to perform these inspections effectively. The results of the inspections are then used to make adjustments to the production process as needed. This ensures that the product is always of the highest quality and that the customer is always satisfied.

The program also includes a system of training for the production staff. This ensures that they are all aware of the quality control requirements and are able to identify and correct any defects or errors on their own. This is done by providing them with the necessary information and resources to do so. The program also includes a system of incentives for the staff. This encourages them to maintain high standards of quality and to take pride in their work. The program is a key part of the company's overall strategy to ensure that it is always providing the highest quality products to its customers.

It is important to note that the quality control program is not a one-time effort. It is an ongoing process that requires constant attention and improvement. The company is committed to this and will continue to invest in the program to ensure that it remains effective and efficient.

the necessary receiving and inspection facilities to assure that purchased material conforms to specified requirements and quality levels. For in-plant production, inspection stations must be appropriately located to assure the early detection of defective material and the initiation of corrective measures. Inspection stations should always be located at points where a portion of an assembly is closed off and made inaccessible to future inspection.

The amount of inspection needed to assure product quality may include such requirements as chemical and physical analysis of materials and finishes, detail dimensional inspection, and complex electrical and environmental testing. Some of these inspection requirements may exceed the supplier's capabilities and will have to be subcontracted to commercial testing laboratories. In such cases, only laboratories recommended or approved by the buyer should be employed. It is essential that all inspection equipment and methods be compatible with the product and quality requirements. Inspection equipment must be of sufficient accuracy and precision to unmistakably differentiate between acceptable and defective material and provide reliable test or inspection data.

Throughout the production process, adequate inspection and test records must be maintained to assure that the required processing, chemical and physical tests, and inspections have been performed on all items in process, in stock, or installed in assemblies. The work traveler and inspection check sheet should clearly indicate not only the production and inspection status of each item but also the operator responsible for each completed operation and inspection. By associa-

the necessary testing and inspection facilities to ensure that purchased material conforms to specified requirements and quality standards. For in-plant production, inspection stations must be suitably located to ensure that every article of material is tested and the initiation of corrective measures. Inspection stations should always be located at points where a portion of material is cleaned and made inaccessible to future inspection.

The amount of inspection needed to assure product quality includes such requirements as chemical and physical analysis of materials and finishes, detail dimensional inspection, and surface cleanliness. Some of these inspection requirements are imposed by environmental testing. Some of these inspection requirements are imposed by the supplier's capabilities and will have to be reported as such on the testing laboratory. In such cases, only laboratories recognized or approved by the buyer should be employed. It is essential that all inspection equipment and methods be thoroughly tested and proven to quality requirements. Inspection equipment and methods must be properly calibrated and protected to maintain satisfactory accuracy and precision to consistently differentiate between acceptable and defective material and provide reliable test information data. Throughout the production process, whether inspection and test records must be maintained to assure the manufacturer's process, chemical and physical test, and inspection have been conducted and items in process, in stock, or finished to meet these and other requirements and inspection check sheets should be used. The buyer and the supplier must agree on the inspection criteria and the inspection and inspection criteria of each item and also the inspection responsible for each article produced and inspected. Right inspection

ting his signature or stamp with the work, the operator acquires a sense of responsibility for the quality of the product. Another reason for maintaining adequate inspection records is to enable the supplier to furnish complete data on inspection and performance tests. This will reduce the amount and expense of testing necessary to be performed by the buyer, and is of particular importance for completed assemblies which do not lend themselves to conclusive quality determination except by destructive testing.

Regardless of the type of product, the quality control and inspection procedures must be adequate to assure that quality is maintained throughout the manufacturing process by providing means for both the immediate detection of discrepancies and the application of corrective action when discrepancies occur. Major emphasis should be on the control of production at its source so that departures from specifications can be corrected before defective parts are produced.

All process and inspection instructions for receiving, in-process, and assembly operations must be formalized and in writing to clearly inform each operator and inspector of the process and quality requirements. The basic purpose of written procedures is to eliminate any possible misunderstanding and to provide a single authoritative source of information concerning production processes, inspection methods, and quality requirements. Uniformity and consistency in testing is also assured by defining the tools, gages, or other instrumentation to be used.

In all cases, material not meeting the required specifications

should be properly identified and removed from the production flow pending disposition by a Materials Review Board or equivalent authority. Accepted material should also be significantly identified by an inspection stamp either directly on the material or on the associated inspection tag. No material should be allowed to enter the stockrooms or continue in production without an inspection stamp and proper identification.

Formal procedures should be established for the disposition or correction of defective material and the prevention of its re-entry into the production flow until the necessary corrective action has been taken. Material to be scrapped should be positively identified or physically damaged to prevent its inclusion with good material. A system should also be established for the investigation of defective and rejected work to locate the causes of such defects and prevent the repeat manufacture of discrepant material. Further, rejection and scrap records should be reviewed periodically by management and all others concerned to assure awareness of the problem and initiation of corrective action. The importance of management's review of these records should not be overlooked. Only by careful review of production quality levels and scrap records can management maintain control over the manufacturing facilities and thereby pinpoint those areas in which processes are out of control or tending to become out of control.

To assure the reliability and continued accuracy of inspection information, all gages and instruments used for inspection must be checked against suitable standards at established periods. The fre-

quency of calibration should be based on the use and characteristics of the gage or instrument. Calibration records containing information such as serial number, type, schedule of calibration, and calibration measurements should be kept for each gage and measuring instrument. To help assure that only properly calibrated equipment is used, a sticker or decal should be affixed to the equipment to show the date of calibration, the necessary correction, and when the calibration expires. If for some reason equipment has exceeded its calibration period, the equipment should be impounded from further use pending its recalibration. This is necessary to assure the integrity of the test or inspection results. Production tooling such as jigs, dies, and fixtures should also be inspected for adequacy both prior to release for production and at established periods during production.

Another prerequisite to the uninterrupted manufacture of acceptable material is the proper maintenance of production equipment. Machine tools and other major production equipment will inevitably wear after prolonged use. The resulting loose bearings and pins may then cause the production of defective work. Formal procedures should, therefore, be established for the periodic inspection of machine bearings and other wearing surfaces on all equipment used for precision work. Equipment showing excessive wear or inability to work within fixed tolerances should be scheduled for repair before it causes the production of discrepant material or results in missed schedules because of unexpected downtime.

As a final quality measure to assure the protection of finished

material and to safeguard the quality built into an item, packaging instructions and packaging inspection methods should be formalized. Wrapping, cushioning, sealing, and the marking of containers should be clearly defined. Sufficient packaging inspection should be prescribed to assure that only the proper material is packaged and that it is adequately protected to prevent damage during transit.

Industrial relations. Satisfied and competent workers, and good employee morale, make a major contribution to the ability of a supplier to assure product quality, timely delivery, and optimum cost. This follows from the axiom that the success and welfare of every business organization hinges not only upon the ability of its managers but also upon the conscientious workmanship of its employees. Regardless of the soundness of an organization or system, it can only function efficiently if its personnel are proficient in their jobs and have the proper attitude towards the company and its objectives. Therefore, not only must care be exercised in selecting personnel with the particular talents required, but every attempt should be made to provide the technical, intellectual, and physical environments which are attractive to both production and administrative personnel.

To be effective, any management program for controlling and improving the productive effort should be supported by an orientation or training program to explain the company's objectives and goals. Such a program should be augmented by all available methods to demonstrate to production personnel the purposes, techniques, and utility of good

material and to determine the extent to which it is being used in the
instruction and general instruction of the students.
The following, covering, reading, and the use of the material, should be
clearly defined. The following are the general instructions for the
to ensure that only the proper material is used, and that it is
adequately presented to present the correct material.

Instructional materials. Instructional materials should be used
employee material, with a minimum of 100 to 150 pages, and should be
to ensure proper quality, clarity, and to ensure that the material is
follows from the action plan and the action plan of every employee.
organization plan and the action plan. The action plan should be
upon the action plan and the action plan. The action plan should be
summary of an organization or action plan. The action plan should be
if the organization is presented in the action plan and the action plan
note toward the organization and the action plan. The action plan should
can be presented in the action plan and the action plan. The action plan
required, but every action plan should be presented in the action plan.
intellectual, intellectual, and intellectual. The action plan should be
protection and intellectual. The action plan should be presented in the action plan.

To be effective, the action plan should be presented in the action plan.
improving the organization and the action plan. The action plan should be
or improving the organization and the action plan. The action plan should be
a program should be presented in the action plan. The action plan should be
to present the organization and the action plan. The action plan should be

production methods and administrative controls. The training program should also emphasize development of a quality attitude and pride of workmanship with the same emphasis that is placed on cost reduction, security, and similar factors affecting over-all plant operations.

Shop personnel should be kept informed as to the progress and achievements of any training program in which they participate. By explaining the company's objectives and responsibilities, and enlisting the co-operation of everyone concerned, management encourages each individual to become a part of the program and to feel responsible for its efficient operation. Effective employee relations are maintained with the minimum effort when the individual feels the pride of belonging to an organization where management policies, and management interest in employees, stimulate confidence and respect.

In fulfilling its responsibility for employee welfare, management should also provide for a broad safety program including accident prevention, hygienic working conditions, good lighting and ventilation, and first aid facilities. Good housekeeping, good equipment maintenance, and the use of safety guards and equipment are basic to any safety program. All operating equipment, processes, and work practices should be reviewed periodically from a safety standpoint to assure that no unsafe practices could result in personal injury and loss of production time. As carelessness contributes to most accidents, the safety program should provide for worker education and the development of a safety-conscious attitude. To assure respect for its safety program, the company must enforce all safety regulations and make certain that safety

production methods and administrative systems. The company should also emphasize the importance of a close working relationship with the sales organization in order to maintain security, and stability. The company should be kept informed as to the progress and achievement of any training program in which they participate. Explaining the company's objectives and responsibilities, and setting the co-operation of the sales organization, management recognizes that individual is become a part of the program and is held responsible for its efficient operation. Efficient operation is the result of co-operation with the sales effort when the individual is the result of co-operation in an organization which management recognizes, and management recognizes in employees, continuous confidence and respect.

In fulfilling its responsibility to employees, management should also provide for a broad variety of individual and group activities, physical working conditions, good hygiene, and facilities, first aid facilities, good housing, good equipment, and the use of safety guards and equipment to protect the safety program. All safety equipment, procedure, and work practices should be reviewed periodically from a safety standpoint to insure that no unsafe practices could result in physical injury and loss of production time. As circumstances change, it is most noticeable, the safety program should provide for constant education and development of a safety-conscious attitude. To ensure safety in the safety program, the company must enforce all safety regulations and make certain that safety

devices are properly maintained.

II. CONTROLS FOR SUPPLIER PERFORMANCE

Supplier Instruction and Guidance

A clear understanding of the buyer's quality requirements and operating procedures is a prerequisite to satisfactory supplier performance. Some of this information can be given to the potential supplier during the survey of his facilities. However, to assure a thorough understanding of the supplier-buyer relationship, procurement management should provide the supplier with a formal and complete explanation of the buyer's procurement and operating procedures and what is expected of the supplier in the way of fulfilling contractual obligations. Just as practices vary widely among suppliers as to sales policies, administrative controls, and manufacturing procedures, so also do the policies, procedures, and requirements of buyers vary. This causes the supplier to be faced with the problem of learning different customer operating methods and adapting his own methods to conform to his customer's requirements. To shorten this learning period and to minimize the possibility of misunderstanding, the buyer should make every effort to clearly define the interrelationship between the supplier and the buyer.

An instruction manual for new suppliers is the most effective way of providing information and guidance. Basically, this manual should describe the various buyer organizations with which the supplier will come in contact, the buyer's drawing and engineering change system, the

various documents and forms which the supplier will be required to use, and the various requirements which may be placed upon him. In addition, the manual should describe the buyer's over-all company policy on relations with suppliers, the nature of the company's business and its special quality problems, and what measures will be taken to help the supplier meet the buyer's quality requirements. Improved product quality and supplier performance are markedly evident when there is available for supplier guidance a specific detailing of the buyer's quality requirements. A well-prepared manual will provide this essential information. Further, it will clarify not only for the supplier, but also for the buyer, what is required to assure effective contractual relations and acceptable product quality.

Supplier-buyer organizational relationship. The usual organizations in a buyer's plant with which the supplier will come in contact are purchasing, engineering, manufacturing, inspection, quality assurance, and auditing. The instruction manual should describe the functions and responsibilities of these organizations, and their relationship to each other and to the supplier. Channels of communication between these organizations and the supplier should also be firmly established so that the supplier will not be confused by inconsistent and unco-ordinated contacts from the buyer's plant. To this end, all communications relating to contractual requirements should be co-ordinated by the buyer's purchasing organization. This will help relieve one of the major causes of strained supplier relations—that of inconsistent buyer practices and

lack of explicit information regarding what is expected of the supplier in the way of product and performance.

Documents and procedures. The second major function of the instruction manual is the explanation of documents and the flow of paperwork associated with a production contract. This section of the manual should include a complete description of the buyer's purchase order system, drawing system, engineering change procedures, inspection and test procedures, and any publications which may be furnished to the supplier or which he may be required to use.

The procedures for incoming inspection, defect classification, acceptance, rejection, and supplier performance rating should be thoroughly explained. In addition, the supplier should be apprised of other procedures as necessary to assure a full understanding of the buyer's procurement and operating policies.

Contractual requirements. Another major function of the instruction manual is a complete description of the specific requirements which will be imposed upon suppliers awarded production contracts. These requirements, which are necessary to assure product quality and reliability, may impose minimum standards for manufacturing functions such as inspection, material storage and control, production control, tool and gage control, and drawing control. Any other manufacturing requirements or restrictions which are to be imposed on the supplier should be explicitly defined in the manual so the supplier will be completely aware of what is expected of him as part of his contractual obligations.

The manual should also fully explain any training programs, services, or assistance that the buyer is prepared to offer the supplier to help him meet his contractual obligations and improve product quality. The conditions under which these services are available, and the method of applying for them, should be clearly defined.

