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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW

FINAL REPORT

Vol. I

JUNE 1972

A. LAPIN
AIR PRODUCTS AND CHEMICALS, INC.
ALLENTOWN, PENNSYLVANIA 18105

Prepared for

AEROSPACE SAFETY RESEARCH AND DATA INSTITUTE
LEWIS RESEARCH CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CLEVELAND, OHIO 44135

Under

NASA Contract NAS3–15083
Paul M. Ordin, Program Manager

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This report is the result of the joint effort of a corporate wide team: a steering committee comprising Mr. W. L. Ball and Drs. A. Lapin and C. McKinley and about 15 additional senior personnel representing different departments and divisions. The efforts of Mrs. A. M. Powell and Miss S. L. Price in the preparation of the General Index, and of Mrs. K. F. Quay in the typing and preparation of the final report are appreciated. Special acknowledgment is made of the very significant contributions of Mssrs. I. Iverson, F. K. Kitson, H. H. Master, and W. W. Schmoyer.

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ABSTRACT

A thorough and detailed study of Air Products and Chemicals, Inc. and Air Products Ltd. practices in the design and use of equipment in oxygen service, was performed. The report includes Liquid and Gaseous Oxygen Safety Review information covering: Material Compatibility, Operational Hazards, Maintenance Programs, Systems Emergencies, and Accident/Incident Investigations and Reports, and a set of references. Areas requiring further research and development for systems involving exposure to oxygen environment have been identified. An index to the Liquid and Gaseous Safety Review Data Forms and a General Index have been included to allow for easy retrieval of the reported information.

INTRODUCTION

The NASA Aerospace Safety Research and Data Institute (ASRDI) is responsible for providing NASA and its contractors with technical information and consultation on safety problems. To assist in this effort, a thorough and detailed study of Air Products and Chemicals, Inc. (APCI) and Air Products Ltd. (APL) practices in the design and use of equipment in oxygen service, has been performed in accordance with the terms of NASA Contract NAS3-15083.

The purpose of this study was to provide ASRDI with some of the industrial information needed for their oxygen safety review program which has the following objectives:

1. Providing early recommendations to improve NASA's oxygen handling by comparing NASA and contractor oxygen systems design, inspection, operation, maintenance and emergency procedures with those practiced in industry, universities and other government establishments. These systems include those used on space vehicles, aircraft, test and service facilities, surface vehicles, and disposal systems.

2. Assessing the vulnerability of NASA and contractor oxygen equipment to failure from a variety of sources so that hazards may be defined and remedial measured formulated.

3. Filling gaps in knowledge on oxygen handling through analysis and research in order to provide a better data base for the design of oxygen system and associated safety equipment, and for the formulation of meaningful tests, inspections, and emergency procedures.

4. Issuing criteria and standards on all aspects of oxygen handling and disposal.

5. Providing insight into the key processes that control the performance of oxygen systems and their components as an aid to design and operation, particularly under off-design or emergency conditions.

Specific questions concerning oxygen safety were included in the contract in the form of an Oxygen Safety Review Data Form and Check List. These provided guidelines as to the type of information desired and included a format for identifying referenced documents. A brief summary of each main heading of the NASA Safety Review Check List includes the following:

I. Material Compatibility

   A. List of materials used or contained in liquid and gaseous oxygen systems.

The materials used in oxygen systems, whether in direct contact with oxygen, or exposed to oxygen rich air as a result of leaks or accidents are individually considered under this heading. Methods and tests used to evaluate the compatibility of the materials in an oxygen environment are described. References are listed whenever applicable. Allowable oxygen environments are specified for each one of the materials listed.

B. Compatibility Checks

The compatibility considerations of materials in the oxygen systems are discussed and information on how the areas of possible concern in oxygen systems are handled is provided. Design criteria, cleaning procedures and quality control methods are covered in detail.

II. Operational Hazards

Guidelines, codes, regulations and special procedures used in the design, installation, fabrication, testing and operations for protection against hazards involved with production, transportation, storage and system handling of oxygen are presented with a list of related references.

III. Maintenance Programs

The Company practices employed in the oxygen systems maintenance programs to minimize both accident probabilities and consequences of accidents and/or incidents are described. Appropriate sections of the Operations Department and Industrial Gas Division Operating Manuals are discussed.

IV. Systems Emergencies

The practices employed to handle emergencies are spelled out in some detail. Training, warning, and protection of personnel and equipment are discussed.

V. Accident/Incident Investigations and Reports

A review is made of accidents involving oxygen which occurred in the industry in general, and in the company in particular. Accident reports are presented whenever available.

An Air Products and Chemicals, Inc. steering Committee consisting of:

W. L. Ball	Corporate Safety Director
A. Lapin	Project Manager
C. McKinley	Cryogenic Systems Division - R&D Director

reviewed the information generated by a task force of 15 senior engineers and supervisory personnel who have been instrumental in shaping the company safety policies throughout the years and who represented the following Divisions and Departments of the Company:

Air Products Limited

Corporate Safety Department

Cryogenic Systems Division:
- Central Design Engineering Department
- Electro-Machinery Department
- Operations Department
- Project Engineering Department
- Research and Development Department

Industrial Gas Division
- Engineering Department

Industrial Products Division
- Quality Control Department

Metallurgical Services Division
- Gas Equipment Department

This review was supplemented by interviews, discussions, and visits to several APCI and APL air separation plants and manufacturing facilities both in the U.S. and Europe. This information was then summarized and used in the preparation of the Oxygen Safety Review Forms. In most instances, an individual Form was used to cover the practices of one department, thus resulting in some duplication when two different departments reported on the same type of activity. For example, both APCI and APL's cleaning procedures and practices are separately covered in Forms IBlc-1 and IBlc-2 respectively. In general there was no attempt to identify differences existing between the practices of the different departments, since this was not within the scope of the program.

It should be noted that the Air Products material covers an experience period of over 15 years, therefore some contradictions may exist between new and old documents in particular if they originated in different departments. Where such differences exist through evolutionary changes in practice, the latest Air Products document is controlling.

It is interesting to note that while the Corporate and Divisional Safety Criteria are generally followed throughout the company, local conditions sometimes require special treatment as determined by local managers. For example, the Plant Manager at the Hettingen Plant in Germany, instituted a system of valve locks and keys to insure that liquid oxygen is delivered to liquid oxygen tankers only, thus eliminating the possibility of loading the wrong product in the liquid tanker. Differences in procedures between plants are also necessitated by the fact that in some areas the truck drivers are APCI employees, while in others they belong to other organizations under contract to APCI. In addition some plants service only APCI tankers while others service APCI tankers and others as well. Similarly some customer installations require different or additional precautions as determined by the specifics of the locations, usage, etc. Safety Criteria in these cases are determined by the Departments involved in conjunction with the Safety Department.

It seems that assuring safety in a large organization in which a large number of special local conditions require modifications to the general safety criteria, could best be achieved by the following two-phase approach:

1. Criteria Establishment

   Safety criteria and philosophy are established by the Safety Department with strong technical support from the Research and Development Department. These criteria will identify material compatibility, design concepts, contaminant types and levels acceptable to specific applications, systems evaluations, and other significant factors.

2. Criteria Implementation

   Implementation of safety criteria is the responsibility of all levels of supervision and all personnel. This is achieved by education and training in such a way, that safety implementation becomes second nature. The objective is clear understanding of general philosophy and criteria, so that implementation of safety is achieved, and that changes necessary to accommodate specific local conditions can be made by knowledgeable personnel without endangering the desired goals.

ORGANIZATION OF REPORT

The report consists of the following parts:

1. Recommendations for Research and Development

2. Index to Liquid and Gaseous Safety Review Data Forms

   This index lists the Review Data Forms in numerical sequence. It identifies each form by number, title, date and number of pages.

3. Liquid and Gaseous Oxygen Safety Reveiw Data Forms

   This part of the report closely follows the NASA Oxygen Safety Review Check List and Review Data Form (Attachments I and II of NASA Contract No. NAS3-15083). In fact the forms numbering system corresponds to the NASA Documents numbering system. Thus, Form IA2a-7 is the 7th APCI Form with information requested in paragraph IA2a of the NASA Review Check List which relates to the Material Compatibility of Sealants and Threading Compounds. The organization of the form itself is in close conformity with the suggested NASA Review Data Form. The APCI Data Review Form includes only those sections of the NASA Form which apply to the particular subject.

4. General Index

   The General Index covers all Documents referred to in the Data Review Forms, the Data Review Forms themselves, and an additional number of documents related to the subject of oxygen, oxygen handling and safety. The General Index consists of five sections:

   a. Numerical Section: All documents are listed in numerical sequence, starting from 990000010. (The 9th digit, which is always a zero, except in one case 99000261A, should be ignored).

   b. Authors Section: All documents are listed alphabetically by each one of the authors.

   c. Corporate Titles Section: All documents are reported alphabetically by the name of the Corporation or Institution which originated the document. For example, a paper authored by a member of Lehigh University, will appear under Lehigh University. Similarly, the reports by C. F. Key of NASA will appear with the NASA grouping.

   d. Subjects Section: All documents are listed alphabetically by each one of the main words of the document title, and by key words which were added, whenever desirable.

   e. Source Section: All documents are listed in alphabetical order in accordance to their source identification such as AIChE-CEP-TECH-MANUAL for an American Institute of Chemical Engineer publication or DMIC-MEMO-163, for the Battelle Memorial Institute Report identified as Publication DMIC-MEMO-163.

The General Index arrangement thus allows information retrieval from several bases. For example, a lubricant covered by this study, can be found under L, with all other lubricants, or by looking up its specific name, such as Krytox. All documents referring to this item will be identified and could then be found in the Reference Section of the report, by looking up the Document Numbers.

5. References

This section contains all documents included in the General Index, in a numerical sequence. The APCI documents are reproduced in full and are released for general distribution and availability with the exception of the following documents which are not released and are not available for general distribution:

99000234
99000247
99000258
99000308
99000388
99000389
99000392
99000393
99000394
99000395
99000421

Only one page is included in the Reference Section for each non APCI document, with sufficient information to provide full identification and retrieval.

A number of additional documents have been included in this section even though they were not referred to in the Review Forms. These documents are related to oxygen safety and could be of interest to the reader. Some of them are listed below:

APCI Documents #9900007 and 99000017 provide the properties of gaseous and liquid oxygen.

APCI Documents #99000060 through 99000065 and 99000069 describe Research and Development work performed in the early 60's.

APCI Documents #99000306, 99000312 and 99000313 cover recent work using the O_2 Index as one factor in determining acceptability of materials for oxygen service.

APCI Document #99000340 briefly describes APCI procedure for the determination of material compatibility with oxygen.

APCI Document #99000595 is an APCI report on the experimental burning of metals in oxygen atmosphere and includes an appendix containing the abstracts of 43 papers on the ignition of metals.

RECOMMENDATIONS FOR RESEARCH AND DEVELOPMENT

In order to determine acceptance of materials for oxygen service and the safety of the system itself, it is essential to have material properties and criteria for acceptability as follows:

1. Material Properties as a Function of Oxygen Concentration and Pressure

   Some or all of the following information is required to evaluate a material for oxygen service.

   a. Material identification

   b. Ignition temperature

   c. Ignition energy

   d. Oxygen index

   e. Calorimetric heat values

   f. Adsorption capacity for oxygen

   g. Autoignition temperature

   h. High pressure compatibility

   i. Behavior under impact conditions

   Literature should be carefully reviewed so that available information is evaluated and used. Laboratory work may be needed to supplement available information.

2. Systems Behavior

   In any industrial hazard situation, the amount of ignition energy to ignite a material in oxygen or oxygen rich environment is importantly related to the material and intensity of the energy input. It is also related in an extremely important fashion to the entire system. The dynamics of the ignition process is also a function of the entire system. It is therefore necessary to carefully examine and evaluate each individual component as well as the subsystems and total system for behavior in an oxygen atmosphere as a function of oxygen concentration, pressure, and temperature.

3. Criteria for Acceptability

Criteria will have to be established for the acceptability of materials in oxygen service based on the material properties and examination of the system or subsystem, in which the materials are used. These criteria should be based on the following:

a. Acceptance of materials per se.
b. Limits on the quantity of materials in the specific system being examined.
c. Level and type of allowable contamination for the application.
d. Limits of temperature, pressure and oxygen concentrations.
e. Inspection and quality control procedures.

Review of the available information regarding oxygen compatibility of materials indicates that additional information in the following areas may be required for the complete safety evaluation of a specific system.

1. Material Properties

Material properties needed for oxygen compatibility evaluation are usually available in the technical literature. However, this information is sparse or lacking completely in the case of new materials and for high pressure (3,000-10,000 psi) applications. In these instances, it will be necessary to acquire the needed properties by experimental determination.

2. Significant Testing

A number of tests are being used to determine material compatibility in the presence of oxygen. However, these tests are usually not closely related to the main characteristics of the system in which these materials are used. For example, impact testing is a widely used criterion for material acceptance, even when impact is not a factor of the specific application under consideration. The amount of energy needed to ignite a material is importantly related to the material itself, its physical dimensions, to the character and intensity of the energy input, and in an extremely important fashion to the entire system. For example, massive metal sections clearly ignite less readily than do powders, wires, ribbons, and small sections. Therefore it is essential to devise appropriate tests which incorporate the potential hazards of the system, such as sparks, friction, or gas compression and the correct size of the test specimen. The results of these tests will be significant and will provide a more dependable basis for material selection for the contemplated service.

3. Effect of Contaminants on the Materials Suitability

In general, the bulk of the work in the area of oxygen compatibility is performed with meticulously clean materials. Contaminants are studied by themselves, independently of the materials that they would contaminate.

It is believed that some materials may be more detrimentally affected than others by the presence of contaminants. It is therefore necessary to consider the complete system in order to determine the possible sources, types and quantities of contaminants, so that appropriate testing conditions may be determined. These tests will help establish tolerable contamination levels for the system.

4. System Testing

Complete systems should be carefully examined to determine their oxygen compatibility. Even if each individual component is acceptable on its own, synergistic effects may render an assembly of these components unacceptable. Therefore, systems and subsystems may have to be tested before a decision can be made regarding oxygen suitability. The effect of contamination in this particular case is extremely important since reactions or chain reactions may be triggered by contamination with a resulting ignition and combustion of materials which would not otherwise have been ignited.

5. Criteria for Compatibility

Present criteria for oxygen compatibility are often based on one or two types of tests even when they are not closely related to the intended applications. It is recommended that the information obtained from new research programs be used to reexamine the present criteria to determine their validity. These programs should also provide the basis for new criteria which will integrate all available factors related to the compatibility of materials and to the system itself such as: oxygen phase, concentration, temperature and pressure, materials properties, systems characteristics, potential hazards and degree of exposure to life and equipment in case of a failure. It is envisioned that an all inclusive "System Compatibility Index" or "System Safety Factor" could be developed by applying an empirical coefficient to each pertinent factor, which would apply to all types of oxygen systems: high or low pressure applications, liquid or gas phase environment, simple or complex. This "System Compatibility Index" or "System Safety Factor" will provide a numerical system which will indicate the degree of safety of the system being examined and will enable sound comparisons between competing schemes.

The research and development programs that are needed to provide the required information for a complete safety evaluation of systems involving oxygen, should consist of a number of limited scope parts dealing with specific systems and/or subsystems. In general each part of the program should provide answers to the following questions for the system being studied:

1. Assessment of realistic hazards as opposed to laboratory hazards.

2. Criteria for cleaning and frequency of solvent washing.

3. Effect of rust and foreign particles in the oxygen streams of the system.

4. Maximum allowable level of contamination.

5. Relation between allowable level of contaminants and cleanliness requirements.

6. Frequency of equipment inspection.

7. Criteria for lubricant selection for air and oxygen service, if applicable.

8. Criteria for compatibility, in terms of quantity of materials, system pressure and temperature, and exposure.

It is recommended that all information presently available and being developed as a result of new research and development programs be readily retrievable.

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III. Maintenance Program

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Cleaning Procedures

Pressure Testing

IV. System Emergencies

V. Accident/Incident Investigation and Report

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Krytox 143 AA oil (duPont)

a. Specific Oxygen Environment

Normal exposure is to air, but may be exposed to gaseous or liquid oxygen at ambient temperature to -297°F and atmospheric pressure in the event of a process leak.

(1) Company Practices

(a) Motor Bearing lubrication for liquid oxygen pump assemblies.

B. Information Sources

1. Company Practices

b. Company Operating Experience.

Was on a trial basis for replacement of Halocarbon lubricants which do not appear to have the lubricity and mechanical properties necessary for our application. However its performance was unacceptable.

c. Based on Research and Development of Others.

(1) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV," NASA TM X-53773, P. 12, 13, August 23, 1968 (Doc. # 99000126).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Halocarbon 11-21E, Halocarbon Products Corporation

a. Specific Oxygen Environment

Normal exposure is to air, but may be exposed to gaseous or liquid oxygen at ambient temperature to -297°F and atmospheric pressure in the event of a process leak.

(1) Company Practices

(a) High pressure reciprocating pumps. Lubricant is not in direct oxygen contact, but in drive train of pump where the possibility of intimate contact exists.

(b) As the hydraulic fluid in diaphragm comprssors in oxygen service.

(c) Not to be used with aluminum, magnesium, or their alloys under conditions of high torque or shear.

B. Information Sources

1. Company Practices

c. Based on Research and Development of Others

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 28, December 4, 1963 (Doc. # 99000128).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Halocarbon 11-14E, Halocarbon Products Corporation

a. Specific Oxygen Environment

Normal exposure is to air, but may be exposed to gaseous or liquid oxygen at ambient temperature to -297°F and atmospheric pressure in the event of a process leak.

(1) Company Practices

(a) Centrifugal liquid oxygen pump drive trains bearings where intimate contact is possible.

(b) Vertically mounted multi-stage centrifugal liquid oxygen pump drive motor bearings

(c) Not to be used with aluminum, magnesium, or their alloys under conditions of high torque or shear.

B. Information Sources

1. Company Practices

(1) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, III," NASA TM X-53533, P. 12, Nov. 3, 1966, (Doc. #99000125).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Halocarbon 6-25 Wax, Halocarbon Products Corporation

a. Specific Oxygen Environment

Ambient temp. to 160°F up to 1500 psig gaseous oxygen

(1) Company Practices

(a) Protective coating of oxygen compressor spare parts and compressor components during storage. Coating is not removed prior to using equipment.

(b) Not to be used with aluminum, magnesium, or their alloys under conditions of high torque or shear.

B. Information Sources

1. Company Practices

e. Other

Schmoyer, W. W., "Oxygen Compressors", February 6, 1969 (Doc #99000138). Record of telecon with Halocarbon Products, Feb. 4, 1969. Wax 6-25 is a mixture of 25% Halocarbon 600 wax and 75% Freon 113. The Freon evaporates upon application leaving a protective coating on the surface.

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Kel F-90 grease, Minnesota Mining & Manufacturing Co.

a. Specific Oxygen Environment

Gaseous Oxygen, ambient temp, pressures to 3000 psi.

(1) Company Practices

(a) Laboratory glassware, analyzers, and testing apparatus in contact with gaseous oxygen.

(b) Some lubricant function in valves in gaseous oxygen service.

(c) "O" ring and diaphragm lubricant in oxygen regulators

(d) Not to be used with aluminum, magnesium, or their alloys under conditions of high torque or shear.

(e) No longer manufactured. Will be replaced by Halocarbon 25-5S grease -- Refer IAla-6

B. Information Sources

1. Company Practices

a. Company Research

(1) Walde, R. A., Flammability and Explosion Hazards, APCI 87-0-8822, May 1963 (Doc. #99000072).

c. Based on Research and Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, P. 28, December 4, 1963 (Doc #99000128).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Halocarbon 25-5S grease, Halocarbon Products Corp.

a. Specific Oxygen Environment

Gaseous Oxygen, ambient temp., pressures to 3000 psi

(1) Company Practices

(a) Laboratory glasswear, analyzers, and testing apparatus in contact with gaseous oxygen.

(b) Some lubricant functions in valves in gaseous oxygen service.

(c) "O" ring and diaphragm lubricant in oxygen regulators.

(d) Not to be used with aluminum, magnesium, or their alloys under conditions of high torque or shear.

B. Information Sources

1. Company Practices

c. Based on Research and Development of Others.

(1) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV", NASA TM X-53773, p. 12, August 23, 1968 (Doc. #99000126).

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IA1a-7

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Fluorolube, FS, Hooker Chemical

a. Specific Oxygen Environment

Gaseous oxygen service, ambient temperature to -297°F pressures to 3000 psig

(1) Company Practices

(a) Internal threaded devices in Air Separation Plant distillation columns.

(b) On teflon tape on some NPT screwed connections to improve the lubricity of the system for better seal.

(c) Bonnet and stem threads and other valve parts exposed to oxygen service.

(d) Not to be used with aluminum, magnesium, or their alloys under conditions of high torque or shear.

B. Information Sources

1. Company Practices

a. Company Research

(1) Ent, W. L., "Investigation of The Resistant Qualities of Cellulubes 220," TM #40, Sept. 18, 1959 (Doc. #99000140). Technical Memorandum TM No. 40 references LOX bomb tests of Hooker's Fluorolube FS and FS 5 and Kellog's Kel-F 3 oils.

b. Company Operating Experience.

Chlorotrifluoroethylene Family of lubricants are permitted to be used where lubricants are needed in contact with oxygen. Each application is reviewed.

c. Based on Research and Development of Others.

(1) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen III", NASA TM X-53533, p. 9, November 3, 1966, (Doc. #99000125).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Krytox 143 AB oil (duPont)

a. Specific Oxygen Environment

Normal exposure is to air, but may be exposed to gaseous or liquid oxygen at ambient temperature to -297°F and atmospheric pressure in the event of a process leak.

(1) Company Practices

(a) Motor Bearing lubrication for liquid oxygen pump assemblies.

B. Information Sources

1. Company Practices

b. Company Operating Experience.

Was on a trial basis for replacement of Halocarbon lubricants which do not appear to have the lubricity and mechanical properties necessary for our application. However its performance was unacceptable.

c. Based on Research and Development of Others.

(1) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV," NASA TM X-53773, P. 12, 13, August 23, 1968 (Doc. # 99000126).

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IA1a-9

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Krytox 143 AC oil (duPont)

a. Specific Oxygen Environment

Normal exposure is to air, but may be exposed to gaseous or liquid oxygen at ambient temperature to -297°F and atmospheric pressure in the event of a process leak.

(1) Company Practices

(a) Motor Bearing lubrication for liquid oxygen pump assemblies.

B. Information Sources

1. Company Practices

b. Company Operating Experience.

Was on a trial basis for replacement of Halocarbon lubricants which do not appear to have the lubricity and mechanical properties necessary for our application. However its performance was unacceptable.

c. Based on Research and Development of Others.

(1) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV," NASA TM X-53773, P. 12, 13, August 23, 1968 (Doc. # 99000126).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Krytox 143 AZ oil (duPont)

a. Specific Oxygen Environment

Normal exposure is to air, but may be exposed to gaseous or liquid oxygen at ambient temperature to -297°F and atmospheric pressure in the event of a process leak.

(1) Company Practices

(a) Motor Bearing lubrication for liquid oxygen pump assemblies.

B. Information Sources

1. Company Practices

b. Company Operating Experience.

Was on a trial basis for replacement of Halocarbon lubricants which do not appear to have the lubricity and mechanical properties necessary for our application. However its performance was unacceptable.

c. Based on Research and Development of Others.