Product Definition and Control

The other major factor in controlling supplier performance is the complete description of product requirements and the explicit communication of these requirements to the supplier. Although the quality of a product starts with its design, and is ascertained by its final inspection, the determination of quality takes place during the manufacturing cycle. Quality enters the product only once—at the point of manufacture. Subsequent to manufacture, defectives can be screened out (except for devices that are destroyed by testing) but this adds to unit cost and sometimes results in missed schedules. It follows, therefore, that the manufacturer or supplier must have all the information required to produce the desired quality. The processing and inspection procedures must be adequately designed to control the quality of materials and components through all stages of manufacture up to, and including, packaging and shipping. The product definition should be clear, and as simple as is consistent with exactness, yet so specific and accurate as to avoid any misunderstanding.

Material and process specifications. In the control of product quality, the communication of clear and complete specifications is

The central portion of the page is devoted to a discussion of the various methods of determining the relative values of the different components of the system. It is pointed out that the relative values of the different components of the system are determined by the relative values of the different components of the system. The conditions under which the system is operating are also discussed. The conditions under which the system is operating are also discussed.

Relative Values of the Components

The relative values of the components of the system are determined by the relative values of the different components of the system. It is pointed out that the relative values of the different components of the system are determined by the relative values of the different components of the system. The conditions under which the system is operating are also discussed. The conditions under which the system is operating are also discussed.

The relative values of the components of the system are determined by the relative values of the different components of the system. It is pointed out that the relative values of the different components of the system are determined by the relative values of the different components of the system. The conditions under which the system is operating are also discussed. The conditions under which the system is operating are also discussed.

second in importance only to the selection of qualified suppliers. For standard or shelf items, the specifications are well known and therefore present no problem in communicating product requirements. However, where the product is manufactured to the buyer's design or functional requirements, or where engineering changes are frequently necessary, the possibility of misinterpretation of specifications is a real problem. For this type of product, drawings must be complete and clear before they are transmitted to the supplier. Specifications should be realistic and reviewed frequently for their compatibility with technological development and industrial progress.

Wherever nonstandard items are purchased, procurement action must be taken to guide, control, and co-ordinate the activities of suppliers in making the required product. Product and process specifications should contain sufficient information to make clear to the supplier exactly what he is required to produce and deliver. These specifications must give exact details of the materials and processes to be used and the quality measures which the supplier is expected to apply. Product definition should also include the required specifications for plating, soldering, heat treating, plastic molding, and similar types of processes. No effort should be spared in completely defining for the supplier every characteristic affecting product quality.

Inspection and acceptance. Specifications that cannot be checked are of small value, and confusion may result when room is left for variation in inspection methods. The specifications should, there-

fore, clearly define exactly how the product will be tested and inspected by both the supplier and the buyer. Complete quality standards for any product require that the characteristics to be measured or inspected be accurately defined. Although the relative importance of these characteristics will vary for different products, they all must have quality standards which can be accurately interpreted by both the supplier and the buyer. Characteristics should be classified and the Acceptable Quality Level specified. Although most suppliers do perform to some Acceptable Quality Level, trouble occurs if, say, the supplier assumes that a quality level of two per cent is acceptable when the buyer actually wants one per cent. If sampling plans are to be used by the buyer for inspection and as a basis for acceptance and rejection, the supplier should be so informed. Further, the supplier and buyer must reach an agreement as to what constitutes a defect and how these defects are classified as to severity.

Another important factor in the design of test and inspection procedures is the correlation of methods and equipment used by the supplier and the buyer. Disagreements over measurements can be very costly in terms of delay and expense. By carefully defining the inspection methods and correlating the test equipment, both the supplier and the buyer have the assurance that any decision on quality or acceptability is objective. Objective information not only eliminates the need for the continuous duplication of effort by the supplier and the buyer but forestalls disagreements over measurement and test results.

Control over supplier's procedures. Not only must the buyer make every effort to adequately define the required product, but he must also require the supplier to define his special processes, manufacturing procedures, and quality control measures. Regardless of the product being produced, its quality depends on the degree of control exercised in the various stages of its manufacture. The supplier's manufacturing procedures and quality control measures should be reviewed by the buyer to ascertain their adequacy in assuring that the manufactured product will meet the required quality and reliability standards. After the supplier's manufacturing processes have been approved by the buyer, no changes affecting the product should be permitted without the prior consent of the buyer.

Training and assisting new suppliers. Procuring a quality product is a continuing responsibility and depends on the combined effort and mutual interest of the supplier and the buyer. After a new supplier has been selected, procurement activities must be directed toward assisting and guiding the supplier so that any problems or misunderstandings will be recognized and corrected early in the life of the contract.

Successful procurement has come to regard the supplier's operations as part of a continuous process leading up to, and including, the operations in the buyer's own plant. With this concept, the supplier's inspection, material control, production control, quality control, and other operating procedures are definitely the concern of the buyer. The supplier should be given the co-operation and assistance required to

Control over the... every effort to... require the... sedentary, and... produced, the... various stages... three and... ascertain their... meet the... manifesting... affecting the... fever.

... is a... mutual interest... good... and... be... Success... those... operation... inspection... other... supply...

assure the effective implementation of these and other manufacturing functions contributing to quality production.

An important part of any quality control program is the communication of quality requirements. Frequently, such communications cannot be adequately handled by correspondence or by telephone, and a closer contact between the supplier and buyer is required. To promote quality mindedness, the new supplier should be visited by a quality control team from the buyer's plant, or key supplier personnel should be invited to attend quality and reliability symposiums sponsored by the buyer. A well-organized quality control team, in which the supplier participates, can be very effective in improving product quality as it brings together a number of people each of whom has something to contribute to the assurance of quality production.

Sometimes the buyer's requirements may exceed the "state of the art". Other exceptional demands may be in the form of requirements for unusually high quality, very compressed time scales, or conformance to regulations imposed by a government contract. In such cases, every possible effort should be made in assisting the supplier to extend his capabilities to meet the buyer's requirements.

Benefits of complete product definition and control. In addition to assuring quality of product, the complete and explicit definition of the product results in several other major benefits. First, it enables the potential supplier to completely evaluate his own production and inspection capabilities against the buyer's requirements. This will

assure the effective functioning of these and other mechanisms
furthermore contributing to quality production.

An important part of the total production process is the control
of quality. It is essential, however, that the control system be
adequately handled by correspondence to the situation, and a close con-
tact between the supplier and buyer is required. The quality of the
product, the new supplier and the value of a quality control system
from the buyer's point of view, on the other hand, must be based on
attend quality and reliability of the product. It is not possible
well-organized quality control system, in which the supplier's
can be very effective in improving product quality as it is being produced.
a number of people with a view to assisting in the work on the quality
of quality production.

Sometimes the buyer's requirements may exceed the limits of the
art. Other exceptional demands may be in the form of requirements for
usually high quality, very consistent dimensions, or consistency in
regulations imposed by a government contract. In such cases, the
possible effort should be made to assist the supplier to expand his
capabilities to meet the buyer's requirements.

Benefits of complete quality control and inspection

to ensure quality of product, the supplier's and buyer's satisfaction
the product results in several other important benefits. First, it enables
the potential supplier to maintain consistent quality and production
inspection capabilities to assist the buyer's requirements. This will

permit the supplier to bid on an intelligent and equitable basis and to take exception to requirements which he is unable to meet. It will also help to establish the desired mutual understanding of supplier capabilities and buyer requirements prior to the start of production. This is the best insurance against production delays and contractual difficulties.

The use of sound, well-prepared specifications also contributes to improved supplier-buyer relations. Both the supplier and the buyer know what is required, how it is to be accomplished, and what inspection evidence is necessary to establish the quality of the product. The confusion and strained relations which arise because of misunderstandings of product requirements or acceptance criteria are thus eliminated. There will also be a minimum of wasted time, effort, and resources in producing the required product.

Another important benefit to the buyer is the potential saving in inspection costs. By using carefully designed manufacturing and inspection methods, decisions on product quality or acceptability can be made completely objective. This will eliminate the need for extensive inspection and product appraisal by the buyer. After the supplier has demonstrated his dependability, the buyer can minimize his own costs by reducing his inspection to the lowest level required to assure continued acceptable supplier performance. Objective evidence, and the avoidance of disagreements and delays over test and inspection results, also enables the supplier to immediately initiate any required corrective action.

Finally, the explicit definition and clear communication of product requirements will be most welcomed by new suppliers. Not only will their better understanding of the buyer's requirements enable them to produce a more acceptable product, but the suppliers can stress those aspects of quality which are significant to the buyer. This will not only increase the buyer's satisfaction but will also enable suppliers to improve their competitive standing.

Finally, the subject of the present investigation is not
 but regulations with regard to the subject of the present
 their best interests of the subject of the present
 process a more complete review, and the subject of the present
 aspects of quality which are significant to the subject of the present
 only interest and subject of the present, and the subject of the present
 to improve their respective positions.

CHAPTER IV

THE SUPPLIER SURVEY AND EVALUATION

The basic purpose for evaluating potential suppliers is to provide procurement management with the information needed to intelligently select suppliers on a basis of their capability to satisfactorily produce and furnish a uniform product of acceptable quality and reliability. In the past, many companies have purchased material or components from suppliers where quality was merely an advertising slogan and where quality control did not exist. The consequences of this type of procurement—lack of reliability and quality of purchased material—has pointed up the need for a quality evaluation of suppliers before contracts are awarded. Purchase specifications and product specifications are only as effective as the suppliers selected for subcontract work. Accordingly, it should be the constant aim of procurement management to select only those suppliers with the financial stability, productive facilities, and administrative controls capable of assuring constant adherence to contractual requirements. Screening out unsatisfactory suppliers before the award of contracts is one of the best ways of assuring that purchased material will be of the required quality and reliability.

I. SURVEY FORM AND ORGANIZATION

Objectives and procedures. To effectively accomplish its intended purpose, the evaluation of potential suppliers must be performed in

an orderly and economical manner. It is with this goal in mind that the survey and evaluation procedures developed by this study have been evolved. Accordingly, these procedures are based on the main objective of furnishing procurement management with a technique for (1) obtaining as much information as possible about a potential supplier's capabilities, (2) obtaining this information with a minimum of inconvenience to the supplier, and (3) obtaining the information with a minimum expenditure of time and money.

With the objectives of economy, convenience, and thoroughness in mind, the procedures for the detailed physical survey are designed to require no more than three days for the survey and evaluation of the typical specialty supplier of less than five hundred employees. Larger facilities, or dispersed operations, will obviously require more time. In such instances, judicious planning and scheduling by the survey team will be necessary to perform the survey as efficiently as possible and to the mutual benefit of the supplier and the buyer. However, as the purpose of a survey is to obtain the information required to make an intelligent selection of suppliers, the survey must be comprehensive enough to assure a thorough audit of every facet of the operation which affects the supplier's ability to produce and deliver acceptable material.

In order to minimize the length of time required to be spent in a supplier's plant, and also to obtain needed information in advance of a scheduled survey, the procedures are designed to obtain much of the basic information prior to the survey by use of questionnaires sent to the supplier. It should be recognized, however, that a supplier self-

evaluation questionnaire can be used only for obtaining objective information; it should never be used to obtain information subject to opinion or bias.

The Financial Questionnaire. The Financial Questionnaire (see Appendix A) is designed to obtain information relative to the supplier's financial condition and accounting procedures. The requested information is in the form of financial reports and objective data relative to the supplier's contracts administration, material accounting, fixed assets costing and depreciation, payroll and labor accounting, and indirect expense accounting. This information, together with Dun & Bradstreet financial reports, can be examined to determine if the supplier's financial condition meets the required standards, if his proposed rates for quotation and billing purposes are reasonable, and if his accounting systems comply with accepted practices.

The Financial Questionnaire can be sent to a potential supplier for completing and returning to the buyer before a physical survey is scheduled. The financial data submitted by the supplier, along with Dun & Bradstreet reports, should then be reviewed by the buyer's financial and subcontract audit groups to determine the supplier's ability to perform effectively from a financial standpoint. If any of the information indicates the existence of unsatisfactory conditions or practices which would not justify further relations with the supplier, the expense of a physical survey can be avoided. If it is considered desirable to further negotiate with the supplier, any necessary verifi-

cation of the data submitted can be performed during the physical survey of the supplier's facilities.

Normally, the Financial Questionnaire and financial reports will provide the information required to determine a supplier's ability to perform from a fiscal point of view. However, if the proposed contracts are of the cost-plus-fixed-fee type or price-redeterminable type, or if the contracts will be of high dollar value or of long duration, a personal audit of the supplier's financial and accounting records may be required. This audit could be performed at the time of the facility survey by a member of the buyer's auditing staff. While conducting his investigation, the auditor should make sure that the supplier is familiar with the cost principles of the Armed Services Procurement Regulation. It is also essential that the supplier clearly understands what supporting accounting data will be required to qualify for progress payments if these are to be made. The auditor should also determine if the supplier's accounting system is capable of accumulating the required data rapidly enough after costs are incurred.

The Facility Questionnaire and Supplier Evaluation Check List.

Like the Financial Questionnaire, the Facility Questionnaire and the Supplier Evaluation Check List (see Appendixes B and C) are designed to obtain the information needed to determine a supplier's ability to perform satisfactorily if awarded a contract. To facilitate obtaining the required information, the facility evaluation data collection forms have been divided into two sections. One section, which pertains to basic

objective information, can be sent to the supplier for completion by him prior to the physical survey of his facilities. The other section, which pertains to the supplier's operational procedures and production capabilities, is used as a guide by the survey team in making a comprehensive personal investigation of the supplier's facilities.

In developing the Supplier Evaluation Check List for use in investigating and appraising a supplier's production capabilities, consideration was given to the different organizational structures that exist throughout industry. Accordingly, the Check List was designed on a basis of functional activities rather than organizational activities. This makes the Check List adaptable to both large, highly-organized companies and to small operations where two or three functions may be performed by one group or organization.

As with the Financial Questionnaire, the Facility Questionnaire completed by the supplier is useful in preparing for the physical survey of the supplier's facilities. The information pertaining to plant size and distribution of facilities is helpful in estimating the time required to perform a survey. Further, the supplier's organization chart is helpful in determining who is responsible for the functions in which the buyer is most interested. It will also indicate the management and other key personnel who are to be contacted during the survey.

The survey team. The membership of the supplier survey and evaluation team should consist of personnel capable of assessing the supplier's production facilities, engineering ability, organizational

structure, administrative controls, and other functions contributing to the supplier's ability to produce and deliver acceptable material. Normally, one representative from the buyer's purchasing organization and one from the manufacturing organization should be adequate to conduct a complete and scientific appraisal of the supplier's facilities. If special requirements or problems are involved, representatives of auditing, engineering, or other organizations may accompany the purchasing and manufacturing representatives. It is desirable, however, to limit the survey team membership to as few as possible, and representatives of other organizations should be included only if the nature of the product or procurement problem demands their assistance. Experience has shown that a survey team composed of many members is likely to result in greater inconvenience to the supplier, yet being less productive than a small, well-organized team composed of competent and proficient personnel.

Regardless of the composition of the survey team, it is important that all members have a thorough knowledge of (1) the fundamentals of organization and management, (2) the principles of effective methods of control, and (3) modern manufacturing and quality control techniques. Although the survey team members may not be experts in all fields of management and manufacturing, they should be proficient in the ability to examine and appraise the effectiveness of management policies and manufacturing controls. They should know, for example, that the organization chart and quality control manual are not ends in themselves but are only the means to an end. Both are of little importance or value

unless they are implemented by an efficient and effective organization.

In addition to the ability to conduct scientific appraisals and to disclose areas of weakness or deficiency, the survey team members should be able to make constructive recommendations pointing out better or more effective methods of control. This requires certain personal characteristics such as good judgment, objectivity, diplomacy, an inclination toward analysis, and the ability to communicate clearly and logically. Good appraisals can only be obtained by a careful gathering and evaluation of facts--facts concerning company objectives, organization, policies, and practices. The quality and value of the appraisal will be no better than the quality of the survey team.

Organization of the survey. If an examination of the supplier's financial reports and self-evaluation questionnaires indicates the desirability of conducting a physical survey, the supplier should be so informed and advised of the proposed schedule for the survey. The scheduling of surveys, along with all other activities pertaining to visits of survey teams to suppliers, should be co-ordinated by the buyer's purchasing organization. This is consistent with the usual responsibility of the purchasing organization to act as the medium of contact between the buyer and suppliers. Co-ordination of supplier survey activities by one organization will permit these activities to be conducted in the most economical manner and with a minimum of interruption to suppliers' operations.

The comprehensive survey and evaluation of a supplier's facili-

unless they are prepared to accept the results of the survey.

In addition, the survey should be conducted in a manner

so that the results are not distorted by the survey method.

It should be noted that the survey should be conducted in a manner

or more effective means of control. The results of the survey

characteristics such as good judgment, honesty, and integrity, as

inclination toward analysis, and the ability to make a decision

and logically. Good examples of this are given in the survey

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ties consists of six major phases: (1) the survey team members' preparation for the survey, (2) an introductory presentation or supplier briefing, (3) a brief orientation tour of the supplier's facilities, (4) a detailed investigation and evaluation of the supplier's production facilities and operating procedures, (5) a review of the survey findings with supplier management, and (6) the writing of a formal survey and evaluation report.

Proper preparation is a prerequisite to the satisfactory conduct of the survey. In preparing for the survey, the team members should learn as much as possible about the requirements of the proposed contract. They should also become familiar with the supplier's facility by reviewing the data submitted by him. Having this knowledge will assist the survey team in expeditiously performing the survey and making an intelligent appraisal of the compatibility of the supplier's capabilities with the buyer's requirements.

At the initial meeting with the supplier's representatives, the survey team should explain its objective of learning as much as possible about the supplier's facilities and capabilities. The team should also brief the supplier as to the buyer's requirements and the buyer's interest in the supplier's ability to produce and deliver an acceptable product. To assure the expeditious conduct of the survey, the plan of operations should be fully explained to the supplier. This will enable the supplier to assure availability of the needed personnel as the survey team progresses in its detailed survey of the supplier's facilities.

After the introductory meeting, a brief orientation tour of the supplier's facilities should be taken. The purpose of this tour is to obtain a complete picture of the supplier's operations. This will contribute to a better understanding of the various functions and organizations as they are later individually examined in detail.

The next phase of the survey is the comprehensive investigation and evaluation of the supplier's productive facilities and operating procedures. This is the most important phase of the survey and demands that a careful evaluation be made of all processes, procedures, and controls to determine their adequacy and effectiveness in assuring the production of material of the required quality and reliability. The objective of the comprehensive survey and evaluation is not only to differentiate between adequate and inadequate suppliers but also to determine what corrective measures may be required to assure satisfactory performance by those suppliers that are selected. The areas in which a supplier is capable or proficient, and the type or class of product for which he has special talents, should also be determined.

Following the detailed appraisal of the supplier's facilities, the survey team should discuss with the supplier's management the findings and results of the survey. The final step of the survey and evaluation is the preparation of a comprehensive evaluation report for procurement management and other concerned buyer personnel. This report should be prepared by the survey team immediately upon returning from the supplier's plant. At the discretion of procurement management, a copy of the report and other information relative to future negotiations

may be sent to the supplier.

II. THE COMPREHENSIVE SURVEY AND EVALUATION

Preparation for the survey. The amount of preparation needed by the team members prior to visiting a supplier's plant will depend upon the type of survey to be performed. If the purpose of the survey is to determine the supplier's general capabilities and their compatibility with the buyer's requirements, no special technical preparation is required. Having prior knowledge of the types or classes of product for which additional sources are needed, the team will be able to determine the ability of the supplier to produce and deliver the required product. On the other hand, if the purpose of the survey is to locate a source for a new product, the team members must become completely knowledgeable of the requirements of this product. This will require a review of the drawings, process and inspection requirements, and other information which will have a bearing on the appraisal of a supplier's ability to satisfactorily produce the required product.

Regardless of the type of survey, the team members should review the information contained in the self-evaluation questionnaires previously completed by the supplier. This information will enable the survey team to make a realistic estimate of the time required to complete the survey. Any required clarification or verification of information submitted by the supplier can be noted and scheduled for inclusion with the physical survey of the supplier's facilities. Experience has indicated that for supplier surveys to be most productive, the survey team should review

IN THE SUPPLEMENTARY REPORT ON THE SURVEY

Observations on the Survey

by the present author, to which a preliminary report was submitted to the Survey Committee in 1901. It is the purpose of the present report to describe the results of the survey, and to discuss the various questions which have arisen in connection with it. The survey was conducted in 1901, and the results were published in the Supplementary Report on the Survey, which was published in 1902. The present report is a continuation of the work done in the Supplementary Report, and is intended to bring up to date the results of the survey, and to discuss the various questions which have arisen in connection with it. The survey was conducted in 1901, and the results were published in the Supplementary Report on the Survey, which was published in 1902. The present report is a continuation of the work done in the Supplementary Report, and is intended to bring up to date the results of the survey, and to discuss the various questions which have arisen in connection with it.

before the survey all readily available information about the supplier. The survey team should also plan in advance the kinds of information to be sought.

The introductory presentation. The initial phase of the detailed survey and evaluation of the supplier's facilities consists of an introductory presentation by the survey team to representatives of the supplier's administrative, engineering, production, quality control, and other concerned organizations. At this time, the purpose of the survey, and the proposed method of conducting the survey, are discussed with the supplier. A more important aspect of this phase of the survey is the opportunity to tell the supplier about the exacting requirements of the buyer's product and the need for strict compliance with the product specifications. The supplier also has an opportunity to define his objectives and what he thinks his capabilities are. Also, any related questions raised by the supplier are answered by the survey team. This portion of the survey is thus a mutual learning period in which the survey team not only obtains as much information as it can about the supplier's attitude and interest, but also informs the supplier about those aspects of the buyer's operations and requirements which are particularly significant to the supplier.

The information given to the supplier during this presentation will, of course, vary for each buyer. It should, however, always include enough basic information to provide the supplier with a clear understanding of the requirements that would be placed upon him particularly

in the areas of product quality and delivery schedules. If the supplier has been engaged in commercial production only, the vast difference between the requirements of commercial products and the exacting quality and reliability requirements of military products should be thoroughly explained. How the buyer intends to help the supplier to meet these exacting requirements should also be explained.

All of the introductory information may be presented orally or be supported by brochures. Regardless of the type of presentation, the information should be adequate to establish a sound basis for effective supplier-buyer relations should contract negotiations follow the survey and evaluation.

The orientation tour. After the introductory presentation, the survey team should take a brief orientation tour of the supplier's facilities. The purpose of this tour is to enable the survey team to obtain a complete picture of the supplier's operations so that the contribution of the separate organizations and functions to the complete operation can be better understood. In order to conserve time and obtain the desired over-all conception of operations, it has been found desirable to withhold all questions or probing into details during this tour. Obviously, there will be exceptions to this procedure, and some questions may need answering in order to provide a better understanding of the supplier's operations. Further, if it is known that for some reason a department or area will not be revisited during the detailed survey, any questions should be immediately resolved.

The orientation tour also provides an excellent opportunity to gain a mental picture of such things as employee conduct, housekeeping, material handling and storage, lighting and ventilation, safety practices, and general working conditions. These are important considerations in evaluating the supplier's ability to perform satisfactorily.

The facility survey and evaluation. The qualifications of a supplier to perform a specific contract or type of work are established only in part by his plant facilities and production capabilities. To these must be added management controls to assure the effective utilization of all phases of the operation. It follows that the scientific appraisal of a supplier's facilities requires an examination of both the production processes and the effectiveness of management controls over these processes. In making this examination, each important administrative and productive function must be investigated and consideration given to its purpose and its effectiveness. Although a precise measurement of how effective a system or procedure operates may be difficult to determine, the degree of effectiveness can be ascertained by a comparison of the actual conditions with those that were intended by the system. The various functions must be reviewed from the standpoint of clarity and completeness of procedures, accuracy of performance, and orderly flow of material and associated paper work.

Experience has shown that the most efficient method of conducting this investigation is to follow a hypothetical customer's order through the supplier's plant. A good understanding of the adequacy and effective-

The estimated cost also may be an important factor in
 gain a general picture of such things as relative efficiency, relative
 material handling and storage, relative waste, and so on.
 piece, and general working conditions. These are the things
 those in evaluating the supplier's ability to perform his function.

The facility survey and evaluation.

Supplier to perform a complete survey of his plant and
 only to give to the plant a complete and accurate picture of
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 and, and under the conditions of the actual conditions.

Experiments have shown that the most important factors in
 this investigation is to follow a complete and accurate picture
 the supplier's plant. It is not enough to give a complete

ness of the supplier's entire operations will be gained by starting the investigation with the contracts administration function and following the flow of paper and material through such operations as purchasing, receiving, inspection, stores, production, assembly, and packaging. During the investigation, supporting functions such as materials control, environmental testing, tool and gage control, materials handling, and quality control should also be appraised for their adequacy and effectiveness. This investigation not only establishes the supplier's capabilities and deficiencies but also is a means of determining what engineering, manufacturing, quality control, or other assistance will be required by the supplier to assure his satisfactory performance.

A systematic, but flexible, survey procedure supported by a Supplier Evaluation Check List (see Appendix C) is recommended for making the detailed investigation. A systematic procedure assures uniformity in the information obtained and provides a basis for comparing supplier capabilities. The Check List, which serves as a guide in seeking answers to various questions, may be modified to conform to different supplier operations and buyer requirements. A major factor requiring flexibility in the conduct of the survey is the different manufacturing methods and procedures that exist among suppliers. No two suppliers' plants are exactly alike, nor do they have the same operating procedures and manufacturing controls. Often in small family owned plants, fewer records are kept, and operating procedures are less formal than in larger plants. In such cases, it would be presumptuous

to expect the supplier to have a formal quality control department staffed with engineers and statisticians. It would be expected, however, that the responsibility for quality be vested in some authoritative person or group. It would also be expected that the quality control measures, and other important management and manufacturing policies and controls, be formally defined and not entrusted to the knowledge of one or a few persons. Policies and procedures may differ, but manufacturing controls must be adequate to assure quality production throughout the manufacturing cycle.

Although the survey and evaluation procedures may be modified to meet individual conditions, it is most important that the conduct of the survey be directed toward the principal objective of a complete gathering of factual material. Accordingly, certain basic operating requirements will always be investigated. For example, in the appraisal of a supplier's purchasing function, basic policies and practices to examine would always include the following:

- Completeness of purchase order information

- Method of selecting suppliers

- Use of performance records in placing repeat orders

- Follow-up and expediting

A comprehensive investigation and evaluation of these basic purchasing functions can only be accomplished by a complete gathering of facts and a weighing of company objectives and policies against actual operations and accomplishments.

By similarly investigating each operation or function that

to expect the supplier to have a formal quality control department
staffed with engineers and technicians. It would be expected, how-
ever, that the responsibility for quality control is shared by all
personnel on the job. It would also be expected that the quality control
department, and other important departments and manufacturing divisions and
control, be formally linked and not separated by the knowledge of the
on a few persons. It would be expected that the quality control
control must be capable of reacting quickly to changes in the
manufacturing cycle.

Although the survey and evaluation procedures are designed to
meet individual conditions, it is most important that the content of the
survey be directed toward the practical objectives of a quality man-
aging of technical material. Secondly, in certain cases of quality man-
agement will always be investigated. For example, in the area of a
supplier's production function, basic policies and procedures to ensure
will always include the following:

- Completeness of product or service information
- Method of selecting suppliers
- Use of performance records in placing repeat orders
- Follow-up and evaluation
- A comprehensive investigation and evaluation of basic data
- Proposed functions can only be carried out by a quality control
of facts and a weighing of company objectives and policies against
actual operations and circumstances.
- If quality investigation and control is a basic data

contributes to the supplier's ability to produce and deliver acceptable material, the survey team will be able to objectively evaluate the supplier's qualifications to meet the buyer's requirements. As the qualifications of a supplier are dependent upon his plant facilities, technological competency, and administrative controls, many specific engineering, manufacturing, and administrative observations must be made. The facts must then be reviewed and evaluated in order to make sound recommendations for use by procurement management in the selection of suppliers.

The importance of the survey team's evaluation and recommendation of a supplier's facilities dictates that any judgment of the supplier's capabilities should always be based upon personal observations of actual operations. Seldom is it necessary to rely on verbal answers from supplier personnel. Records and other documentary evidence should be available and should always be investigated to establish the adequacy and integrity of a system or procedure.