(1) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV," NASA TM X-53773, P. 12, 13, August 23, 1968 (Doc. # 99000126).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Fluorolube, FS 5, Hooker Chemical

a. Specific Oxygen Environment

Gaseous oxygen service ambient temperature to -297°F, pressures to 3000 psig

(1) Company Practices

(a) Transmitters and liquid level gauges in oxygen service

B. Information Sources

1. Company Practices

a. Company Research

(1) Ent, W. L., "Investigation of The Resistant Qualities of Cellulubes 220," TM #40, Sept. 18, 1959 (Doc. #99000140). Technical Memorandum TM No. 40 references LOX bomb tests of Hooker's Fluorolube FS and FS 5 and Kellog's Kel-F 3 oils.

(2) Foster, R. H., APCI Safety, Hazards, and Explosion Testing Ignition Test Apparatus, Florulube Greases, Epoxy Compounds Devcon 2 Ton and Devcon F, Foam Type Insulations -- Styrofoam and Polyurethane Foam Insulation, Raybestos Manhattan Packing and Impregnated Asbestos Rope Material, APCI MAR 87-0-8821, February 1962 (Doc. #99000066).

b. Company Operating Experience.

Chlorotrifluoroethylene Family of lubricants are permitted to be used where lubricants are needed in contact with oxygen. Each application is reviewed.

c. Based on Research and Development of Others.

(1) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen III", NASA TM X-53533, p. 9, November 3, 1966, (Doc. #99000125).

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IA1a-12

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Molylube "N" Bel-Ray Co., Farmingdale, N. J.

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperatures to -297°F pressures to 3000 psig.

(1) Company Practices

(a) Used in small capacity liquid oxygen reciprocating pumps to correct a seizure problem between stainless and aluminum thread joints.

(b) Used as thread lubricant on oxygen regulators

B. Information Sources

1. Company Practices

a. Company Research

(1) Brophy, M., R&D Tests of Oxygen Compatibility, R&D Notebook #130, p. 16 & 17, Feb. 11, 1963, (Doc. #99000120).

(2) Foster, R. H., APCI Safety, Hazards, and Explosion Testing -- Epon H-60, Polycel 440R, and Styrofoam, Lubricants, Moly Spray Kote, and Dri Lube, APCI MAR 87-0-8821, April 1962 (Doc. #99000068).

(3) Walde, R. A., APCI Flammability and Explosion Hazards, Oxygen Pressure Gauge TWF Wool, Spintex 305, Molykote Type Z and Type X-15, APCI MAR 87-0-8822, March 1963 (Doc. #99000071).

b. Company Operating Experience.

(1) Schmoyer, W. W., "Regulator Thread Sealant," Oct. 4, 1963, (Doc. #99000119).

c. Based on Research & Development of Others.

(1) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV," NASA TM X-53773, p. 14, August 23, 1968, (Doc. #99000126).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Moly Lube No. 99, Moly Lube Products, Glen Cove, N. Y.

a. Specific Oxygen Environment

Exposure is to air at ambient temperature and atmospheric pressure excepting in cases of leaks in process system then the exposure is to gaseous and liquid oxygen, ambient temperature to -297°F, atmospheric pressure

(1) Company Practices

(a) Used as a lubricant for some screw threads on bolts and studs as an aid to disassembly of parts. Usually not in oxygen product stream.

B. Information Sources

1. Company Practices

a. Company Research

(1) Brophy, M., R&D Tests with High Pressure Oxygen, R&D Notebook #130, p. 31, June 1963, (Doc. #99000123). Bomb test at 2000 psig

(2) Walde, R. A., "Gaseous Oxygen Compatibility Test on Moly Lube No. 99", June 11, 1963, (Doc. #99000117)

(3) Foster, R. H., APCI Safety, Hazards, and Explosion Testing -- Epon H-60, Polycel 440R, and Styrofoam, Lubricants, Moly Spray Kote, and Dri Lube, APCI MAR 87-0-8821, April 1962 (Doc. #99000068).

(4) Walde, R. A., APCI Flammability and Explosion Hazards, Oxygen Pressure Gauge TWF Wool, Spintex 305, Molykote Type Z and Type X-15, APCI MAR 87-0-8822, March 1963 (Doc. #99000071).

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IA1a-14

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Fluoro-glide, Chemplast Inc.

a. Specific Oxygen Environment

Gaseous oxygen, ambient temperature, pressures to 250 psig.

(1) Company Practices

(a) Used as an alternate lubricant to fluorolubes when required for oxygen control and distribution system valve stems under conditions which warrant the use of a lubricant.

B. Information Sources

1. Company Practices

a. Company Research

(1) Yoder, L., Analytical Report on Flammability in 100% gaseous oxygen, 61-262, April 11, 1961, (Doc #99000139).

c. Based on Research and Development of Others

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," NASA TM X-985, p. 16, August 1964, (Doc. #99000127).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Krytox 143 AD oil (duPont)

a. Specific Oxygen Environment

Normal exposure is to air, but may be exposed to gaseous or liquid oxygen at ambient temperature to -297°F and atmospheric pressure in the event of a process leak.

(1) Company Practices

(a) Motor Bearing lubrication for liquid oxygen pump assemblies.

B. Information Sources

1. Company Practices

b. Company Operating Experience.

Was on a trial basis for replacement of Halocarbon lubricants which do not appear to have the lubricity and mechanical properties necessary for our application. However its performance was unacceptable.

c. Based on Research and Development of Others.

(1) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV," NASA TM X-53773, P. 12, 13, August 23, 1968, (Doc. # 99000126).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Voltalef 3A (Kingsley and Keith Limited, U.K.)

a. Specific Oxygen Environment

Normal exposure is to air at ambient temperature, but may be exposed to gaseous or liquid oxygen, at ambient temperature to -297°F and atmospheric pressure in the event of a process leak.

(1) Company Practices (APL)

(a) Centrifugal liquid oxygen pump drive trains bearings where intimate contact is possible.

(b) Vertically mounted multi-stage centrifugal liquid oxygen pump drive motor bearings.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Esso Beacon 325

a. Specific Oxygen Environment

Normal exposure is to air at ambient temperature, but may be exposed to gaseous or liquid oxygen, at ambient temperature to -297°F and atmospheric pressure in the event of a process leak.

(1) Company Practices (APL)

(a) Oxygen Pump motor bearings (Byron Jackson).

(b) Cryostar direct drive pump motor bearings.

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Lubricants

1. Formblin Y04 (Montecatini - Edison)

a. Specific Oxygen Environment

Normal exposure is to air at ambient temperature, but may be exposed to gaseous or liquid oxygen, at ambient temperature to -297°F and atmospheric pressure in the event of a process leak.

(1) Company Practices (APL)

(a) This lubricant at present is being tested on a LIN pump for its lubrication properties prior to use on Centrifugal liquid oxygen pump gear box.

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Sealants & Threading Compounds

1. Permatex #1516

a. Specific Oxygen Environment

Gaseous Oxygen, Ambient Temperature to 160°F, pressure to 4500 psig.

(1) Company Practices

(a) Centrifugal oxygen compressor, as a gasket material on the case halves of centrifugal oxygen compressors. Used in conjunction with GE RTV 60 Silicone rubber applied to the bearing portion of the case halves.

B. Information Sources

1. Company Practices

a. Company Research

(1) Brophy, M., Compatibility Tests with High Pressure Oxygen, R&D Notebook #111 p. 152, Jan. 1963 (Doc #99000122). The ignition bomb and test method is described in memo from E. Kehat, subject: "Development of Standard Ignition Test, Interim Report. Project No. 87-0-8820/1" Dated Nov. 17, 1961. (Doc #99000109).

b. Company Operating Experience

(1) Satisfactory experience as a gasket material on the case halves of centrifugal oxygen compressors. Used in conjunction with GE RTV 60 Silicone rubber applied to the bearing portion of the case halves.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Sealants & Threading Compounds

1. Teflon Tape -- Permacel

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, vacuum to 3000 psi pressures.

(1) Company Practices

(a) All National Pipe Thread (NPT) screwed connections used in oxygen service.

(b) APCI Design Engineering Standard 570.5.1 Nov. 1960 (Doc. #99000118).

(c) APCI Safety Standard 609.1, June 1964 (Doc. #99000051).

(d) APCI Safety Gram No. 27, Lubricants and Thread Components for Oxygen Systems, March 22, 1963 (Doc. #99000009).

B. Information Sources

1. Company Practices

a. Company Research.

Material tests performed by R&D on Permacel #412 Tape in 1959, no reactions in LOX bomb tests and no ignition in open flame. Mechanical performance tests at the same time indicated good acceptance for threaded joints and led to issuance of Design Engineering Standard 570.5.1 in November 1960 and Safety Standard 609.1 in June 1964. Further testing in 1936, 1964, and 1965 in a 2000 psig oxygen bomb indicated some reactions occurred. No reactions occurred when tape was thoroughly solvent cleaned prior to testing. Later solvent washings were analyzed to be hydrocarbon contaminated to an extend of 0.34 and 2.68 mg/sq. ft. of tape. Most popular brand names of tape have been tested with results similar to above tests.

(1) Dinan, E., Jan. 28, 1959. (Doc. #99000111). Permacel Ribbon Dope, is Item 3.

(2) Yoder, L., Analytical Report on % Hydrocarbon Contaminant, 61-3, Jan. 16, 1961 (Doc. #99000116).

(3) Walde, R. A., "Gaseous Oxygen Compatibility of Crosslite Fluorocarbon Tape" July 30, 1963 (Doc. #99000113). Permacel Tape was compared to Crosslite Tape and 3M Fluorocarbon Tape.

(4) Foster, R. H., APCI Safety, Hazards, and Explosion Testing Ignition Test Apparatus, Fluorlube Greases, Epoxy Compounds Devcon 2 Ton and Devcon F, Foam Type Insulations -- Styrofoam and Polyurethane Foam Insulation, Raybestos Manhattan Packing and Impregnated Asbestos Rope Material, APCI MAR 87-0-8821, February 1962 (Doc. #99000066).

(5) Foster, R. H., APCI Safety, Hazards, and Explosion Testing -- Polyester Resin Impregnated Fiberglass Lava, APCI MAR 87-0-8821, March 1962 (Doc. #99000067).

b. Company Operating Experience.

No reactions have occurred between oxygen and teflon tape in actual operating experience. The space occupied by the teflon tape in threaded connections reduces the exposure and thereby minimizes the potential for reaction.

c. Based on Research and Development of Others.

NASA publications regarding Compatibility of Materials with Liquid Oxygen is used as a guide for selection of teflon tape, other teflon products, and other inert materials of similar formulation.

(1) NASA-MSC, "Nonmetallic Materials Design Guide Lines and Test Data Handbook," MSC-02681, May 29, 1970 (Doc. #99000129).

(2) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 35, December 4, 1963, (Doc. #99000128).

(3) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," NASA TM X-53052, P. 13, May 26, 1964. (Doc. #99000124).

(4) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, III", NASA TM X-53533, p. 17, November 3, 1966, (Doc. #99000125).

(5) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV," NASA TM X-53773, p. 16, August 23, 1968, (Doc. #99000126).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Sealants & Threading Compounds

1. T-Film, Eco Mfgr. Co.

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, vacuum to 3000 psi pressure.

(1) Company Practices

(a) On all pipe threads. Limited use, as the principal sealant is teflon tape. Used only in special applications where teflon tape has caused assembly problems. Specifically, for threaded connections in oxygen regulator assembly.

B. Information Sources

1. Company Practices

a. Company Research

(1) Yoder, L., Analytical Report on Flammability in 100% gaseous oxygen, Autoignition at 1 atmoshpere oxygen. Sept. 18, 1961, 61-683, (Doc. #99000114).

(2) Kehat, E., "Ignition tests of "T" Film and Penton," Nov. 28, 1961, (Doc. #99000100). 2000 psig bomb test.