As with any other task, the value and reliability of the survey and evaluation will increase with its thoroughness and intensiveness. For economical reasons, however, and also to minimize the inconvenience caused the supplier, the survey must be completed as quickly as possible consistent with obtaining the needed information. The efficient and timely completion of the survey depends primarily upon the guidance and direction given the survey by the team members. It follows that the team members should control the progress of the survey by tactfully directing their efforts towards an effective utilization of their own

examination to the supplier's ability to provide the required quantities and quality of the goods. The survey team will be made up of representatives of the supplier's production, management, and technical departments, and administrative, engineering, and economic departments. The team will be selected and organized in a way that will ensure the most effective use of government resources in the selection of suppliers.

The importance of the survey team's selection and organization of a supplier's facilities is that the selection of the supplier's facilities should be based on the general observation of the supplier's facilities. This is necessary to help in the selection of the supplier's facilities. The team should be able to identify the supplier's facilities and should be able to identify the supplier's facilities and should be able to identify the supplier's facilities and should be able to identify the supplier's facilities.

As with any other task, the team and the results of the survey and evaluation will improve with the experience and refinement. For economical reasons, however, and also to increase the effectiveness of the survey, the survey team should be selected in a way that will ensure the most effective use of government resources in the selection of suppliers. The team should be able to identify the supplier's facilities and should be able to identify the supplier's facilities and should be able to identify the supplier's facilities and should be able to identify the supplier's facilities.

time and the supplier's time.

Review of survey findings. The review of the survey findings with supplier management at the conclusion of the survey is a very important part of the survey procedure. It affords an opportunity for the survey team to not only re-emphasize the buyer's quality and reliability requirements but to be of service to the supplier by bringing to his attention weaknesses or deficiencies in his operating procedures.

In reviewing the survey findings, the survey team should indicate its opinion of the adequacy and effectiveness of the supplier's operations based on the quality and reliability required by the buyer. Areas in which the supplier is inadequate or deficient, and the possible effect on product quality of these deficiencies, should be brought to the supplier's attention. Since some of the comments or ideas that appear sound to the survey team may seem like an unreasonable imposition or expense to the supplier, the survey team must be completely objective and submit its findings in a manner which attests to its integrity.

It should be made clear to the supplier that the survey team is not in a position to recommend that corrective action be taken by the supplier or to imply that any contractual benefits will result from such corrective action. It should be emphasized that the only function of the survey team is to determine the supplier's present capabilities, and that any further negotiations are the responsibility of the buyer's procurement management.

Although some suppliers may object to the inconvenience caused

them by having a survey team audit their plants, most suppliers consider a survey of their facilities very beneficial. Supplier management is frequently unaware of the weaknesses in policies and procedures that exist in their operations. Many times, so called "policies" are established by custom or precedent and not necessarily by planned action of top management. In fact, such "policies" often represent practices created at one time or another, possibly at a lower level in the organization, and not known or approved by top management. Supplier management also recognizes a thorough survey as an opportunity to gain the confidence of the buyer and to acquire information which can be used not only to improve its operations but to enhance the company's competitive standing.

The survey and evaluation report. The careful preparation of the survey and evaluation report containing the details of the survey team's findings and recommendation plays an important part in the completion of a supplier survey. By providing a sound objective basis for the making of procurement decisions, the survey team can be most effective in guiding procurement management in the difficult job of selecting suppliers. Because of its importance in providing the information for making intelligent procurement decisions, the formal survey and evaluation report should be completed as soon as possible after the survey and distributed to all concerned organizations for review and required action.

The survey report must be impartial and each statement must be

that by having a survey team which is not directly involved in the survey of their facilities very beneficial. Regular management is frequently unaware of the weaknesses in their facilities and procedures which exist in their operations. They must, so called "blind spots" are established by means of feedback and necessary to be planned action of top management. In fact, such feedback is a very important procedure needed at all times or at least, usually at a fixed interval in the organization, and top management or approved by top management. Regular management also recognizes a thorough survey as an opportunity to solve the confusion of the survey and to achieve information which can be used not only to improve the organization but to achieve the company's competitive standing.

The survey and evaluation report. The overall presentation of the survey and evaluation report contains the details of the survey team's findings and recommendations as well as a summary part in the conclusion of a regular survey. By providing a brief objective summary for the writing of management decisions, the survey team can be more effective in giving management management of the situation for a realistic approach. Because of the importance of providing the information for making intelligent management decisions, the formal survey and evaluation report should be prepared as soon as possible after the survey and distributed to all concerned organizational units for review and regular action.

The survey report will be prepared and sent to the management unit

based on personal observation or documentary evidence. Further, the report must reflect supplier capabilities as they exist at the time of the survey and not as the supplier claims they will be in the future. If changes are being effected through new management, improved processes, or new equipment, such changes should, of course, be noted. Proposed changes do not always materialize, however, nor are they always effective in accomplishing their objectives.

Survey reports should be somewhat uniform in format and content. Uniformity in presentation enhances the usefulness of reports as users learn where to look for the information in which they are interested. The content of the report will depend upon the use to be made of the report as determined by the number of organizations on distribution for the report and the amount of information they desire. Generally, the report should include the survey team's conclusions and recommendations and information concerning the supplier's organization and administration, general capabilities, typical products, research facilities, manufacturing facilities, and quality control practices. The report should also point out the supplier's operating deficiencies and indicate the corrective action required to be taken by either the supplier or the buyer to assure satisfactory performance by the supplier.

The major purposes for evaluating suppliers' facilities are to differentiate between qualified and unqualified suppliers and to determine the capability of suppliers to produce an acceptable product of uniform quality and reliability. It follows that the conclusions and recommendations sections of the report are particularly important, and

the survey team should be very explicit and completely objective in recommending approval or disapproval of a supplier. For those suppliers that are recommended for further consideration, the report should clearly define the type and class of product which each supplier is capable of manufacturing or the service he is capable of performing.

In those cases where the buyer's requirements exceed the "state of the art", careful discernment must be exercised in judging a supplier's ability to perform satisfactorily. In some cases it may be necessary to accept certain deficiencies or inadequacies in order to take advantage of special skills or techniques possessed by the supplier. However, in such instances the selected supplier can be assisted in correcting the reported deficiencies before they result in unsatisfactory performance. The point to remember is that when a supplier with known deficiencies is selected, the buyer must take the necessary precautions and assist the supplier in instituting the required corrective action to assure satisfactory fulfillment of the contract.

A word of caution is in order concerning the handling of supplier survey and evaluation reports. Because of the confidential nature of the material contained in them, reports should not be exposed to persons other than those authorized to receive them. Confidential or proprietary information disclosed by the supplier during the survey should be respected and adequately protected. To betray such confidence not only does injustice to the supplier but probably closes the door to further information.

the survey team should be very explicit and specific objectives in recommending approval or disapproval of a supplier. For those suppliers that are recommended for further consideration, the report should clearly define the type and class of contract which will be awarded in terms of contracting or the services to be provided in performing.

In those cases where the buyer's representatives conduct the initial of the survey, mutual discussion must be provided in defining a supplier's ability to perform satisfactorily. In some cases it may be necessary to accept certain deficiencies or weaknesses in order to take advantage of special skills or technical personnel by the supplier. However, in such instances the selected supplier can be assisted in correcting the reported deficiencies before they result in unsatisfactory performance. The point to remember is that when a supplier has known deficiencies is selected, the buyer must take the necessary precautions and assist the supplier in correcting the reported deficiencies action to secure satisfactory fulfillment of the contract.

A word of caution is in order concerning the handling of supplier survey and evaluation reports. Because of the confidential nature of the material contained in them, reports should not be exposed to persons other than those authorized to receive them. Confidentiality of reports and information disclosed by the supplier during the survey should be respected and adequately protected. To insure this, suppliers should not be given information to the supplier not necessary to carry out the survey information.

CHAPTER V

SUMMARY AND CONCLUSIONS

I. SUMMARY

The trend towards specialized manufacturing, and the resulting supplier-buyer interdependence have focused increased procurement attention on reliable sources of supply. These characteristics of modern industry, coupled with the exacting quality and reliability requirements of modern military and industrial equipment, have made the procuring of material which fully meets all requirements a very important element of the buying process and one of the biggest problems of procurement management.

In many cases, the procuring of quality material has proved difficult—not because of lack of effort on the part of the supplier—but rather because the supplier lacks an understanding of the buyer's requirements, or because the supplier is unable to meet the buyer's requirements. Too often these difficulties have occurred because the buyer has approached the responsibility of selecting a supplier in an arbitrary fashion and with no knowledge of the supplier's ability to mass produce the particular item. It follows that to meet the exacting requirements of an increasingly complex military and industrial technology, procurement management must follow an analytical approach to supplier selection and supplier-buyer relations.

The analytical approach to supplier selection requires a thorough

investigation of the many financial, administrative, technical, and manufacturing considerations that affect the supplier's ability to perform satisfactorily. By evaluating and determining suppliers' capabilities prior to the award of contracts, incapable suppliers can be avoided, and corrective action can be initiated to whatever degree necessary to assure the satisfactory performance of those suppliers awarded contracts.

The intelligent selection of suppliers demands that the many required engineering, manufacturing, and administrative investigations be made in an orderly and efficient manner. It is essential, therefore, that formal and comprehensive survey procedures be employed, and that the survey team members have the required technical and administrative skills to accurately appraise a supplier's capabilities. To be most effective in guiding procurement management in the selection of qualified suppliers, the survey results must then be clearly reported. All conclusions and recommendations must be based on objective information supported by documentary evidence or personal observation.

Meeting the challenge of increasing emphasis on product quality and reliability not only calls for the discriminating selection of suppliers but also requires the promotion of effective supplier-buyer relations. This demands the establishment of procedures for controlling the supplier's performance and for assisting him in meeting the buyer's exacting quality requirements. The full utilization of a supplier's capabilities, and the assurance of his satisfactory performance depend upon a mutual understanding of the supplier's capabilities and the

investigation of the way financial, administrative, technical, and manufacturing considerations that affect the supplier's ability to perform satisfactorily. By evaluating and determining suppliers' capabilities prior to the award of contracts, inadequate suppliers can be avoided, and corrective action can be initiated to improve quality necessary to ensure the satisfactory performance of those suppliers awarded contracts.

The intelligent selection of supplier demands that the buyer require engineering, manufacturing, and administrative investigations be made in an orderly and efficient manner. It is essential, therefore, that formal and comprehensive survey procedures be required, and that the survey team members have the required technical and administrative skills to accurately appraise a supplier's capabilities. To be cost-effective in guiding procurement management in the selection of qualified suppliers, the survey results must be in a clearly reported, all conclusions and recommendations must be based on objective information supported by documentary evidence or personal observation.

Meeting the challenge of increasing requests for prompt quality and reliability not only calls for the discriminating selection of suppliers but also requires the provision of effective supplier-quality programs. This demands the establishment of procedures for controlling the supplier's performance and for assisting him in meeting the requirements of quality requirements. The full utilization of a supplier's capabilities, and the assurance of his ability to perform quality work upon a mutual understanding of the supplier's capabilities and the

buyer's requirements as they relate to the co-operative effort of producing an acceptable product.

The responsibility for the selection of qualified suppliers and the establishing of effective supplier-buyer relations requires that procurement management perform a co-ordinating and managing job of the highest order. The selection of suppliers, and the control of their performance are too important and too open to misjudgment to be left to chance or haphazard practices. These responsibilities must be part of a well-conceived and thoroughly understood procurement plan administered by competent personnel adequately trained to apply the principles involved. Only in this way can the procurement objectives of product quality, timely delivery, and reasonable cost be realized.

II. CONCLUSIONS

The supplier selected for the manufacture of a part or component is one of the most important determinants of the cost and quality of the end product. If the supplier selected is capable of meeting the quality requirements, then reasonable costs and timely delivery can be expected. If the supplier cannot meet the quality requirements, then high costs, defective product, and missed schedules are inevitable.

Many of the supplier-buyer problems, and much of the misunderstanding between suppliers and buyers can be traced to an arbitrary selection of suppliers based on fragmentary information, or to a superficial evaluation of a supplier's capabilities. It follows that procurement management must place greater emphasis on selecting suppliers who

have the production facilities, technical competency, administrative controls, and financial stability capable of assuring adherence to the buyer's product and delivery requirements.

It might be argued that the analytical approach to supplier selection and the control of supplier performance is time consuming and expensive. In fact, these activities are often considered an overhead item until trouble starts and delivery stops, at which time everyone wonders why the supplier was ever awarded a contract. The cost of these activities cannot be denied, and consequently they should be used judiciously and with particular emphasis on longer run, complex, and costly items.

Although the analytical approach to supplier selection and supplier-buyer relations does involve the expenditure of time and money, experience has shown that this approach results in lower costs and improved quality by minimizing problems with unqualified suppliers. It must be recognized that the production of defective material, the inability of a supplier to meet scheduled deliveries, or the need for extensive liaison and expediting always increases the true cost of the product. Procurement management has thus been paying the price for quality. The issue, therefore, is not whether to use the analytical approach to supplier selection and supplier-buyer relations, but how can this approach be improved.

have the protection furnished by the... controls, and financial stability of... paper's content and delivery...

It is not to be... selection and the control of... expensive. In fact, these... item until... wonder why the... activities cannot be... closely and with... items.

Although the... application... experience has shown that... prove quality of... must be recognized that the... liability of a supplier to... extensive list of... product. Furthermore... quality. The... approach to... and this approach...

W. S. ...
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APPENDIX A

THE UNIVERSITY OF CHICAGO
PRESS

FINANCIAL QUESTIONNAIRE

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

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FINANCIAL QUESTIONNAIRE

The following information is requested for the purpose of determining the compatibility of your financial and accounting procedures with our procurement requirements. If attachments are used for supplying this information, please identify the material with the Section and Question numbers.

SECTION 1

GENERAL

1. Name and address of this organization, and date founded:
2. Name and address of home office:
3. Name and address of parent organization, and date founded:
4. Names, addresses, and principal activities of any subsidiaries or affiliates:
5. Principal activities of this organization:
6. Legal form of this organization:
7. Legal form of parent organization:
8. Please attach the following:
 - a) Organization chart or charts for this facility.
 - b) Copies of published annual reports to stockholders for last three years.
 - c) Chart of accounts.