(3) Kitson, F. K., "Assembly of Oxygen Regulators" November 30, 1961. (Doc. #99000110)

(4) Kehat, E., APCI Safety, Hazards, and Explosion Testing -- Silicon Oils, Dow Corning RF-1-0065, Silicon Oils Dow Corning RF-1-0065, Indopol Polybutene Oil Amoco L-10, Indopol Polybutene Oil Amoco H-100, Penton, T-Film Thread Compound, APCI MAR 87-0-8821, November 1961 (Doc. #9900063).

b. Company Operating Experience

Experience satisfactory, but limited.

c. Based on Research and Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 34, December 4, 1963, (Doc. #99000128).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Sealants & Threading Compounds

1. Putti-Rope, National Greenhouse Co.

a. Specific Oxygen Environment

Exposure is normally to an inert or air atmosphere excepting when a leak in process system causes oxygen enrichment. Exposure under these conditions is gaseous or liquid oxygen. Ambient temperature to -297°F, atmospheric pressure.

(1) Company Practices

(a) Panel sealant on cold box closures.

(b) Safety standard 609.1, June 1964, (Doc. #99000051).

B. Information Sources

1. Company Practices

a. Company Research

(1) Ent, W. L., "Putti-rope"; Analysis for Oil Content and Flammability Temperature," Dec. 11, 1959, (Doc. #99000112).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Sealants & Threading Compounds

1. Molylube "N" Bel-Ray Co., Farmingdale, N. J.

a. Specific Oxygen Environment

Gaseous oxygen, ambient temperature, pressures to 3000 psig.

(1) Company Practices

(a) Approved substitute for teflon tape on oxygen regulators where plating has reduced thread joint clearance making assembly difficult when using teflon tape.

B. Information Sources

1. Company Practices

a. Company Research

(1) Brophy, M., R&D Oxygen compatibility Test -- R&D Notebook #130, p. 16, 17, Feb. 11, 1963, (Doc. #99000120)

b. Company Operating Experience.

(1) Schmoyer, W. W., "Regulator Thread Sealant", Oct. 4, 1963. (Doc. #99000119) Safety Dept. Correspondence authorizing use.

c. Based on Research & Development of Others.

(1) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV," NASA TM X-53773, p. 14, August 23, 1968, (Doc. #99000126).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Sealants & Threading Compounds

1. Crosslite Fluorocarbon Tape

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, vacuum to 3000 psi pressures.

(1) Company Practices

(a) All National Pipe Thread (NPT) screwed connections used in oxygen service.

(b) APCI Design Engineering Standard 570.5.1 Nov. 1960 (Doc. #99000118).

(c) APCI Safety Standard 609.1, June 1964 (Doc. #99000051).

B. Information Sources

1. Company Practices

a. Company Research.

Material tests performed by R&D on Permacel #412 Tape in 1959, no reactions in LOX bomb tests and no ignition in open flame. Mechanical performance tests at the same time indicated good acceptance for threaded joints and led to issuance of Design Engineering Standard 570.5.1 in November 1960 and Safety Standard 609.1 in June 1964. Further testing in 1936, 1964, and 1965 in a 2000 psig oxygen bomb indicated some reactions occurred. No reactions occurred when tape was thoroughly solvent cleaned prior to testing. Later solvent washings were analyzed to be hydrocarbon contaminated to an extend of 0.34 and 2.68 mg/sq. ft. of tape. Most popular brand names of tape have been tested with results similar to above tests.

(1) Walde, R. A., "Gaseous Oxygen Compatibility of Crosslite Fluorocarbon Tape" July 30, 1963 (Doc. #99000113). Permacel Tape was compared to Crosslite Tape and 3M Fluorocarbon Tape.

b. Company Operating Experience.

No reactions have occurred between oxygen and teflon tape in actual operating experience. The space occupied by the teflon tape in threaded connections reduces the exposure and thereby minimizes the potential for reaction.

c. Based on Research and Development of Others.

NASA publications regarding Compatibility of Materials with Liquid Oxygen is used as a guide for selection of teflon tape, other teflon products, and other inert materials of similar formulation.

(1) NASA-MSC, "Nonmetallic Materials Design Guide Lines and Test Data Handbook," MSC-02681, May 29, 1970 (Doc. #99000129).

(2) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 35, December 4, 1963, (Doc. #99000128).

(3) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," NASA TM X-53052, P. 13, May 26, 1964. (Doc. #99000124).

(4) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, III", NASA TM X-53533, p. 17, November 3, 1966, (Doc. #99000125).

(5) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV," NASA TM X-53773, p. 16, August 23, 1968, (Doc. #99000126).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Sealants & Threading Compounds

1. Damco Tape

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, vacuum to 3000 psi pressures.

(1) Company Practices

(a) All National Pipe Thread (NPT) screwed connections used in oxygen service.

(b) APCI Design Engineering Standard 570.5.1 Nov. 1960 (Doc. #99000118).

(c) APCI Safety Standard 609.1, June 1964 (Doc. #99000051).

B. Information Sources

1. Company Practices

a. Company Research.

Material tests performed by R&D on Permacel #412 Tape in 1959, no reactions in LOX bomb tests and no ignition in open flame. Mechanical performance tests at the same time indicated good acceptance for threaded joints and led to issuance of Design Engineering Standard 570.5.1 in November 1960 and Safety Standard 609.1 in June 1964. Further testing in 1936, 1964, and 1965 in a 2000 psig oxygen bomb indicated some reactions occurred. No reactions occurred when tape was thoroughly solvent cleaned prior to testing. Later solvent washings were analyzed to be hydrocarbon contaminated to an extend of 0.34 and 2.68 mg/sq. ft. of tape. Most popular brand names of tape have been tested with results similar to above tests.

(1) Frederick, L. G., Analytical Report on % Ether Extractable Contaminants and Fluorescence. 70-368, Oct. 7, 1970, (Doc. #99000115).

b. Company Operating Experience.

No reactions have occurred between oxygen and teflon tape in actual operating experience. The space occupied by the teflon tape in threaded connections reduces the exposure and thereby minimizes the potential for reaction.

c. Based on Research and Development of Others.

NASA publications regarding Compatibility of Materials with Liquid Oxygen is used as a guide for selection of teflon tape, other teflon products, and other inert materials of similar formulation.

(1) NASA-MSC, "Nonmetallic Materials Design Guide Lines and Test Data Handbook," MSC-02681, May 29, 1970 (Doc. #99000129).

(2) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 35, December 4, 1963, (Doc. #99000128).

(3) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," NASA TM X-53052, P. 13, May 26, 1964. (Doc. #99000124).

(4) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, III", NASA TM X-53533, p. 17, November 3, 1966, (Doc. #99000125).

(5) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV," NASA TM X-53773, p. 16, August 23, 1968, (Doc. #99000126).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Sealants & Threading Compounds

1. Sanden Tape

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, vacuum to 3000 psi pressures.

(1) Company Practices

(a) All National Pipe Thread (NPT) screwed connections used in oxygen service.

(b) APCI Design Engineering Standard 570.5.1 Nov. 1960 (Doc. #99000118).

(c) APCI Safety Standard 609.1, June 1964 (Doc. #99000051).

B. Information Sources

1. Company Practices

a. Company Research.

Material tests performed by R&D on Permacel #412 Tape in 1959, no reactions in LOX bomb tests and no ignition in open flame. Mechanical performance tests at the same time indicated good acceptance for threaded joints and led to issuance of Design Engineering Standard 570.5.1 in November 1960 and Safety Standard 609.1 in June 1964. Further testing in 1936, 1964, and 1965 in a 2000 psig oxygen bomb indicated some reactions occurred. No reactions occurred when tape was thoroughly solvent cleaned prior to testing. Later solvent washings were analyzed to be hydrocarbon contaminated to an extend of 0.34 and 2.68 mg/sq. ft. of tape. Most popular brand names of tape have been tested with results similar to above tests.

(1) Frederick, L. G., Analytical Report on % Ether Extractable Contaminants and Fluorescence. 70-368, Oct. 7, 1970, (Doc. #99000115).

b. Company Operating Experience.

No reactions have occurred between oxygen and teflon tape in actual operating experience. The space occupied by the teflon tape in threaded connections reduces the exposure and thereby minimizes the potential for reaction.

c. Based on Research and Development of Others.

NASA publications regarding Compatibility of Materials with Liquid Oxygen is used as a guide for selection of teflon tape, other teflon products, and other inert materials of similar formulation.

(1) NASA-MSC, "Nonmetallic Materials Design Guide Lines and Test Data Handbook," MSC-02681, May 29, 1970 (Doc. #99000129).

(2) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 35, December 4, 1963, (Doc. #99000128).

(3) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," NASA TM X-53052, P. 13, May 26, 1964. (Doc. #99000124).

(4) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, III", NASA TM X-53533, p. 17, November 3, 1966, (Doc. #99000125).

(5) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV," NASA TM X-53773, p. 16, August 23, 1968, (Doc. #99000126).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Sealants & Threading Compounds

1. Crane Packing Co. Tape

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, vacuum to 3000 psi pressures.

(1) Company Practices

(a) All National Pipe Thread (NPT) screwed connections used in oxygen service.

(b) APCI Design Engineering Standard 570.5.1 Nov. 1960 (Doc. #99000118).

(c) APCI Safety Standard 609.1, June 1964 (Doc. #99000051).

B. Information Sources

1. Company Practices

a. Company Research.

Material tests performed by R&D on Permacel #412 Tape in 1959, no reactions in LOX bomb tests and no ignition in open flame. Mechanical performance tests at the same time indicated good acceptance for threaded joints and led to issuance of Design Engineering Standard 570.5.1 in November 1960 and Safety Standard 609.1 in June 1964. Further testing in 1936, 1964, and 1965 in a 2000 psig oxygen bomb indicated some reactions occurred. No reactions occurred when tape was thoroughly solvent cleaned prior to testing. Later solvent washings were analyzed to be hydrocarbon contaminated to an extend of 0.34 and 2.68 mg/sq. ft. of tape. Most popular brand names of tape have been tested with results similar to above tests.

(1) Frederick, L. G., Analytical Report on % Ether Extractable Contaminants and Fluorescence. 70-368, Oct. 7, 1970, (Doc. #99000115).

b. Company Operating Experience.

No reactions have occurred between oxygen and teflon tape in actual operating experience. The space occupied by the teflon tape in threaded connections reduces the exposure and thereby minimizes the potential for reaction.

c. Based on Research and Development of Others.

NASA publications regarding Compatibility of Materials with Liquid Oxygen is used as a guide for selection of teflon tape, other teflon products, and other inert materials of similar formulation.

(1) NASA-MSC, "Nonmetallic Materials Design Guide Lines and Test Data Handbook," MSC-02681, May 29, 1970 (Doc. #99000129).

(2) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 35, December 4, 1963, (Doc. #99000128).

(3) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," NASA TM X-53052, P. 13, May 26, 1964. (Doc. #99000124).

(4) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, III", NASA TM X-53533, p. 17, November 3, 1966, (Doc. #99000125).

(5) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV," NASA TM X-53773, p. 16, August 23, 1968, (Doc. #99000126).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Sealants & Threading Compounds

1. Oxomat

a. Specific Oxygen Environment

Gaseous oxygen, ambient temperature, pressures to 3000 psig.

(1) Company Practices

(a) Used as an alternate thread sealant in applications where teflon tape is not satisfactory. Approval from Safety Dept. is required in each specific application.

B. Information Sources

1. Company Practices

a. Company Research

Moysan, S. R., Analytical Report on Flammability in 100% gaseous oxygen, 61-435, June 6, 1961, (Doc. #99000121). Autoignition test in oxygen.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Sealants & Threading Compounds

1. 3M Fluorocarbon Tape

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, vacuum to 3000 psi pressures.

(1) Company Practices

(a) All National Pipe Thread (NPT) screwed connections used in oxygen service.