FINANCIAL QUESTIONNAIRE

The following information is requested for the purpose of determining the comparability of your financial and accounting procedures with our procurement requirements. If attachments are used for supplying the information, please identify the material with the Section and Question numbers.

SECTION I

GENERAL

1. Name and address of this organization, and date founded:
2. Name and address of home office:
3. Name and address of parent organization, and date founded:
4. Names, addresses, and principal activities of any subsidiaries or affiliates:
5. Principal activities of this organization:
6. Legal form of this organization:
7. Legal form of parent organization:
8. Please attach the following:
 - a) Organization chart or chart for this family.
 - b) Copies of published annual reports to stockholders for last three years.
 - c) Chart of accounts.

SECTION II

CONTRACTS ADMINISTRATION

1. What portion of your total current sales is in government contracts? List types of contracts.
2. What government agency audits your contracts? List dates and agency performing audits during last five years.
3. Have you held cost-plus-fixed-fee and price-redeterminable contracts?
4. Are contracting and accounting personnel familiar with the provisions of the Armed Services Procurement Regulation?
5. Where will the books and records in support of charges to our contract be located?
6. Will all accounting records and supporting information such as material requisitions, time cards, scrap tickets, etc. relating to our contract be available to us and preserved until we have made an audit?
7. Is there any particular time of the year when it would be disadvantageous to have us audit your records?
8. When does your fiscal year end?
9. What is the name and title of the person who would be directly responsible for the accumulation of costs on our order? Will this person see our purchase order so that he will be acquainted with the requirements of the cost formula?

THE PROBLEM OF THE FUTURE

1. That the future of the world is in the hands of the people, and that the people must take responsibility for their own future.
2. That the future of the world is in the hands of the people, and that the people must take responsibility for their own future.
3. That the future of the world is in the hands of the people, and that the people must take responsibility for their own future.
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9. That the future of the world is in the hands of the people, and that the people must take responsibility for their own future.
10. That the future of the world is in the hands of the people, and that the people must take responsibility for their own future.

10. List elements such as material, labor, overhead, travel, tooling, general and administrative expenses, etc. which will be included in accumulating costs.

10. List elements which are present in each of the following groups, and indicate the relative importance of each element in the group.

SECTION III

MATERIAL ACCOUNTING

1. Are requisitions and formal purchase orders issued for all materials? If not, explain the procedures followed.
2. Are withdrawal tickets used for all stockroom materials? Are returns and transfers recorded?
3. Will all purchases for our contract be on a fixed-price basis? If not, explain.
4. Describe procedures for receiving and paying for material.
5. How often are inventory records adjusted to physical counts? How is this adjustment treated on the books?
6. Which of the following methods do you use for charging material costs?
 - a) Actual cost and quantity.
 - b) Standard price.
 - c) Standard quantity.
7. If standard material costing is used, how are variances handled?
8. Are any handling charges or loading factors assessed to material cost?
9. Do intercompany transactions, interdepartmental transactions, and transactions with subsidiaries exclude all profit factors?

1. The respondent and the complainant have been advised of their rights. If not, explain the procedures followed.

2. The respondent is to be advised of the right to a fair hearing and to be heard by an impartial and competent authority.

3. Will all persons have an opportunity to be heard? If not, explain.

4. Describe the steps taken for ensuring the hearing is fair.

5. How often are the respondent's views considered? If not, explain.

6. Which of the following methods do you use to ensure a fair hearing?
a) Written report and decision.
b) Oral hearing.
c) Written report and oral hearing.

7. If a written report is used, how is it prepared?

8. Are any hearings held in private? If not, explain.

9. Do you have any other procedures for ensuring a fair hearing? If not, explain.

10. How are purchase discounts and rebates handled?
11. How is freight-in handled?
12. How will the following items be accounted for on our contract?
 - a) Excess material.
 - b) Obsolete material.
 - c) Scrap material.
13. Will a material requirement or bill of material be prepared for each item or product?

10. How was the ...

...

11. How is the ...

...

12. How will the ...

- a) ...
- b) ...
- c) ...

13. Will a ...

...

SECTION IV

FIXED ASSETS COSTING AND DEPRECIATION

1. Which of the following methods do you use to distinguish between capital items and expense items?
 - a) Minimum dollar value.
 - b) Minimum life.
 - c) Other (explain).
2. Are all assets capitalized at original cost?
3. Describe methods of depreciation, and indicate rates for each category.
4. Are you amortizing any assets on Certificates of Necessity? On "true depreciation"?
5. Are any assets fully depreciated?
6. Will costs on our contract include any charges for fully depreciated assets?
7. Are any assets depreciated on reappraised values?

SECTION IV

NET ASSETS COSTING AND OTHER FACTORS

1. Which of the following methods do you use to determine net assets?
a) Market value
b) Liquidation value
c) Other (explain):

2. Are all assets capitalized at original cost?

3. Describe method of depreciation, and indicate rates for each category.

4. Are you maintaining any assets on basis of historical cost?
If yes, depreciation?

5. Are any assets fully depreciated?

6. Will costs on any contracts include any charges for fully depreciated assets?

7. Are any assets depreciated on accelerated basis?

SECTION V

PAYROLL AND LABOR

1. Are personnel records maintained independently from the payroll department? Do records show employee occupation?
2. Are any payroll payments made in cash? If so, are signed pay receipts obtained?
3. What records are used to account for employees' time? Do supervisors approve time reports?
4. Which of the following methods will be used to charge time to our contract?
 - a) Actual hours and amount by employee.
 - b) Actual hours at departmental average or departmental standard rate.
 - c) Standard labor amount by unit of production.
 - d) Other (explain).
5. If standard labor costs are used, how are variances handled?
6. Are job time cards reconciled with clock cards or attendance records?
7. Is labor distribution reconciled with payroll?
8. What job functions (inspection, purchasing, engineering, etc.), in addition to production and assembly, do you include in direct labor?

9. Describe your procedures with respect to:
- a) Vacation and holiday pay.
 - b) Sick leave.
 - c) Overtime premium.
 - d) Shift premium.
 - e) Bonus and incentive plans.
 - f) Idle time.

9. Describe your organization's mission and vision.

a) Vision and mission statement.

b) Core values.

c) Organizational structure.

d) Staff and management.

e) Goals and objectives.

f) Other information.

SECTION VI

INDIRECT EXPENSE

1. What overhead pools do you have and how are they distributed?

<u>Pool</u>	<u>Base</u>	<u>Current Rate</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

2. What have your book and approved DOD overhead rates been for the past two fiscal years?

<u>Pool</u>	<u>Period and Rate</u>	<u>Period and Rate</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

3. How soon after the close of your fiscal year are DOD audited rates usually established?
4. What problems, if any, have arisen to delay negotiation of the final rates either currently or in the past?
5. What DOD authorized provisional billing rates are currently in use?

SECTION 4

WORKING EXAMPLES

1. What overhead costs do you have and how are they allocated?

Pool	Base	Allocation Rate

2. What have your best and worst performing divisions done to improve their performance?

Pool	Performance Base	Allocation Rate

3. How soon after the time of your financial statement is your financial statement usually completed?

4. What problems, if any, have arisen in determining the cost of the goods or services produced?

5. What does your management believe is the most important factor in determining the cost of the goods or services produced?

6. For what period are they effective and when will new rates be established?
7. What rates are currently in use for quotation on contracts? (Explain reason for any differences from provisional billing rates.)
8. Are you planning on making any direct charges to our contract which would normally be treated as overhead in your accounting system?
9. Are any accruals for contingencies charged to overhead?
10. Does your overhead include as an item of cost any payments made in connection with a pension or retirement plan for your employees? If so, has it been accepted by the Internal Revenue Bureau?
11. Are any employees paid for services in any manner other than current salary?
12. Will those classes of expense which are charged direct be eliminated from overhead pools?

6. For what period are they effective and when will new rates be established?

7. What rates are currently in use for protection or nonprotection? (Explain reasons for any differences from provisional billing rates.)

8. Are you planning to make any direct charges to our contract which would normally be treated as overhead in your accounting system?

9. Are any accruals for contingencies charged to overhead?

10. Does your overhead include as an item of cost any payments made in connection with a pension or retirement plan for your employees? If so, has it been accepted by the Internal Revenue Service?

11. Are any employees paid for services in any manner other than current salary?

12. Will those classes of expenses which are charged direct be eliminated from overhead pools?



APPENDIX B

COMMONS COMMITTEE
ENCLOSURE
JAN 11 1911



1914

THE UNIVERSITY OF TORONTO

LIBRARY

1914

FACILITY QUESTIONNAIRE

COLLIER C. WILSON
FEB 21 1964
HPR-2, BITE

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF CHEMISTRY

1953

103

FACILITY QUESTIONNAIRE

The following information is requested for the purpose of determining the compatibility of your facilities with our product requirements. If attachments are used for supplying this information, please identify the material with the Section and Question numbers.

SECTION 1

GENERAL

1. Name and address of this facility:
2. Type of products manufactured at this facility:
3. Principal customers or users of these products:
4. Present division of facilities:

	<u>% R&D</u>	<u>% Production</u>
a) Government prime contract	_____	_____
b) Government subcontract	_____	_____
c) Commercial or proprietary	_____	_____

5. What per cent of government work and proprietary work do you subcontract?
6. At what per cent of capacity are you presently operating?
 - a) Research and development _____%
 - b) Production _____%

7. Attach brochure of company facilities (if available).
8. Attach quality control manual (if available).
9. Indicate areas of research, and areas in which patents are held, if any.
10. Briefly describe any plant security measures such as guard force, employee picture badges, etc.
11. Describe any plant security clearances, or clearances held by personnel.
12. Briefly describe your medical or first-aid facilities and safety program.
13. Indicate plant distance from truck, rail, and air transportation facilities.

7. Action proposed with respect to the situation.

8. Action plan, including a timeline, to be completed by 12/31/2010.

9. Indicate areas of responsibility and accountability for the action plan.
10. By.

10. Briefly describe the nature of the problem, including the scope and impact of the problem, and the current status of the problem.

11. Describe the current status of the problem, including the scope and impact of the problem, and the current status of the problem.

12. Briefly describe the nature of the problem, including the scope and impact of the problem, and the current status of the problem.

13. Indicate areas of responsibility and accountability for the action plan.
14. By.

SECTION II

BUILDINGS

1. Number and type of construction of buildings:
2. Floor space in each building, and percentage now used for administration, engineering, and manufacturing:
3. Area and location of floor space that is air conditioned in each building:
4. Type of fire alarm and fire protection systems in each building:
5. Indicate areas or buildings in which work on our product would be performed.

SECTION II

ARTICLE I

1. Name and type of building or structure

2. Floor space in each building, and other space used for business, office, engineering, and other purposes

3. Area and location of floor space that is used for business, office, engineering, and other purposes

4. Type of live alarm and life preserver system in each building

5. Indicate areas or buildings in which work is performed, and in which work is performed.

SECTION III

MANUFACTURING FACILITIES

1. Attach list of manufacturing, inspection, and test equipment. Include make, model, and age of equipment.
2. What percentage of this equipment is government owned?
3. Describe any "clean" or "white" rooms used in the manufacture of your product. Include description of method used for monitoring and controlling dust and humidity.
4. List your manufacturing capabilities such as sheet metal fabrication, welding, machining, plastic molding, electronic component manufacture, electronic assembly, etc. Include work size capacity where applicable.
5. List your manufacturing and inspection processing capabilities such as heat treating, plating, chemical analysis, magnetic particle inspection, ultrasonic inspection, radiography, etc. Indicate if any of these processes have been certified by a government agency.
6. Describe any restrictions against the use of your plant facilities for our product.

SECTION III

QUESTIONS TO BE ANSWERED

1. Approximate date of construction, and name of contractor, including name, address, and age of contractor.
2. What percentage of this work was in Government service?
3. Describe in detail the nature of the work done by the contractor, and the nature of the work done by the Government, including the nature of the work done by the contractor, and the nature of the work done by the Government.
4. List your findings with reference to the work done by the contractor, including the nature of the work done by the contractor, and the nature of the work done by the Government.
5. List your findings with reference to the work done by the contractor, including the nature of the work done by the contractor, and the nature of the work done by the Government.
6. Describe any recommendations you have for the improvement of the work done by the contractor, including the nature of the work done by the contractor, and the nature of the work done by the Government.

SECTION IV

QUESTIONS TO BE ANSWERED

1. Approximate date of construction, and name of contractor, including name, address, and age of contractor.

SECTION IV

OTHER FACILITIES

1. Attach list of environmental test equipment and facilities. Include make, model, size, and age of equipment. Also list names and addresses of outside laboratories performing environmental testing for you.
2. Attach list of model-shop equipment.
3. Attach list of calibration equipment. Also list names and addresses of outside laboratories performing calibration services for you.
4. Describe plant and equipment maintenance facilities.

SECTION V

PERSONNEL

1. List number of administrative, engineering, technical, quality control, inspection, and production personnel by function or organization.
2. List other personnel not included above.
3. List total number of personnel.
4. List number of personnel with degrees, and type of degrees.
5. Indicate average length of employment of production personnel.
6. Indicate union affiliation of employees, and expiration date of present union contracts.
7. Briefly describe any employee training programs.
8. Describe present work schedule.
9. Briefly describe local labor market and availability of additional skilled help.

SECRET

SECRET

1. List names of individuals, organizations, countries, territories, and political movements of interest to the United States.

2. List other persons, organizations, countries, territories, and political movements.

3. List other names of persons, organizations, countries, territories, and political movements.

4. List names of persons, organizations, countries, territories, and political movements.

5. Indicate any other names of persons, organizations, countries, territories, and political movements.

6. Indicate any other names of persons, organizations, countries, territories, and political movements.

7. Indicate any other names of persons, organizations, countries, territories, and political movements.

8. Indicate any other names of persons, organizations, countries, territories, and political movements.

9. Indicate any other names of persons, organizations, countries, territories, and political movements.

APPENDIX C
EXHIBIT 3
FEDERAL BUREAU OF INVESTIGATION

APPENDIX C

COMMON COUNCIL

OF THE CITY OF NEW YORK

IN SENATE

ASSEMBLED

SUPPLIER EVALUATION CHECK LIST

COLLEGE COMMISSION
EAST VERNON
JAN 19 1964

THE HOUSE OF COMMONS

SUPPLIER EVALUATION CHECK LIST

The following information should be obtained while performing the detailed audit of the supplier's facilities. Questions which are not applicable should be so indicated. Pertinent observations not covered by the questions should be briefly described.