(b) APCI Design Engineering Standard 570.5.1 Nov. 1960 (Doc. #99000118).

(c) APCI Safety Standard 609.1, June 1964 (Doc. #99000051).

B. Information Sources

1. Company Practices

a. Company Research.

Material tests performed by R&D on Permacel #412 Tape in 1959, no reactions in LOX bomb tests and no ignition in open flame. Mechanical performance tests at the same time indicated good acceptance for threaded joints and led to issuance of Design Engineering Standard 570.5.1 in November 1960 and Safety Standard 609.1 in June 1964. Further testing in 1936, 1964, and 1965 in a 2000 psig oxygen bomb indicated some reactions occurred. No reactions occurred when tape was thoroughly solvent cleaned prior to testing. Later solvent washings were analyzed to be hydrocarbon contaminated to an extend of 0.34 and 2.68 mg/sq. ft. of tape. Most popular brand names of tape have been tested with results similar to above tests.

(3) Walde, R. A., "Gaseous Oxygen Compatibility of Crosslite Fluorocarbon Tape" July 30, 1963 (Doc. #99000113). Permacel Tape was compared to Crosslite Tape and 3M Fluorocarbon Tape.

b. Company Operating Experience.

No reactions have occurred between oxygen and teflon tape in actual operating experience. The space occupied by the teflon tape in threaded connections reduces the exposure and thereby minimizes the potential for reaction.

c. Based on Research and Development of Others.

NASA publications regarding Compatibility of Materials with Liquid Oxygen is used as a guide for selection of teflon tape, other teflon products, and other inert materials of similar formulation.

(1) NASA-MSC, "Nonmetallic Materials Design Guide Lines and Test Data Handbook," MSC-02681, May 29, 1970 (Doc. #99000129).

(2) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 35, December 4, 1963, (Doc. #99000128).

(3) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," NASA TM X-53052, P. 13, May 26, 1964. (Doc. #99000124).

(4) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, III", NASA TM X-53533, p. 17, November 3, 1966, (Doc. #99000125).

(5) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV," NASA TM X-53773, p. 16, August 23, 1968, (Doc. #99000126).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Sealants and Threading Compounds

1. Sodium Silicate and China Clay Paste

a. Specific Oxygen Environment

Liquid and gaseous oxygen -300°F to +320°F, pressures up to 600 PSIG.

(1) Company Practices

(a) Horizontal split seals on oxygen turbo compressor (G.H.H. Design).

(b) Valve bonnets.

(c) Valve seat threads.

B. Information Sources

1. Company Practices (APL)

b. Used in the above duties for several years without incident.

c. Based on Research and Development of Others

Recommended by British Cryogenics Council's Cryogenic Safety Manual, A Guide to Good Practice, 1970, London, Great Britain, (Doc. #99000359).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Thermal & Electrical Insulations

1. Foamglas (cellular glass) Insulation, Pittsburgh-Corning Corp.

a. Specific Oxygen Environment

Normal exposure is to air, but may be exposed to gaseous or liquid oxygen at ambient temperatures -297°F and atmospheric pressure in the event of process leak. Also exposure may be to liquid air in the event of insulation-breakdown.

(1) Company Practices

(a) Thermal insulation for oxygen transmission lines.

(b) Thermal insulation for any line operating at cryogenic temperatures below the liquefaction temperature of air.

(c) APCI Safety Standard 609.1, page 5, June 1964, (Doc. 99000051).

(d) APL Engineering Specification N.05, Rev. 0, January 2, 1970 (Doc. #99000381).

B. Information Sources

1. Company Practices

a. Company Research

(1) Yoder, L., Analytical Report on Flammability in 100% gaseous oxygen, 61-34 to 61-40 and 61-42, February 3, 1961, (Doc. #99000130).

c. Based on Research and Development of Others.

(1) Key, C. D. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 36, December 4, 1963, (Doc. #99000128).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Thermal & Electrical Insulations

1. Transite, Johns-Manville

a. Specific Oxygen Environment

Normal exposure is to inert or air atmosphere excepting when a leak in process system causes oxygen enrichment. Exposure under these conditions is gaseous or liquid oxygen, ambient temperature to -297°F, atmospheric pressure.

(1) Company Practices

(a) Cold box vessel supports needed for shipping and not as structural supports. A replacement for wooden supports.

(b) APCI Safety Standard 609.1, page 5, June 1964. (Doc. #99000051).

B. Information Sources

1. Company Practices

a. Company Research

(1) Bauer, E., "Behavior of Transite Under Compressive Loads at Ambient and Liquid N_2 Temperatures" APCI TR #53, August 1962, (Doc. #99000134).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Thermal & Electrical Insulations

1. Glass Wool

s. Specific Oxygen Environment
Normal exposure is to inert or air atmosphere excepting when a leak in process system causes oxygen enrichment. Exposure under these conditions is gaseous or liquid oxygen, ambient temp. to -297°F, atmospheric pressure.

(1) Company Practices

(a) Thermal insulation in cold boxes.

(b) APCI Design Engineering Standard 581.3, Oct. 24, 1960. (Doc. #99000041).

(c) APCI Safety Standard 609.1, p. 4, June 1964. (Doc. #99000051).

(d) Batch analysis for oil content required on every shipment per QCL 103L. (Doc. #99000131). Maximum allowed oil contamination is 3.5 lbs. per ton of glass wool.

B. . Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 38, December 4, 1963, (Doc. #99000128).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Thermal & Electrical Insulations

1. Mineral Wool

a. Specific Oxygen Environment

Normal exposure is to inert or air atmosphere excepting when a leak in process system causes oxygen enrichment. Exposure under these conditions is gaseous or liquid oxygen, ambient temp. to -297°F and atmospheric pressure.

(1) Company Practices

(a) Thermal Insulation for cold boxes.

(b) APCI Safety Standard 609.1, p. 4, June 1964 (Doc. #99000051).

(c) APCI Design Engineering Standard 581.2, June 26, 1969, (Doc. #99000040).

(d) Batch analysis for oil content required on every shipment of Rockwool per QCL 103L. (Doc. #99000131). Maximum allowable oil contamination is 3.5 lbs. per ton of mineral wool.

(e) APL Engineering Specification N.02, Rev. 0, January 2, 1970 (Doc. #99000380).

B. Information Sources

1. Company Practices

a. Company Research

(1) Himmelberger, F. "Quality Control of Rockwool" November 6, 1959. (Doc. #99000145).

(2) Bassler, E. "Production of Rockwool - Bethlehem Steel Company," November 12, 1959, (Doc. #99000147).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 38, December 4, 1963, (Doc. #99000128).

(2) Matthews, W. D., and G. G. Owen, ICI Ltd, "Safety Aspects of Reconstructed ICI Oxygen Plant", AIChE, Safety in Air and Ammonia Plants, Vol. 5, p. 11, 1963. (Doc. #99000103).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Thermal & Electrical Insulations

1. Perlite

a. Specific Oxygen Environment

Normal exposure is to inert or air atmosphere excepting where a leak in process system causes oxygen enrichment. Exposure under these conditions is gaseous or liquid oxygen, ambient temp. to -297°F and atmoshperic pressure.

(1) Company Practices

(a) Thermal insulation for cold boxes.

(b) APCI Design Engineering Standard 581.1, May 26, 1961. (Doc. #99000039).

(c) APCI Safety Standard 609.1, p. 4, June 1964. (Doc. #99000051).

(d) APL Engineering Specification N.01, Rev. 0, January 2, 1970 (Doc. #99000379).

(e) Campbell, R. W. and B. W. Taylor, Use of Perlite in Air Separation Cold Boxes, APCI TB 39, June 14, 1971 (Doc. #99000038).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Thermal & Electrical Insulations

1. Milfoam -- Milfoam Corporation

a. Specific Oxygen Environment

Normal exposure is to air, but may be exposed to gaseous or liquid oxygen at ambient temperatures to -297°F and atmospheric pressure in the event of a process leak. Also, exposure may be to liquid air in the event of insulation breakdown.

(1) Company Practices

(a) Thermal insulation for oxygen transmission lines as an alternate material for Foamglas under conditions where Foamglas is used 5 feet on either side of a leak potential joint (flange, valve, etc.)

(b) APCI memorandum, Kitson, F. K., Insulation Materials for Cryogenic Systems, November 1, 1968 (Doc. #99000292).

B. Information Sources

1. Company Practices

a. Company Research

(1) APCI memorandum, Schmauch, G., Flammability Tests on Insulation, October 24, 1968 (Doc. #99000293).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Thermal & Electrical Insulations

1. National Gypsum Blue - National Gypsum Corporation

a. Specific Oxygen Environment

Normal exposure is to air, but may be exposed to gaseous or liquid oxygen at ambient temperatures to -297°F and atmospheric pressure in the event of a process leak. Also, exposure may be to liquid air in the event of insulation breakdown.

(1) Company Practices

(a) Thermal insulation for oxygen transmission lines as an alternate material for Foamglas under conditions where Foamglas is used 5 feet on either side of a leak potential joint (flange, valve, etc.) with the balance of the insulation as National Gypsum Blue.

(b) APCI memorandum, Kitson, F. K., Insulation Materials for Cryogenic Systems, November 1, 1968 (Doc. #99000292).

B. Information Sources

1. Company Practices

a. Company Research

(1) APCI memorandum, Schmauch, G., Flammability Tests on Insulation, October 24, 1968 (Doc. #99000293).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Plastics, Elastomers, and Adhesives

1. RTV-60, Silicone Rubber Compound with SS-4004 silicone primer, G. E. Thermolite-12 curing catalyst.

a. Specific Oxygen Environment

Gaseous oxygen, ambient temperature, atmospheric pressure to 450 psig.

(1) Company Practices

(a) Centrifugal Oxygen Compressors. Used only at the bearing area of centrifugal oxygen compressor case halves where there is a continuous exposure to oxygen leaks through labyrinth seals.

B. Information Sources

1. Company Practices

a. Company Research

(1) Brophy, M., R&D High Pressure Oxygen Compatibility Test. R&D Notebook #111, p. 149, Jan. 1963, (Doc. #99000137). Ignition was obtained only with the sample in direct contact with the ignition wire at 100 and 2000 psi.

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Plastics, Elastomers, and Adhesives

1. Keene Binder

a. Specific Oxygen Environment

No direct exposure to gaseous or liquid oxygen exists in normal use excepting where leakage from process system is possible or breaks in the insulation permit liquefaction of air on cold surfaces then the exposure is to gaseous and liquid oxygen at -297°F and atmospheric pressure or oxygen enriched gaseous or liquid air at temperatures below -297°F and atmospheric pressure.

(1) Company Practices

(a) An inorganic cement type binder used as an adhesive for sealing joints between cellular glass foam line insulating material.

(b) APCI Safety Standard 609.1, page 5, June 1964, (Doc. #99000051).

B. Information Sources

1. Company Practices

a. Company Research

It is believed that this material was tested for flammability, however no test records could be found.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Plastics, Elastomers, and Adhesives

1. Kel-F 81

a. Specific Oxygen Environment

Gaseous oxygen ambient temperature pressures to 3000 psig.

(1) Company Practices

(a) Regulator seats

(b) Selected cylinder valve seats

B. Information Sources

1. Company Practices

a. Company Research

(1) Walde, R. A., "Kel-F High Pressure Oxygen Compatibility,", May 17, 1963, (Doc. #99000132). The Kel-F in these tests was shreded giving results which were not in agreement with results of other testing agencies.

c. Based on Research and Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 45, December 4, 1963, (Doc. #99000128).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Plastics, Elastomers, and Adhesives

1. Nylon

a. Specific Oxygen Environment

Gaseous oxygen, ambient temperature, pressures to 3000 psig.

(1) Company Practices

Nylon is not entirely compatible in oxygen service, gaseous and liquid. However successful performance history with relatively few failures in the past 25 years is the reason why nylon continues to be used in high pressure oxygen service to 3000 psig as cylinder valve seats and regulator seats.