CONTRACTS ADMINISTRATION

1. Are formal procedures established for preparing bids and quotations?
2. Do established bid and quotation procedures enlist the services of all related functions such as procurement, engineering, production planning, quality control, and inspection?
3. Can prime contractor changes be handled authoritatively and expeditiously?
4. Is the production status of customer work adequately maintained?
5. Are prime contractor design changes thoroughly evaluated for their effect on production and schedules?

Comments:

SUPPLIER EVALUATION LIST

The following information should be obtained while reviewing the detailed units of the supplier's facilities. Questions which are not applicable should be so indicated. Particular observations and comments by the question should be briefly recorded.

CONTRACT ADMINISTRATION

1. Are formal procedures established for preparing bids and proposals?
2. Do established bid and evaluation procedures exist at the review of all related functions such as procurement, engineering, production planning, quality control, and inspection?
3. Can prime contractor changes be handled satisfactorily and expeditiously?
4. Is the production status of customer work carefully monitored?
5. Are prime contractor design changes thoroughly evaluated for their effect on production and schedule?

Comments:

PURCHASING

1. Does supplier use a rating system for his subcontractors?
2. Are receiving inspection records advantageously used for rating subcontractors and for awarding new orders?
3. Is supplier familiar with, and does he have authority to audit, his subcontractor's procedures and processes?
4. Does supplier use competitive bidding? Are purchases from a subsidiary, parent, or other related organization made on a competitive basis?
5. Are inspection, testing, certification, packaging, and other requirements clearly stated in the purchase order?
6. Do purchase orders spell out drawing and specification issues, and are these drawings and specifications supplied with the purchase order?
7. Is purchase order follow-up expeditiously handled?
8. Does supplier maintain his own approved source list?
9. Does supplier establish multiple sources where possible?
10. Does the originator of the purchase requisition get a copy of the purchase order? Is a formal procedure set up for checking the purchase order against the purchase requisition?

Comments:

QUESTIONS

1. Does supplier have a rating system for its suppliers?
2. Are receiving inspection procedures standardized across the organization and for similar raw material?
3. Is supplier familiar with, and does he have authority to make, the subcontractor's processes and procedures?
4. Does supplier use progressive sampling? Are samples from a single lot, parcel, or other related organization used in a representative basis?
5. Are inspection, testing, certification, and other reports/records clearly stated in the purchase order?
6. Do purchase orders state all the terms of inspection, testing, and other criteria and standards? Are these terms clearly stated in the purchase order?
7. Is purchase order followed up by handling?
8. Does supplier-subcontractor have an approved process list?
9. Does supplier establish written records of its handling?
10. Does the organization of its processes conform to the requirements of the purchase order? Is a formal inspection and testing procedure established against the purchase order?

Comments:

DRAWING CONTROL

1. Are drawings and their distribution adequately controlled from a central file? Is there an adequate card index or control system to establish the location of all drawings?
2. Are revised drawings (new issues) expeditiously distributed in accordance with the effectivity dates established by the production planning and control group? Are superseded drawings removed from all locations?
3. Are working drawings adequately controlled, i. e., in good condition, up-to-date, and free of unauthorized markings?
4. Are military specifications adequately maintained?
5. Does supplier have safes and vaults for classified information?

Comments:

SECRET
CONFIDENTIAL

1. The Committee has been informed that the following information is being furnished to the Committee for its information and guidance:
2. The Committee has been informed that the following information is being furnished to the Committee for its information and guidance:
3. The Committee has been informed that the following information is being furnished to the Committee for its information and guidance:
4. The Committee has been informed that the following information is being furnished to the Committee for its information and guidance:
5. The Committee has been informed that the following information is being furnished to the Committee for its information and guidance:

Continued

RESEARCH AND DEVELOPMENT

1. Are personnel talents and background adequate to support research and development objectives?
2. Are model-shop facilities adequate to support research and development activities?
3. Are design evaluation test facilities adequate to support research and development activities?
4. In what areas have research efforts been expended?
5. What accomplishments have been realized in advancing the frontiers of knowledge?

Comments:

RESEARCH IN DEVELOPMENT

1. The personnel, materials and equipment available to conduct research and development activities
2. The model-type facilities available to support research and development activities
3. The design evaluation and facilities available to support research and development activities
4. In what areas have research efforts been expanded?
5. What accomplishments have been realized in advancing the frontier of knowledge?

Continued

QUALITY CONTROL

1. Are personnel talents and background adequate to support production and quality requirements?
2. Has the quality control program been formalized and an adequate manual prepared?
3. Do quality control personnel participate in drawing review and bid preparation?
4. Do quality control personnel review purchase requisitions and purchase orders to assure that materials, test reports, and certifications are adequately specified?
5. Are formal procedures prepared for the receiving and inspection of all purchased items?
6. Do quality control procedures define identification and storage requirements for material in receiving, stores, and production areas?
7. Are formal inspection procedures prepared for in-process and final inspection?
8. Are production processes adequately controlled by sample inspection or \bar{X} and R charts? If first parts inspection only is used, what controls are used for balance of production run?
9. Are in-process and final inspection records reviewed for possible improvement in process controls and reduction of rejects? Are inspection results tabulated to show quality trend?
10. Do quality control personnel or a Materials Review Board review and make disposition of nonconforming material? Are disposition procedures formalized, i. e., written instructions and permanent records? Is reworked material positively identified? Is material to be scrapped positively identified or physically damaged so as to prevent its re-entry into production flow?
11. Is a "Recurring Discrepancy Report" maintained? Do records or graphs show evidence of an effective quality control program to prevent recurring discrepancies?
12. Are all defective and scrap material reports submitted to management for review?

1. The proposed project is in accordance with the
and shall be carried out.
2. The project is in accordance with the
and shall be carried out.
3. The project is in accordance with the
and shall be carried out.
4. The project is in accordance with the
and shall be carried out.
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10. The project is in accordance with the
and shall be carried out.
11. The project is in accordance with the
and shall be carried out.
12. The project is in accordance with the
and shall be carried out.

13. Is a quality training program conducted for production, processing and inspection personnel?
14. Are quality control and inspection personnel free to exercise their duties without interference from other organizations?
15. Do management and other personnel appear quality conscious?
16. Does the quality control group have responsibility for assuring the adequacy of all inspection, test, and calibration equipment?
17. Does the quality control group have responsibility for assuring the adequacy of all testing, inspecting, qualifying, and certifying procedures?
18. Do quality control personnel review the design, and determine the adequacy, of all gages and testers?
19. Do quality control personnel review all drawing and design changes for effect on inspecting, gaging, and testing?
20. Do quality control personnel maintain surveillance over qualification, environmental, and life tests during the product development phase to assure compliance with the product reliability requirements?
21. Do quality control personnel periodically conduct in-plant and subcontractor quality surveys or audits?
22. Are work areas periodically inspected to assure that only approved procedures, tools, and materials are being used?
23. Are stockrooms periodically inspected to assure that material is properly stored and protected, and that obsolete or expired material is removed from active storage areas?
24. Do quality control personnel periodically inspect special process solutions, methods, instrumentation, and work samples to assure compliance to all specifications and requirements?

Comments:

12. Is a positive human factor essential to the success of a program?
13. Are positive human factors essential to the success of a program?
14. Do management skills and techniques play a significant role in the success of a program?
15. Does the quality of the program itself play a significant role in the success of a program?
16. Does the quality of the program itself play a significant role in the success of a program?
17. Does the quality of the program itself play a significant role in the success of a program?
18. Do quality control systems play a significant role in the success of a program?
19. Do quality control systems play a significant role in the success of a program?
20. Do quality control systems play a significant role in the success of a program?
21. Do quality control systems play a significant role in the success of a program?
22. Are there any other factors that play a significant role in the success of a program?
23. Are there any other factors that play a significant role in the success of a program?
24. Do quality control systems play a significant role in the success of a program?

Continued

MANUFACTURING/INDUSTRIAL ENGINEERING

1. Are personnel talents and background adequate to support production and quality requirements?
2. Are laboratory facilities adequate to support process and product evaluation activities?
3. Are formal procedures established for preparing production and process lay-outs?
4. Are formal procedures established for tool and gage design and tryout?

Comments:

REVIEW OF THE LITERATURE ON THE

1. The personnel, facilities and equipment available to support production and quality improvement.
2. The laboratory facilities available to support process and product evaluation activities.
3. The formal procedures established for preparing production and process reports.
4. The formal procedures established for tool and gear design and reports.

Comments:

PRODUCTION PLANNING

1. Are personnel talents and background adequate to support production and quality requirements?
2. Are raw material and commercial material requirements adequately controlled?
3. Are subcontracted items adequately controlled?
4. Are production facilities (personnel and equipment) adequately scheduled and controlled?
5. Are work schedules and progress and quality reports, based on outside and in-plant performance, adequately maintained?
6. Are rejects and reworks adequately controlled and replacement material requisitioned?
7. Are operation cards, or similar planning sheets used for routing of parts through production and inspection?
8. Is adequate control maintained on production progress throughout the manufacturing cycle?
9. Are records of product changes and their effectivity dates adequately maintained?
10. Are adequate records maintained on scrapped material?

Comments:

ANNEX 1

1. The purpose of the study is to determine the effect of the treatment on the health of the patients.
2. The study is a randomized controlled trial.
3. The study is a parallel design.
4. The study is a prospective study.
5. The study is a clinical trial.
6. The study is a therapeutic trial.
7. The study is a diagnostic trial.
8. The study is a prognostic trial.
9. The study is a screening trial.
10. The study is a quality improvement trial.

Continued

TOOLS AND GAGES

1. Is storage area adequate to provide necessary protection for tools and gages?
2. Are tools and gages adequately identified?
3. Are tools and gages adequately stored and protected by dip-coat?
4. Are adequate records kept on tool and gage use?
5. Are tools and gages inspected after being used?
6. Are defective tools and gages, or items needing calibration, adequately identified?

Comments:

FOODS AND FEEDS

1. In storage area adjacent to outside storage building for food and feed.
2. The food and feed are stored in the building.
3. The food and feed are stored in the building and are protected by fire.
4. The food and feed are stored in the building and are protected by fire.
5. The food and feed are stored in the building and are protected by fire.
6. The food and feed are stored in the building and are protected by fire.

Continued

TOOL AND GAGE CALIBRATION

1. Does supplier have adequate primary and secondary standards for calibrating working equipment?
2. Are primary and secondary standards calibrated at reasonable intervals?
3. Are facilities adequate to provide proper temperature and humidity control where necessary?
4. Are all inspection tools and gages calibrated at a predetermined frequency based on usage and tolerances?
5. Are working tools and gages (crimping tools, wire strippers, torque wrenches, etc.) inspected at reasonable intervals based on usage?
6. Are actual calibration readings recorded for use in determining future calibration frequency and to assure replacement or repair of gages before they reach an out-of-tolerance condition?
7. Are production workers' personal tools and gages adequately controlled and inspected?
8. Do tool and gage inspection and calibration personnel report to the quality control group?
9. Are written instructions provided for the calibration and maintenance of tools, gages, and other measuring equipment?
10. Are all new and reworked tools and gages inspected or calibrated before production use?
11. Are first parts from new or modified tooling inspected prior to final acceptance and production release of such tooling? Are production tools periodically checked for accuracy?
12. Is equipment that has exceeded its calibration period conspicuously identified and removed from the inspection area?

Comments:

WILLER 1375

THE WILLER

1. The first of the series is the first of the series.
2. The second of the series is the second of the series.
3. The third of the series is the third of the series.
4. The fourth of the series is the fourth of the series.
5. The fifth of the series is the fifth of the series.
6. The sixth of the series is the sixth of the series.
7. The seventh of the series is the seventh of the series.
8. The eighth of the series is the eighth of the series.
9. The ninth of the series is the ninth of the series.
10. The tenth of the series is the tenth of the series.
11. The eleventh of the series is the eleventh of the series.
12. The twelfth of the series is the twelfth of the series.

Comments

ELECTRICAL TEST EQUIPMENT

1. Is equipment adequately stored and protected from physical damage?
2. Is equipment adequately identified?
3. Are adequate records kept on equipment use?
4. Is equipment checked after being used?
5. Is defective equipment, or equipment needing calibration, adequately identified?

Comments:

ELECTRICAL TEST EQUIPMENT CALIBRATION

1. Does supplier have adequate primary and secondary standards to calibrate working equipment?
2. Are primary and secondary standards calibrated at reasonable intervals?
3. Is working equipment calibrated at a predetermined frequency based on usage?
4. Are calibration readings recorded for use in determining future calibration frequency and to assure replacement or repair of equipment before it reaches an out-of-tolerance condition?
5. Do test equipment calibration and inspection personnel report to the quality control group?
6. Are written instructions provided for the calibration and maintenance of test equipment?
7. Is all new or reworked test equipment calibrated before use?
8. Is equipment that has exceeded its calibration period conspicuously identified and removed from the test area?

Comments:

RECOMMENDATIONS FOR THE FUTURE

1. The committee has recommended that the following be done:
2. The primary and secondary schools should be encouraged to provide information.
3. The committee has recommended that the following be done:
4. The committee has recommended that the following be done:
5. The committee has recommended that the following be done:
6. The committee has recommended that the following be done:
7. The committee has recommended that the following be done:
8. The committee has recommended that the following be done:

Comments:

ENVIRONMENTAL TEST EQUIPMENT

1. Is environmental test equipment adequate to support production and quality requirements?
2. Has equipment been certified by a government agency?
3. Is equipment and instrumentation calibrated at reasonable intervals?
4. Does supplier have a working arrangement with an outside certified test laboratory for supplementing his own facilities?

Comments:

INSTRUCTIONS FOR THE USER

1. In order to use the equipment, the user must first read the instructions carefully.
2. The equipment must be used in accordance with the instructions.
3. The equipment must be used in accordance with the instructions.
4. The equipment must be used in accordance with the instructions.

Comments:

ALL INFORMATION CONTAINED
HEREIN IS UNCLASSIFIED
DATE 11-11-83 BY 111-111-111

MATERIALS LAB

1. Are equipment and personnel talents adequate to support production and quality requirements?
2. Has equipment been certified by a government agency?
3. Does supplier have a working arrangement with an outside certified laboratory for supplementing his own facilities?
4. Is supplier's equipment calibrated at reasonable intervals?