(a) H.P. regulator seats

(b) Oxygen cylinder valve seats

B. Information Sources

1. Company Practices

a. Company Research

(1) Yoder, L., Analytical Report on Ignition Temperature in 100% oxygen Atmosphere, 60-496, Jan. 6, 1961. (Doc. #99000133).

(2) Walde, R. A., "Kel-F High Pressure Oxygen Compatibility", May 17, 1963, (Doc. #99000132). Comparison tests with Kel-F.

b. Company Operating Experience.

Nylon is not entirely compatible in oxygen service, gaseous and liquid. However successful performance history with relatively few failures in the past 25 years is the reason why nylon continues to be used in high pressure oxygen service to 3000 psig as cylinder valve seats and regulator seats.

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Plastics, Elastomers, and Adhesives

1. Neoprene

a. Specific Oxygen Environment

Gaseous oxygen, ambient temperature, pressures to 3000 psig.

(1) Company Practices.

Neoprene is not entirely compatible in oxygen service, however satisfactory performance over last 25 years permits neoprene to remain in low pressure oxygen service. Its principal use is in oxygen regulators where the exposure is to normally less than 50 psig oxygen.

(a) Regulator safety valve stem seats

(b) Regulator diaphragms with neoprene molded on brass parts.

(c) "O" rings

(d) High pressure seats in two stage regulators.

B. Information Sources

1. Company Practices

b. Company Operating Experience.

(1) Neoprene is not entirely compatible in oxygen service, however satisfactory performance over last 25 years permits noeprene to remain in low pressure oxygen service. Its principal use is in oxygen regulators where the exposure is to normally less than 50 psig oxygen.

c. Based on Research & Development of Others.

(1) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, III," NASA TM X-53533, p. 31, November 3, 1966, (Doc. #99000125).

(2) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV," NASA TM X-53773, p. 25, August 23, 1968, (Doc. #99000126).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Plastics, Elastomers, and Adhesives

1. Viton A, duPont

a. Specific Oxygen Environment

Gaseous oxygen ambient temperature to 160°F, pressures to 250 psig.

(1) Company Practices

(a) Soft seating faces of butterfly valves in oxygen compressor systems.

B. Information Sources

1. Company Practices

a. Company Research

(1) Brophy, M., "Safety Tests Under WO 81-0095", April 27, 1966. (Doc. #99000135). Oxygen bomb tests to 250 psig. Hylomar Unward Jointing compound SQ-32 was rejected under the same test.

(2) Frederick, L. G., and D. R. Latshaw, Oxygen Index Rating Viton O-Ring Material, Viton E-60 (Green), Viton A (Black), Garlock 900 Johns Manville Asbestos 61 Sheet, APCI Analytical Report 71-344, APCI Analytical Report 71-345, August 13, 1971 (Doc. #99000304).

(3) Nissler, K. H., Demag KA-27-IV/KA-4-IV Oxygen Compressor Viton A (Black), Viton E-60 (Green), Demag Letter to APCI, August 11, 1971 (Doc. #99000305).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 58, December 4, 1963, (Doc. #99000128).

(2) Key, C. F. NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, III," NASA TM X-53533, p. 38, November 3, 1966, (Doc. # 99000125).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Plastic, Elastomers and Adhesives

1. Nylon 66' (I.C.I. Limited, U.K.)

a. Specific Oxygen Environment

Gaseous oxygen, ambient temperature, pressures up to 3000 psig.

(1) Company Practices (APL)

(a) H.P. Regulator Seats

(b) Oxygen Cylinder Valve Seats

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Gaskets and Packings

1. Graphite Impregnated Asbestos Packing.

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, atmospheric pressure to 3000 psig.

(1) Company Practices

(a) Packing for high pressure reciprocating liquid oxygen pumps

(b) Stem packing for various valves in oxygen service.

B. Information Sources

1. Company Practices

a. Company Research

(1) Ball, W.L., "Combustible Contaminant Content in Graphite Impregnated Asbestos Packing." Sept. 30, 1960., (Doc. #99000144).

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IA5a-2

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Gaskets and Packings

1. TFE-GF-Green, Melrath Gaskets Co.

a. Specific Oxygen Environment

Liquid oxygen -297°F. Pressures to 250 psig.

(1) Company Practices

(a) Gaskets in LOX transfer hose connections

B. Information Sources

1. Company Practices

a. Company Research

(1) Kitson, F., "Flammability Test of Gaskets in Oxygen Atmospheres," Oct. 23, 1970, (Doc. #99000146). Material glowed and charred but did not burst into flame.

b. Company Operating Experience.

(1) This material similar to Fluorogreen E-600.

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IA5a-3

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Gaskets and Packings

1. Vallegreen, Valley Forge Gasket Co.

a. Specific Oxygen Environment

Liquid oxygen, -297°F, pressures to 250 psig.

(1) Company Practices

(a) Gaskets in LOX transfer hose connections

B. Information Sources

1. Company Practices

a. Company Research

(1) Kitson, F., "Flammability Test of Gaskets in Oxygen Atmospheres," Oct. 23, 1970, (Doc. #99000146). Material glowed and charred but did not burst into flame.

b. Company Operating Experience.

(1) This material similar to Fluorogreen E-600.

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IA5a-4

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Gaskets and Packings

1. Fluorogreen E-600, John Dore Company

a. Specific Oxygen Environment

Liquid Oxygen, -297°F, Pressures to 250 psig.

(1) Company Practices

(a) Gaskets in LOX transfer hose connections.

B. Information Sources

1. Company Practices

a. Company Research

(1) Kitson, F., "Flammability Test of Gaskets in Oxygen Atmospheres," Oct. 23, 1970, (Doc. #99000146). Material glowed and charred but did not burst into flame.

c. Based on Research & Development of Others.

(1) Key, C.F., and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 62, December 4, 1963, (Doc. #99000128).

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IA5a-5

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Gaskets and Packings

1. Melrath 150 -- sheet asbestos gasket material, Melrath Gasket Co.

a. Specific Oxygen Environment

Gaseous and liquid oxygen ambient temperature to -297°F, Pressures to 250 psig.

(1) Company Practices

(a) Flange gasket connections on oxygen vaporizers

B. Information Sources

1. Company Practices

a. Company Research

(1) Frederick, L. G., Analytical Report on the Compatibility of Melrath Material with Oxygen, 70-026, January 30, 1970. (Doc. #99000141).

b. Company Operating Experience.

As an alternate for Garlock 900.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Gaskets and Packings

1. KM226 Sheet asbestos gasket material, Nicolet Industries Inc.

a. Specific Oxygen Environment

Gaseous and liquid oxygen ambient temperature to -297°F
Pressures to 250 psig.

(1) Company Practices

(a) Flange gasket connections on oxygen vaporizers.

B. Information Sources

1. Company Practices

a. Company Research

(1) Frederick, L. G., Analytical Report on the Compatibility of Gasket Materials with Oxygen, 70-014, January 30, 1970. (Doc. #99000142).

b. Company Operating Experience.

As an alternate for Garlock 900.

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IA5a-7

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Gaskets and Packings

1. Garlock 900, sheet asbestos gasket material, Garlock Mfg. Co.

a. Specific Oxygen Environment

Gaseous and liquid oxygen, 160°F to -297°F, pressures to 600 psig.

(1) Company Practices

(a) Most flange gaskets in air separation plants and in oxygen lines.

B. Information Sources

1. Company Practices

a. Company Research

(1) Frederick, L. G., Analytical Report on the Compatibility of Gasket Materials with Oxygen, 70-013, January 30, 1970, (Doc. #99000141 or 99000142).

(2) Frederick, L. G., and D. R. Latshaw, Oxygen Index Rating Viton O-Ring Material, Viton E-60 (Green), Viton A (Black), Garlock 900 Johns Manville Asbestos 61 Sheet, APCI Analytical Report 71-344, APCI Analytical Report 71-345, August 13, 1971 (Doc. #99000304).

(3) Nissler, K. H., Demag KA-27-IV/KA-4-IV Oxygen Compressor Viton A (Black), Viton E-60 (Green), Demag Letter to APCI, August 11, 1971 (Doc. #99000305).

(4) Frederick, L. G., and D. R. Latshaw, Compatibility of Material with Oxygen, Johns Manville Asbestos Sheet Packing Stype No. 61, Garlock 900, APCI IWO LB-0795, APCI Analytical Report 71-264, May 28, 1971 (Doc. #99000309).

(5) Robinson, G. W., APCI LOX Compatible Gasket Materials, Garlock 900 Durabla Johns-Manville Asbestos Sheet Packing Style 61, APCI Memo dated June 2, 1971 (Doc. #99000310).

b. Company Operating Experiences.

The gasket is not completely compatible with oxygen, however, 25 years of incident free successful service warrants its use in low risk applications.

(1) Key, C. F., and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 62, December 4, 1963, (Doc. #99000128).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Gaskets and Packings

1. Vulcanized Red Fibre Gaskets

a. Specific Oxygen Environment

Exposure is to air at ambient temperature and atmospheric pressure excepting if leak in system develops, then exposure is to gaseous oxygen at ambient temperature and atmospheric pressure.

(1) Company Practices

(a) Oxygen cylinder valve part not exposed to oxygen except on failure of system.

B. Information Sources

1. Company Practices

a. Company Research

Limited to hydrocarbon analysis for hazard evaluation.

(1) Moysan, S. R., Analytical Report on Qualitative and Quantitative Oil Analysis, 63-1662, 63-1663, November 6, 1963, (Doc. #99000143).

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IA5a-9

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Gaskets and Packings

1. KM246 sheet asbestos gasket material - Nicolet Industries

a. Specific Oxygen Environment

Gaseous and liquid oxygen ambient temperature to -297°F, Pressures to 250 psig.

(1) Company Practices

(a) Flange gasket connections on oxygen vaporizers

B. Information Sources

1. Company Practices

a. Company Research

(1) Frederick, L. G., Analytical Report on the Compatibility of Gasket Materials with Oxygen, 70-015, January 30, 1970, (Doc. #99000142).

b. Company Operating Experience.

As an alternate for Garlock 900.

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IA5a-10

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Gaskets and Packings

1. Teflon, duPont

a. Specific Oxygen Environment

Gaseous and liquid oxygen, 100°F to -297°F, pressures to 3000 psig.

(1) Company Practices

(a) Oxygen cylinder valve and manifold shut-off valve stem packing.

(b) Stem packing in various valves in oxygen production compression, distribution, and control systems.

(c) APL Engineering Specification L.14, Rev. 0, July 8, 1969 (Doc. #99000377).

B. Information Sources

1. Company Practices

a. Company Research

The evaluation of teflon tape applies to packing material as well.

(1) Dinan, E., Jan. 28, 1959. (Doc. #99000111). Permacel Ribbon Dope, is Item 3.

(2) Yoder, L., Analytical Report on % Hydrocarbon Contaminant, 61-3, Jan. 16, 1961, (Doc. #99000116).

(3) Walde, R. A., "Gaseous Oxygen Compatibility of Crosslite Fluorocarbon Tape" July 30, 1963, (Doc. #99000113). Permacel Tape was compared to Crosslite Tape and 3M Fluorocarbon Tape.

(4) Geist, J. M., Controlled Kinetics Experimentation -- Teflon Hose, APCI MAR 87-0-8820, May 1960 (Doc. #99000057).

(5) Geist, J. M., Controlled Kinetics Experiments -- Teflon Hoses, Supported by Braided Stainless Steel Housing, and Rubber Hoses, Plasite No 7122H, APCI MAR 87-0-8820, June 1960, (Doc. #99000058).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 54, December 4, 1963, (Doc. #99000128).

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IA5a-11

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Gaskets and Packings

1. Viton A, duPont

a. Specific Oxygen Environment

Gaseous oxygen, ambient temperature to 160°F, pressures to 250 psig.

(1) Company Practices

(a) Flange gaskets for piping systems

(b) "O" ring packings for valves

B. Information Sources

1. Company Practices

a. Company Research

(1) Brophy, M., "Safety Tests Under W081-0095" April 27, 1966. (Doc. #99000135). Oxygen bomb tests to 250 psig.

(2) Frederick, L. G., and D. R. Latshaw, Oxygen Index Rating Viton O-Ring Material, Viton E-60 (Green), Viton A (BLack), Garlock 900 Johns Manville Asbestos 61 Sheet, APCI Analytical Report 71-344, APCI Analytical Report 71-345, August 13, 1971 (Doc. #99000304).

(3) Nissler, K. H., Demag KA-27-IV/KA-4-IV Oxygen Compressor Viton A (Black), Viton E-60 (Green), Demag Letter to APCI, August 11, 1971 (Doc. #99000305).

c. Based on Research & Development of Others.

(1) Key, C.F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 58, December 4, 1963, (Doc. #99000128).

(2) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, III," NASA TM X-53533, p. 38, November 3, 1966, (Doc. #99000125).

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IA5a-12

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Gaskets and Packing

1. Sindanyo. CS 51 Asbestos and Cement Boards. Natural untreated finish (Turners Asbestos Cement Co. Ltd. U.K.).

a. Specific Oxygen Environment

Normal exposure is to air or nitrogen, but may be exposed to gaseous or liquid oxygen at ambient temperature to -297°F and atmospheric pressure in the event of a process leak.

(1) Company Practices (APL)

(a) Cold Pipe Support Insulating and Packing material.

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IA5a-13

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Gaskets and Packing

1. Klingerit 661 (Richard Klinger Limited U.K.)

a. Specific Oxygen Environment

Gaseous and liquid oxygen systems, 160°F to -297°F and pressures up to 600 psig.

(1) Company Practices (APL)

(a) All flange gaskets in air separation plants and in oxygen lines

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IA5a-14

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Gaskets and Packing

1. Tygaflor cementable PTFE tapes (Tygadure Limited U.K.).

a. Specific Oxygen Environment

Normal exposure is to air, but may be exposed to gaseous or liquid oxygen at ambient temperature to -297°F and atmospheric pressure in the event of a process leak.

(1) Company Practices (APL).

(a) APL have used these tapes to provide a low friction joint between two metallic faces of a penetration plate so that pipe stresses could be minimized.

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IA6a-1

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Tarset - Pittsburgh Chemical Co.

a. Specific Oxygen Environment

Exposure is to air excepting where leakage from system occurs. Exposure is then to gaseous oxygen at ambient temperature and atmospheric pressure.

(1) Company Practices

(a) Underground transmission line coating.

(b) APCI Safety Standard 609.1, p. 3, June 1964, (Doc. #99000051).

(c) This is an alternate coating material to Plasite.

B. Information Sources

1. Company Practices

a. Company Research

(1) Brophy, M., R&D Tarset Burning Tests, R&D Notebook #111, p. 129-132, July 1962, (Doc. #99000149).

(2) Brophy, M., R&D Pipe Burning Tests, R&D Notebook #111, p. 26-29, April 1961, (Doc. #99000148).

(3) Foster, R. H., Safety Hazards, and Explosion Testing, APCI Monthly Activities Report, 87-0-8821, July 1962, (Doc. #99000070).

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IA6a-2

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Sealfas Mastic #31-97, Benjamin Foster Co.

a. Specific Oxygen Environment

Exposure is to air excepting where leakage from process system occurs. Exposure then is to gaseous or liquid oxygen, ambient temperature to -297°F, and atmospheric pressure.

(1) Company Practices

(a) A sealant for thermal insulation on product transmission lines operating at a temperature below the liquefaction temp. of air.

(b) APCI Safety Standard 609.1, p. 5, June 1964, (Doc. #99000051).

B. Information Sources

1. Company Practices

a. Company Research

(1) Yoder, L., Analytical Report on Flammability in 100% gaseous oxygen, 61-38, 61-39, Feb. 3, 1961, (Doc. #99000130).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 37, December 4, 1963, (Doc. #99000128).

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IA6a-3

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Plasite, No. 7122H, Wisconsin Protective Coating Co.

a. Specific Oxygen Environment

Exposure is to air excepting where leakage from process system occurs. Exposure then is to gaseous or liquid oxygen, ambient temperature to -297°F, and atmospheric pressure.

(1) Company Practices

(a) Underground transmission line coating.

(b) Above ground insulated transmission line coating.

(c) APCI Safety Standards 609.1, p. 3, June 1964, (Doc. #99000051).

B. Information Sources

1. Company Practices

a. Company Research

(1) Brophy, M. "Plasite Protective Coating," June 9, 1960, (Doc. #99000150). Corrosion resistance and flammability of coated surfaces tests.

(2) Geist, J. M., Controlled Kinetics Experiments -- Teflon Hoses, Supported by Braided Stainless Steel Housing, and Rubber Hoses, Plasite No. 7122H, APCI MAR 87-0-8820, June 1960, (Doc. #99000058).

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IA6a-4

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Copper Pipe ASTM B42

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, pressure to 3000 psig

(1) Company Practices

(a) Various components of oxygen plant piping systems, and instrument systems.

(b) Design Engineering Standard 574.1, p. 3, May 1962, (Doc. #99000161).

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 12, January 15, 1963, (Doc. #99000152).

(2) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 14, February 1, 1966, (Doc. #99000153).

(3) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Copper tube ASTM B75

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, pressures to 2300 psig.

(1) Company Practices

(a) Interconnecting pipe systems in oxygen plants

(b) Design Engineering Standard 574.1, May 1962, (Doc. #99000161).

(c) Design Engineering Standard 574.2, Jan. 1964, (Doc. #99000162).

(d) Design Engineering Standard 574.10, Jan. 1964, (Doc. #99000163).

(e) Design Engineering Standard 574.50, Nov. 1968, (Doc. #99000164).

(f) Design Engineering Standard 574.51, Nov. 1968, (Doc. #99000165).

(g) Design Engineering Standard 574.52, April 1967, (Doc. #99000166).

(h) Design Engineering Standard 574.54, Jan. 1964, (Doc. #99000167).

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 12, January 15, 1963, (Doc. #99000152).

(2) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 14, February 1, 1966, (Doc. #99000153).

(3) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Red Brass Pipe ASTM B43

a. Specific Oxygen Environment

Gaseous oxygen, ambient temperature, pressures to 3000 psig.

(1) Company Practices

(a) Piping headers for gaseous oxygen filling and discharging cylinder manifolds.

(b) Design Engineering Standard 572.1, p. 1, May, 1962, (Doc. 99000151).

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(2) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 14, February 1, 1966, (Doc. #99000153).

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IA6a-7

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Aluminum ASTM B211 2024-T4

a. Specific Oxygen Environment

Exposure is to air excepting where leakage from process system occurs. Exposure then is to gaseous or liquid oxygen, ambient temperature to -297°F, and atmospheric pressure.

(1) Company Practices

(a) Flange bolting and studs.

(b) Design Engineering Standard 571.2, Nov. 1967, (Doc. #99000156).

(c) Design Engineering Standard 571.3, Nov. 1967, (Doc. #99000157).

(d) Design Engineering Standard 571.4, Nov. 1967, (Doc. #99000158).

(e) The references listed below in most tests for compatibility list aluminum without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 66, 67, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 12, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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IA6a-8

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Aluminum, ASTM B 210 3003

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, pressures to 900 psig.

(1) Company Practices

(a) Straight aluminum instrument tubing, 3/8" O.D. x .035" wall, ASTM 3003-H14.

(b) Coiled aluminum instrument tubing, 3/8" O.D. x .035" wall, ASTM 3003-0.

(c) Design Engineering Standard 571.50, Nov. 1968, (Doc. #99000159).

(d) Design Engineering Standard 571.51, Nov. 1968, (Doc. #99000160).

(e) The references listed below in most tests for compatibility list aluminum without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 66, 67, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 12, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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IA6a-9

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Aluminum ASTM B209 5083-0

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, pressures to 150 psig.

(1) Company Practices

(a) Plant piping sizes 14" through 36"

(b) Fittings for pipe sizes 14" through 36"

(c) Design Engineering Standard 571.2, Oct. 1965, (Doc. #99000155).

(d) Design Engineering Standard 571.3, Nov. 1967, (Doc. #99000156).

(e) The references listed below in most tests for compatibility list aluminum without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 66, 67, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 12, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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IA6a-10

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Aluminum, ASTM B210 6061-T6

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, pressures to 900 psig.

(1) Company Practices

(a) Instrument tubing 3/8" O.D. x .065" wall is mandatory for analyzer taps.

(b) Design Engineering Standard 571.50, Nov. 1968, (Doc. #99000159).

(c) Design Engineering Standard 571.51, Nov. 1968, (Doc. #99000160).

(d) The references listed below in most tests for compatibility list aluminum without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 66, 67, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 12, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Aluminum ASTM B241 6061-T6

a. Specific Oxygen Environment

Gas and liquid oxygen, ambient temperature to -297°F, pressures to 300 psig.

(1) Company Practices

(a) Piping systems to 12" diameter

(b) Design Engineering Standard 571.3, November 1967, (Doc. #99000157).

(c) Design Engineering Standard 571.4, November 1967, (Doc. #99000158).

(d) The references listed below in most tests for compatibility list aluminum without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 66, 67, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 12, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Aluminum ASTM B247 6061-T6

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, pressures to 3000 psig.

(1) Company Practices

(a) Anodized body, bonnet, and backcaps of regulators to 3000 psig.

(b) Forged flanges for interconnecting plant aluminum piping to 300 psig.

(c) Forged fittings for interconnecting plant aluminum piping to 300 psig.

(d) Design Engineering Standard 571.2, November 1967, (Doc. #99000156).

(e) Design Engineering Standard 571.3, November 1967, (Doc. #99000157).

(f) Design Engineering Standard 571.4, November 1967, (Doc. #99000158).

(g) The references listed below in most tests for compatibility list aluminum without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 66, 67, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 12, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Aluminum B361 WP6061-T6

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, pressures to 300 psig

(1) Company Practices

(a) Wrought butt weld fittings to 12 in. pipe size for plant piping systems.

(b) Design Engineering Standard 571.3, November 1967, (Doc. #99000157).

(c) Design Engineering Standard 571.4, November 1967, (Doc. #99000158).

(d) The references listed below for most tests for compatibility list aluminum without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 66, 67, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 12, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Carbon Steel - (Oxygen Service)

a. Specific Oxygen Environment

Gaseous oxygen, -20°F to 100°F, pressures to about 3000 psig.

(1) Company Practices

(a) Transmission lines and interconnecting piping using ASTM A53, A53GrB, A134GrA, A135GrA, A245GrA, or A283GrA material.

(b) Fittings for transmission lines using ASTM A105Gr2 and A234 WPB or WPA material

(c) Gaseous oxygen cylinders of D.O.T. specified steels at pressures to 3000 psig and temperatures of -20°F to 130°F.

(d) Safety relief valve springs in cold gas service at ambient temperatures down to -320°F and pressures to 160 psig.

(e) Design Engineering Standard 578.10.1, Oct. 1965, (Doc. #99000168).

(f) Design Engineering Standard 578.10.2, Oct. 1966, (Doc. #99000169).

(g) Design Engineering Standard 578.10.3, June 1962, (Doc. #99000170).

(h) Design Engineering Standard 578.10.4, Jan. 1964, (Doc. #99000171).

(i) Design Engineering Standard 578.10.5, Jan. 1964, (Doc. #99000172).

(j) Design Engineering Standard 578.10.6, June 1962, (Doc. #99000173).

(k) Design Engineering Standard 578.60.3, Sept. 1969, (Doc. #99000030).