Comments:

RESEARCH

1. The equipment and personnel should be in constant readiness for duty.
2. The equipment should be maintained by a government agency.
3. The equipment should have a working arrangement with the various laboratories for exchanging information.
4. The equipment should be able to handle all types of material.

Continued

CLEAN ROOMS

1. Are personnel required to vacuum clean their clothes before entry?
Are they required to wear approved clothing such as smocks, hats, gloves, and shoe coverings?
2. Are floors, benches, walls, etc., vacuum cleaned daily? Are lighting fixtures and/or other dust collecting fixtures cleaned regularly?
3. Are air filters checked and replaced regularly?
4. Is the air within the room adequately sampled to assure freedom from contamination?
5. Is instrumentation properly calibrated?

Comments:

MILLERS FALLS

GENERAL

1. The principal industry of the town is the sawmill, which employs about 100 men. The lumber is shipped to the coast by rail.
2. The town is situated on the shore of Lake Superior, and is one of the best places for fishing and hunting.
3. The climate is very healthy, and the scenery is beautiful.
4. The town is well supplied with all the necessities of life, and is a very pleasant place to live in.
5. The population of the town is about 1000.

Continued

RECEIVING INSPECTION

1. Are equipment and personnel talents adequate to assure conformance to quality requirements?
2. Is equipment properly protected and maintained?
3. Does inspection equipment show evidence of proper calibration?
4. Are procurement data, drawings, and specifications readily available and adequately controlled?
5. Are inspection requirements adequately defined by written check sheets prepared by quality control personnel?
6. Is inspection based on approved sampling plans (MIL-STD-105A or MIL-STD-414) with tightened or reduced inspection as warranted by subcontractors' past performance?
7. Are all test reports and material and process certifications adequately checked against purchase order and drawing requirements?
8. Is material periodically spot-checked by the supplier to confirm certifications and test reports?
9. Is material awaiting certification positively identified by withhold tags and segregated from materials flow pending receipt of certification?
10. Is nonconforming material positively identified by withhold tags and segregated from materials flow pending disposition by a Materials Review Board or equivalent?
11. Is inspected and accepted material positively identified, and can it be associated with the related purchase order, drawing or specification, or certification document?
12. Are inspection records, certifications, test reports, and receiving reports adequately maintained?
13. Are temperature-, humidity-, and dust-controlled inspection facilities available if necessary?
14. Is housekeeping adequate?
15. Are material handling methods adequate?

1. The following are the main points of the report:

1. The following are the main points of the report:
2. In connection with the report, the following points are noted:
3. The following are the main points of the report:
4. The following are the main points of the report:
5. The following are the main points of the report:
6. The following are the main points of the report:
7. The following are the main points of the report:
8. The following are the main points of the report:
9. The following are the main points of the report:
10. The following are the main points of the report:
11. The following are the main points of the report:
12. The following are the main points of the report:
13. The following are the main points of the report:
14. The following are the main points of the report:
15. The following are the main points of the report:

16. Are controls adequate to assure that no material can be admitted to stores or the production line without proper inspection and acceptance?

Comments:

16. Are controls adequate to ensure that no material can be added to
scores or the production line without proper inspection and accep-
tance?

Comments:

RAW STORES

1. Is all material positively identified, and can it be associated with the purchase order, drawing or specification, or certification document?
2. Is only acceptable material permitted in the stores area, and is the inspection status of the material adequately defined?
3. Are temperature-, humidity-, and dust-controlled storage areas available if necessary?
4. Is material adequately protected against corrosion, dust, and physical damage?
5. Is material with limited shelf life adequately controlled? Do quality control personnel periodically audit stores to assure compliance with storage requirements?
6. Are bonded or segregated storage areas available if required?
7. Is access restricted to authorized personnel? Is material issued only by authorized requisition?
8. Does inventory control adequately establish reordering information? Is material disbursed in accordance with the FIFO method?
9. Is housekeeping adequate?
10. Are material handling methods adequate?
11. Is material for cost-plus-fixed-fee contracts held in a bonded area?
12. Are materials segregated according to product or customer? Are segregated materials or storage areas identified as to product or customer?

Comments:

CONCLUSIONS

1. In all cases, the results of the tests are in good agreement with the theoretical predictions, and the error is less than 5%.
2. The only significant deviation from the theoretical predictions is observed in the case of the tests with the highest values of the parameter α .
3. The results of the tests with the highest values of the parameter α are in good agreement with the theoretical predictions, and the error is less than 5%.
4. The results of the tests with the highest values of the parameter α are in good agreement with the theoretical predictions, and the error is less than 5%.
5. The results of the tests with the highest values of the parameter α are in good agreement with the theoretical predictions, and the error is less than 5%.
6. The results of the tests with the highest values of the parameter α are in good agreement with the theoretical predictions, and the error is less than 5%.
7. The results of the tests with the highest values of the parameter α are in good agreement with the theoretical predictions, and the error is less than 5%.
8. The results of the tests with the highest values of the parameter α are in good agreement with the theoretical predictions, and the error is less than 5%.
9. The results of the tests with the highest values of the parameter α are in good agreement with the theoretical predictions, and the error is less than 5%.
10. The results of the tests with the highest values of the parameter α are in good agreement with the theoretical predictions, and the error is less than 5%.
11. The results of the tests with the highest values of the parameter α are in good agreement with the theoretical predictions, and the error is less than 5%.
12. The results of the tests with the highest values of the parameter α are in good agreement with the theoretical predictions, and the error is less than 5%.

Commentary

PRODUCTION AREAS

1. Are all parts or components adequately controlled and identified by work travellers as to part number, lot, quantity, production status, and inspection status?
2. Is material from stores checked for evidence of propriety and proper inspection prior to starting production operations?
3. Are all process materials (solder, cleaning fluids, etc.) adequately identified and protected from contamination?
4. Are all processes formalized and adequately defined in writing?
5. Are certified processes and operators (heat-treat, plating, welding, etc.) adequately controlled? Are certifications current? Are control instruments and devices periodically calibrated? Are processed items or test specimens adequately inspected to applicable specifications?
6. Are process capability studies performed to determine process and equipment limitations? Are processes and production runs adequately controlled by statistical quality control methods?
7. What tolerances are now being held? Can tighter tolerances be held?
8. Are drawings and specifications routed with the work and adequately controlled, i. e., in good condition, up-to-date, and free of unauthorized markings? Do all markings reference the authority for change?
9. Does production equipment show evidence of proper maintenance?
10. Are supplier-furnished and employee's tools and gages adequately calibrated?
11. Are temperature-, humidity-, and dust-controlled areas available if necessary?
12. Are parts and materials adequately protected from contamination by dust, moisture, chips, abrasives, etc.?
13. Is housekeeping adequate? Are work areas clean? Is vacuum cleaning used?
14. Are safety measures adequate and observed?
15. Are aisles adequately marked and kept free of obstructions?

THE LISTING

1. The all parts of equipment, including the following, shall be available as to part number, quantity, production status and location.

2. In addition, the following shall be available as to part number, quantity, production status and location:

3. The all process materials (paper, ink, etc.) shall be available as to part number, quantity, production status and location.

4. The all process materials shall be available as to part number, quantity, production status and location.

5. The all process materials shall be available as to part number, quantity, production status and location. The all process materials shall be available as to part number, quantity, production status and location.

6. The process materials shall be available as to part number, quantity, production status and location. The process materials shall be available as to part number, quantity, production status and location.

7. The process materials shall be available as to part number, quantity, production status and location.

8. The process materials shall be available as to part number, quantity, production status and location. The process materials shall be available as to part number, quantity, production status and location.

9. The process materials shall be available as to part number, quantity, production status and location.

10. The process materials shall be available as to part number, quantity, production status and location.

11. The process materials shall be available as to part number, quantity, production status and location.

12. The process materials shall be available as to part number, quantity, production status and location.

13. The process materials shall be available as to part number, quantity, production status and location.

14. The process materials shall be available as to part number, quantity, production status and location.

15. The process materials shall be available as to part number, quantity, production status and location.

16. Are work and storage areas adequate?
17. Is handling equipment adequate to prevent damage to material?
18. Are production lines organized for an orderly flow of material, and is material routed in accordance with good planning practices?
19. Do personnel appear properly trained in the use and care of their tools and equipment?
20. Are parts and assemblies checked prior to each operation for evidence of previous required inspection?
21. Are jigs, fixtures, and hard tooling used when possible?
22. Are written instructions furnished for repair and rework?
23. Is rejected material properly identified and removed from production areas?

Comments:

16. Are work and storage areas adequate?
17. Is handling equipment adequate to prevent damage to material?
18. Are procedures in place for an orderly flow of material, and is material treated in accordance with good cleaning practices?
19. Is personnel properly trained in the use and care of their tools and equipment?
20. Are parts and assemblies checked prior to each operation for evidence of previous required inspection?
21. Are jigs, fixtures, and hand tooling used when possible?
22. Are written instructions furnished for repair and rework?
23. Is rejected material properly identified and removed from production areas?

Continued

IN-PROCESS INSPECTION

1. Are inspection stations strategically located to adequately control the production process?
2. What inspection methods are used--first run, 100%, sampling, or roving? For continuous production subject to sampling inspection, is new production segregated from previous production pending the next sampling inspection?
3. Do inspection personnel appear adequately trained and capable of assuring quality production?
4. Is equipment adequate to perform all required inspection?
5. Does equipment show evidence of adequate calibration?
6. Are written inspection procedures used, and are check points adequately defined? Do inspection check lists specify drawing issues?
7. Are inspection and test readings recorded? Is the inspector identified?
8. Is inspection in accordance with the prime contractor's drawings and specifications? Does the Inspection Department have readily available all necessary drawings and specifications?
9. Are inspection and test data records adequately maintained?
10. Are inspection results fed back to quality control and management personnel for the initiation of corrective action on out-of-control processes?
11. Is all inspected work positively identified by inspection stamps as to status, i.e., accepted, rejected, hold for disposition, etc.?
12. Is rejected work positively identified and removed from the line to a bonded or restricted hold area pending disposition by the Materials Review Board?
13. Is reworked or repaired material reinspected before the work is returned to the production line?
14. Is reworked or substandard material adequately and permanently identified?

THE PROBLEM OF THE FUTURE

1. The first step is to determine the nature of the problem.
2. The second step is to determine the scope of the problem.
3. The third step is to determine the causes of the problem.
4. The fourth step is to determine the effects of the problem.
5. The fifth step is to determine the possible solutions.
6. The sixth step is to determine the best solution.
7. The seventh step is to determine the implementation of the solution.
8. The eighth step is to determine the evaluation of the solution.
9. The ninth step is to determine the maintenance of the solution.
10. The tenth step is to determine the termination of the solution.
11. The eleventh step is to determine the future of the solution.
12. The twelfth step is to determine the conclusion of the solution.
13. The thirteenth step is to determine the final result of the solution.
14. The fourteenth step is to determine the overall outcome of the solution.

15. If overtime or second and third shifts are worked, are inspection personnel on duty during these periods?

Comments:

12. If you are a member of the American Medical Association, please indicate the year in which you became a member.

Continued

SECTION CONTENT
EFFECTS
ATTACHED

IN-PROCESS STORES

1. Is all material adequately identified, and can it be associated with the purchase order, drawing or specification, or certification document?
2. Is only acceptable material permitted in the stores area, and is the production and inspection status of the material adequately defined?
3. Are temperature-, humidity-, and dust-controlled areas available if necessary?
4. Is access restricted to authorized personnel?
5. Are components adequately protected from contamination and physical damage?
6. Is housekeeping adequate?
7. Are material handling methods adequate?
8. Are materials segregated according to product or customer? Are segregated materials or storage areas identified as to product or customer?

Comments:

IN-PROCESS CHECKS

1. Is all material adequately identified, and are all documents with the purchase order, drawing or specification, or certification label ready?
2. Is only acceptable material permitted in the storage area, and is the production and inspection status of the material adequately defined?
3. Are temperature-, humidity-, and dust-controlled areas available if necessary?
4. Is access restricted to authorized personnel?
5. Are components adequately protected from contamination and physical damage?
6. Is housekeeping adequate?
7. Are material handling methods adequate?
8. Are materials segregated according to product or customer? Are damaged materials or storage areas identified as to product or customer?

Comments:

ASSEMBLY AREAS

1. Are all components and parts adequately identified as to part number, lot, quantity, and inspection status?
2. Are all process materials adequately identified and protected from contamination?
3. Are all processes formalized and clearly defined in writing?
4. Are temperature-, humidity-, and dust-controlled areas available where necessary?
5. Are components adequately protected from contamination by dust, moisture, chips, abrasives, etc.?
6. Is housekeeping adequate? Are work areas clean? Is vacuum cleaning used?
7. Are material handling methods adequate?
8. Are ultrasonic cleaning facilities available, and is the process adequately controlled?
9. Are required drawings and specifications readily available and are they adequately controlled?

Comments:

1. The all-purpose and party membership lists shall be maintained in the party books, lists, party, and individual lists.

2. The all-purpose membership records, including and protected from circulation.
3. The all-purpose records are clearly defined as follows:
4. The membership, party, and individual lists shall be maintained in the party books, lists, party, and individual lists.
5. The membership records shall be maintained in the party books, lists, party, and individual lists.
6. The membership records shall be maintained in the party books, lists, party, and individual lists.
7. The membership records shall be maintained in the party books, lists, party, and individual lists.
8. The membership records shall be maintained in the party books, lists, party, and individual lists.
9. The membership records shall be maintained in the party books, lists, party, and individual lists.

Continued

FINAL INSPECTION

1. Are final inspection and final testing performed after all operations are completed?
2. Do inspection personnel appear adequately trained and capable of assuring quality production?
3. Is equipment adequate to perform all required inspection?
4. Does inspection equipment show evidence of proper calibration?
5. Are written inspection procedures used, and are check points adequately defined? Do inspection check lists specify drawing issues?
6. Are inspection and test readings recorded? Is the inspector identified?
7. Is inspection in accordance with the prime contractor's drawings and specifications? Does the Inspection Department have readily available all necessary drawings and specifications?
8. Are inspection and test data records adequately maintained?
9. Are inspection results fed back to quality control and management for initiating corrective action on manufacturing errors?
10. Is all inspected work positively identified by inspection stamps as to status, i. e., accepted, rejected, hold for disposition, etc.?
11. Is rejected work positively identified and removed from assembly line to a bonded or restricted hold area pending disposition by the Materials Review Board?
12. Is reworked or repaired material reinspected before the work is returned to the assembly line?
13. Is reworked or substandard material adequately and permanently identified?

Comments:

FINAL INSPECTION

1. Are final inspection and final testing performed after all operations are completed?
2. Do inspection personnel appear adequately trained and capable of assuring quality production?
3. Is equipment adequate to perform all required inspections?
4. Does inspection equipment show evidence of proper calibration?
5. Are written inspection procedures used, and are check points adequately defined? Do inspection check lists specify drawing number?
6. Are inspection and test results recorded? Is the inspector identified?
7. Is inspection in accordance with the prime contractor's drawings and specifications? How are the inspection department's results available? All necessary drawings and specifications?
8. Are inspection and test data records adequately maintained?
9. Are inspection results fed back to quality control and management for initiating corrective action on manufacturing errors?
10. Is all inspected work positively identified by inspection stamps as to status, i. e., accepted, rejected, held for disposition, etc.?
11. Is rejected work positively identified and removed from assembly line to a hold area or restricted hold area pending disposition by the Materials Review Board?
12. Is reworked or repaired material rechecked before the work is returned to the assembly line?
13. Is reworked or substituted material adequately and permanently identified?

Comments:

FINAL STORES

1. Is all material adequately identified, and can it be associated with the purchase order, drawing or specification, or certification document.
2. Is only acceptable material permitted in the stores area, and is the inspection status of the material adequately defined?
3. Are temperature-, humidity-, and dust-controlled areas available if necessary?
4. Is access restricted to authorized personnel?
5. Are components adequately protected from contamination and physical damage?
6. Is housekeeping adequate?
7. Are material handling methods adequate?
8. Are materials separated or segregated according to product or customer? Are segregated materials or storage areas identified as to product or customer?

Comments:

PACKAGING AND SHIPPING

1. Is the product protected from dirt, moisture, and other foreign material before and during packaging operations?
2. Are all items checked for evidence of proper inspection before being packaged?
3. Are military packaging specifications readily available and adequately maintained?
4. Are packaging instructions formalized and clearly defined in writing?
5. Is packaging adequately inspected?
6. Are material handling methods adequate?

Comments:

EXHIBIT A-1

1. Is the project proposed for the year 1961, and is it a major project?
2. Are all funds derived from the sale of property, or are they derived from other sources?
3. Are all funds derived from the sale of property, or are they derived from other sources?
4. Are all funds derived from the sale of property, or are they derived from other sources?
5. Are all funds derived from the sale of property, or are they derived from other sources?
6. Are all funds derived from the sale of property, or are they derived from other sources?

Continued

WORK PRACTICES

1. Are working conditions conducive to high morale?
2. Are cafeteria or eating facilities adequate?
3. Is eating at the production and assembly lines prohibited?
4. Are training programs conducted to upgrade and improve personnel?
5. Are labor-management relations healthy?
6. Is employee attitude and interest on a healthy plane? Do employees appear company-minded?
7. Do employees exhibit familiarity with equipment and pride in work?
8. Do supervisory and production personnel appear quality-minded?
9. Does caliber of management and other personnel contacted appear high?
10. What is the rate of labor turnover?
11. Do work practices appear well organized and conducive to high productivity?

Comments:

WORK ANALYSIS

1. The working conditions and constraints to which workers
2. The objectives or setting for the work analysis
3. The nature of the organization and its role in the community
4. The existing processes and procedures in the organization
5. The labor-management relations history
6. The employee attitudes and interests as they relate to the work
7. The employee working conditions as they relate to the work
8. The organization and its history as they relate to the work
9. The nature of management and other personnel involved in the work
10. What is the role of the work analysis?
11. Do work analysis and work design have any relationship to the work?

Comments

PLANT ENGINEERING AND MAINTENANCE

1. Is the maintenance program formalized and adequate?
2. Is equipment adequately maintained? Is there visual evidence of such maintenance?
3. Are plant facilities adequately maintained?
4. Are records kept on downtime resulting from maintenance and/or breakdown?

Comments:

THE PROBLEM OF THE FUTURE

1. The problem of the future is a problem of the future.
2. The problem of the future is a problem of the future.
3. The problem of the future is a problem of the future.
4. The problem of the future is a problem of the future.

Continued

THE PROBLEM OF THE FUTURE
IS A PROBLEM OF THE FUTURE
AND A PROBLEM OF THE FUTURE

SECURITY

1. Is plant access adequately controlled?
2. Are security guards adequately placed?
3. Do employees wear picture badges?
4. Are restricted access areas adequately controlled?

Comments:

RESULTS

1. In this case, the results are as follows:
2. The results are as follows:
3. The results are as follows:
4. The results are as follows:

Conclusion

THE RESULTS OF THE
ANALYSIS OF THE
DATA ARE AS FOLLOWS:

MEDICAL AND SAFETY

1. Are first-aid facilities adequate?
2. Is safety program adequate?
3. Are safety measures enforced and observed?
4. Is emergency fire protection equipment adequate?
5. Are exits clearly marked and unobstructed?
6. Are work areas and aisles adequately defined and unobstructed?
7. Is ventilation adequate?
8. Is lighting adequate?
9. Is the plant generally clean and sanitary, and is housekeeping good?
10. Are guards used on machine tools to assure safe operation?

Comments:

CHAPTER 10

1. The first step in the process is to identify the problem.
2. The second step is to define the problem.
3. The third step is to analyze the problem.
4. The fourth step is to develop a plan.
5. The fifth step is to implement the plan.
6. The sixth step is to evaluate the results.
7. The seventh step is to communicate the results.
8. The eighth step is to document the results.
9. The ninth step is to review the results.
10. The tenth step is to conclude the process.

Continued

CHAPTER 10

CHAPTER 10

CHAPTER 10

CHAPTER 10

CHAPTER 10

CHAPTER 10

CHAPTER 10

CHAPTER 10

CHAPTER 10

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APPENDIX

OF THE

AMERICAN BAPTIST MISSIONARY SOCIETY, 1845-1850.

AMERICAN BAPTIST MISSIONARY SOCIETY, 1845-1850.

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AMERICAN BAPTIST MISSIONARY SOCIETY, 1845-1850.

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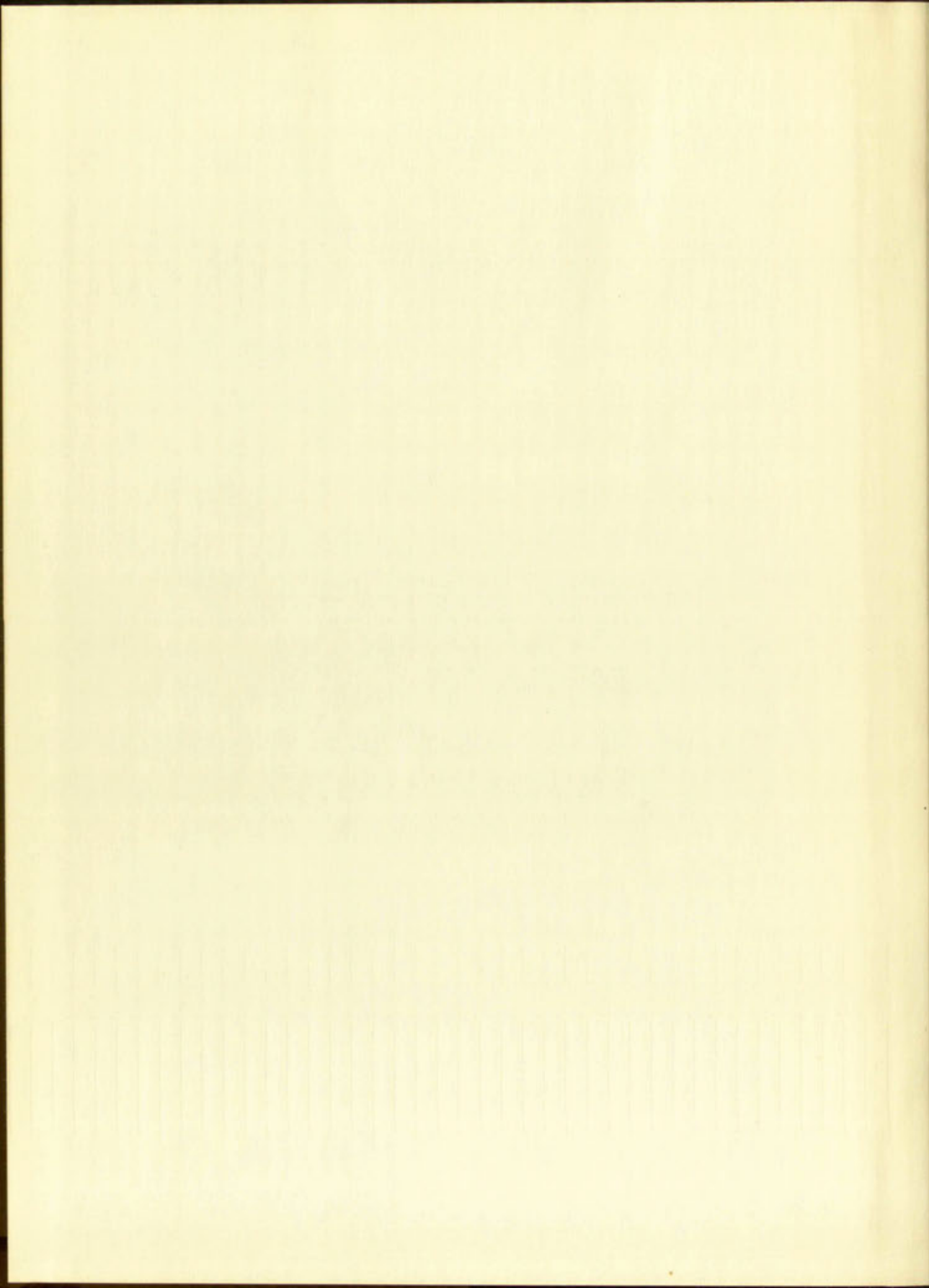
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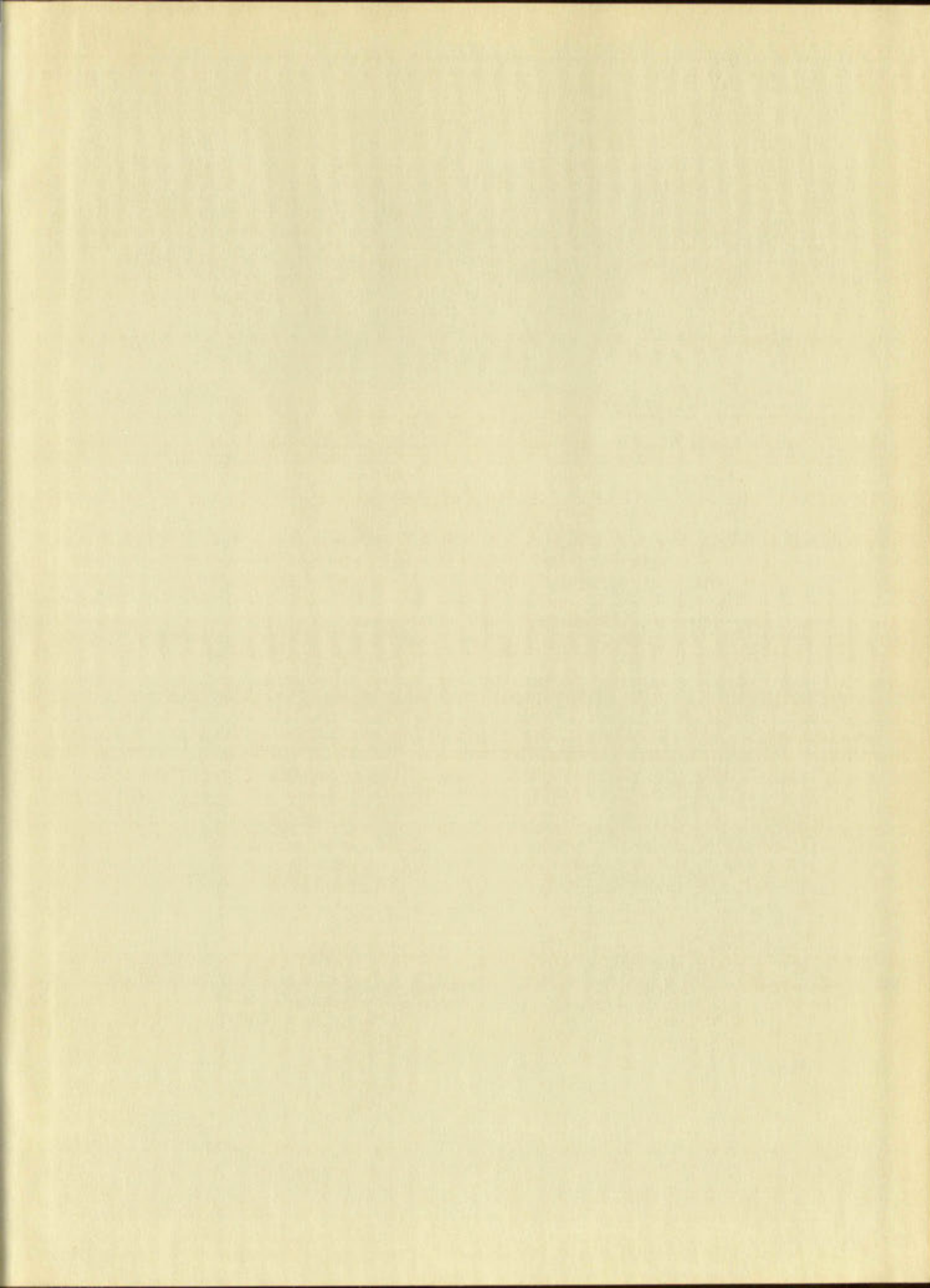
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FARMERS ASSOCIATION
COTTON CONTENT

MILLERS
FARMERS ASSOCIATION
COTTON







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