(l) Design Engineering Standard 578.60.4, Sept. 1969 (Doc. #99000031).

(m) Design Engineering Standard 578.60.5, Sept. 1969, (Doc. #99000032).

(n) Design Engineering Standard 578.60.6, Sept. 1969, (Doc. #99000033).

(o) The references listed below in most tests for compatibility list steel or steel alloys without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

a. Company Research

(1) Foster, R. H., "Cold Test of 1/2" Safety Valve with Carbon Steel Spring, W.O. #10-7071, Project 00-5-3246-51.12" Technical Memorandum No. 79, April 27, 1965, (Doc. #99000185).

(2) Kehat, E., "Burning of Steel Pipes in a Flowing Oxygen Stream." April 17, 1961, (Doc. #99000186).

(3) Bailey, B., "Ignition Limits of Carbon Steel in Oxygen-Nitrogen Atmospheres", IWO LB-0043, APCI Technical Memorandum No. 112, May 8, 1968, (Doc. #99000187).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 69, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 15, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 921, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Stainless Steel ASTM A312 TP304

a. Specific Oxygen Environment

Gaseous and Liquid Oxygen, ambient temperature to -297°F pressures to 3000 psig.

(1) Company Practices

(a) Piping systems at oxygen compressors as dictated by conditions of installation

(b) Instrument piping above 1500 psig

(c) Lubricating oil piping in bearing areas of centrifugal oxygen compressors. Exposure is to air excepting where leakage from system occurs.

(d) Design Engineering Standard 578.30.1, May 1962, (Doc. #99000174).

(e) Design Engineering Standard 578.30.2, November 1967, (Doc. #99000175).

(f) Design Engineering Standard 578.30.3, November 1967, (Doc. #99000176).

(g) Design Engineering Standard 578.30.4, January 1964, (Doc. #99000177).

(h) Design Engineering Standard 578.30.5, January 1964, (Doc. #99000178).

(i) Design Engineering Standard 578.30.6, January 1964, (Doc. #99000179).

(j) Design Engineering Standard 578.30.8, January 1964, (Doc. #99000180).

(k) Design Engineering Standard 578.30.15, November 1967, (Doc. #99000181).

(l) Design Engineering Standard 578.40.1, September 1969, (Doc. #99000182).

(m) The references listed below in most tests for compatibility list stainless steel without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

a. Company Research

(1) Bailey, B., "Ignition Limits of Some Stainless Steels in an Oxygen Atmosphere." Project 00-7-3480-51.00, APCI Technical Memorandum No. 114, (Doc. #99000188).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 69, 70, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 15, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 921, July 1961, (Doc. #99000154).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Stainless Steel ASTM A240 304

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F pressures to 3000 psig

(1) Company Practices

(a) Inner vessel of cryogenic storage tanks, highway tankers and railroad tankers.

(b) Structural support members of internal components of air separation plant cold boxes. Exposure is to air or inert gas excepting where leaks in system occur.

(c) Medium pressure liquid oxygen dewars.

(d) The references listed below in most tests for compatibility list stainless steel without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

a. Company Research

(1) Bailey, B., "Ignition Limits of Some Stainless Steels in an Oxygen Atmosphere." Project 00-7-3480-51.00, APCI Technical Memorandum No. 114, (Doc. #99000188).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 69, 70, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 15, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 921, July 1961, (Doc. #99000154).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Stainless Steel ASTM A403 WP304 and A403 WP304L.

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, pressures to 3000 psig

(1) Company Practices

(a) Wrought stainless fittings for piping systems.

(b) Design Engineering Standard 578.30.1, May 1962, (Doc. #99000174).

(c) Design Engineering Standard 578.30.2, November 1967, (Doc. #99000175).

(d) Design Engineering Standard 578.30.3, November 1967, (Doc. #99000176).

(e) Design Engineering Standard 578.30.4, January 1964, (Doc. #99000177).

(f) Design Engineering Standard 578.30.5, January 1964, (Doc. #99000178).

(g) Design Engineering Standard 578.30.6, January 1964, (Doc. #99000179).

(h) Design Engineering Standard 578.30.8, January 1964, (Doc. #99000180).

(i) Design Engineering Standard 578.30.15, November 1967, (Doc. #99000181).

(j) Design Engineering Standard 578.40.1, September 1969, (Doc. #99000182).

(k) The references listed below in most tests for compatibility list stainless steel without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

a. Company Research

(1) Bailey, B., "Ignition Limits of Some Stainless Steels in an Oxygen Atmosphere." Project 00-7-3480-51.00, APCI Technical Memorandum No. 114, (Doc. #99000188).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 69, 70, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 15, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 921, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Stainless steel ASTM A320 B8304

a. Specific Oxygen Environment

Exposure is to air excepting where leakage from system occurs. Exposure then is to gaseous or liquid oxygen, ambient temperature to -297°F, and atmospheric pressure.

(1) Company Practices

(a) Bolting and studs used with forged flanges in piping systems for liquid and gaseous oxygen.

(b) Design Engineering Standard 578.30.1, May 1962, (Doc. #99000174).

(c) Design Engineering Standard 578.30.2, November 1967, (Doc. #99000175).

(d) Design Engineering Standard 578.30.3, November 1967, (Doc. #99000176).

(e) Design Engineering Standard 578.30.4, January 1964, (Doc. #99000177).

(f) Design Engineering Standard 578.30.5, January 1964, (Doc. #99000178).

(g) Design Engineering Standard 578.30.6, January 1964, (Doc. #99000179).

(h) Design Engineering Standard 578.30.8, January 1964, (Doc. #99000180).

(i) Design Engineering Standard 578.30.15, November 1967, (Doc. #99000181).

(j) Design Engineering Standard 578.40.1, September 1969, (Doc. #99000182).

(k) The references listed below in most tests for compatibility list stainless steel without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

a. Company Research

(1) Bailey, B., "Ignition Limits of Some Stainless Steels in an Oxygen Atmosphere." Project 00-7-3480-51.00, APCI Technical Memorandum No. 114, (Doc. #99000188).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 69, 70, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 15, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 926, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Stainless Steel ASTM A194 8T321

a. Specific Oxygen Environment

(1) Company Practices

(a) Flange nuts in piping systems for liquid and gaseous oxygen.

(b) Design Engineering Standard 578.30.1, May 1962, (Doc. #99000174).

(c) Design Engineering Standard 578.30.2, November 1967, (Doc. #99000175).

(d) Design Engineering Standard 578.30.3, November 1967, (Doc. #99000176).

(e) Design Engineering Standard 578.30.4, January 1964, (Doc. #99000177).

(f) Design Engineering Standard 578.30.5, January 1964, (Doc. #99000178).

(g) Design Engineering Standard 578.30.6, January 1964, (Doc. #99000179).

(h) Design Engineering Standard 578.30.8, January 1964, (Doc. #99000180).

(i) Design Engineering Standard 578.30.15, November 1967, (Doc. #99000181).

(j) Design Engineering Standard 578.40.1, September 1969, (Doc. #99000182).

(k) The references listed below in most tests for compatibility list stainless steel without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

a. Company Research

(1) Bailey, B., "Ignition Limits of Some Stainless Steels in an Oxygen Atmosphere." Project 00-7-3480-51.00, APCI Technical Memorandum No. 114, (Doc. #99000188).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 69, 70, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 15, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 921, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Stainless steels, type 416 cadmium plated

a. Specific Oxygen Environment

Gaseous oxygen, ambient temperature, pressure to 3000 psig.

(1) Company Practices

(a) Oxygen cylinder valve stem tang.

(b) The references listed below in most tests for compatibility list stainless steel without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

a. Company Research

(1) Bailey, B., "Ignition Limits of Some Stainless Steels in an Oxygen Atmosphere." Project 00-7-3480-51.00, APCI Technical Memorandum No. 114, (Doc. #99000188).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 69, 70, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 15, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 921, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Stainless Steel ASTM A182 F 304 and ASTM A182 F 316

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, pressures to 3000 psig.

(1) Company Practices

(a) Forged fittings for piping systems.

(b) Tube adaptors in instrument piping service

(c) Design Engineering Standard 578.30.1, May 1962, (Doc. #99000174).

(d) Design Engineering Standard 578.30.2, November 1967, (Doc. #99000175).

(e) Design Engineering Standard 578.30.3, November 1967, (Doc. #99000176).

(f) Design Engineering Standard 578.30.4, January 1964, (Doc. #99000177).

(g) Design Engineering Standard 578.30.5, January 1964, (Doc. #99000178).

(h) Design Engineering Standard 578.30.6, January 1964, (Doc. #99000179).

(i) Design Engineering Standard 578.30.8, January 1964, (Doc. #99000180).

(j) Design Engineering Standard 578.30.15, November 1967, (Doc. #99000181).

(k) Design Engineering Standard 578.40.1, September 1969, (Doc. #99000182).

(l) The references listed below in most tests for compatibility list stainless steel without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

a. Company Research

(1) Bailey, B., "Ignition Limits of Some Stainless Steels in an Oxygen Atmosphere." Project 00-7-3480-51.00, APCI Technical Memorandum No. 114, (Doc. #99000188).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 69, 70, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 15, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Stainless Steel, type 304, unidentified as to ASTM spec.

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, pressures to 3000 psig.

(1) Company Practices

(a) Sintered filters, high pressure oxygen regulators

(b) Springs, nozzles, stems, pins, and seat retainers in oxygen regulators.

(c) Shafts, rods, and specific parts for reciprocating and centrifugal oxygen pumps and compressors.

(d) Forged and cast stainless steel valve bodies

(e) Forged, cast, and machined stainless steel valve trim.

(f) Bourdon tubes in special gauges.

(g) Design Engineering Standard 578.60.1, p. 2, April 1971, (Doc. #99000028).

(h) Design Engineering Standard 531.2, p. 3, Oct. 1963, (Doc. #99000022).

(i) Design Engineering Standard 579.31., May 1964, (Doc. #99000034).

(j) Design Engineering Standard 579.15, August 1966, (Doc. #99000037).

(k) The references listed below in most tests for compatibility list stainless steel without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

a. Company Research

(1) Bailey, B., "Ignition Limits of Some Stainless Steels in an Oxygen Atmosphere." Project 00-7-3480-51.00, APCI Technical Memorandum No. 114, (Doc. #99000188).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 69, 70, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 15, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Copper-Silicon ASTM B98GrB

a. Specific Oxygen Environment

Exposure is to air excepting where leakage from system occurs. Exposure then is to gaseous or liquid oxygen, ambient temperature to -297°F, and atmospheric pressure.

(1) Company Practices

(a) As bonnet bolts, studs, and nuts for various valve bodies or assemblies.

(b) The references listed below in most tests for compatibility list metals without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

b. Company Operating Experience

(1) Acceptable material through years of successful service.

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, December 4, 1963, (Doc. #99000128).

(2) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," NASA TM X-985, August 1964 (Doc. #99000127).

(3) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen", NASA TM X-53052, May 26, 1964, (Doc. #99000124).

(4) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, III", NASA TM X-53533, November 3, 1966, (Doc. #99000125).

(5) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV", NASA TM X-53773, August 23, 1968, (Doc. #99000126).

(6) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, January 15, 1963, (Doc. #99000152).

(7) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, February 1, 1966, (Doc. 99000153).

(8) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Free Machining Brass

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, pressures to 3000 psig.

(1) Company Practices

(a) Regulator inlet, outlet, gages, and misc. parts.

(b) Oxygen Cyl. valve parts - packing nut, stem body, stem pin, plug, safety nut, handwheel nut. Some parts exposed to oxygen only when leak in systems occur.

(c) Valve trim.

(d) The references listed below in most tests for compatibility list metals without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

b. Company Operating Experience

(1) Accepted material through years of successful service.

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, December 4, 1963, (Doc. #99000128).

(2) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," NASA TM X-985, August 1964, (Doc. #99000127).

(3) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen", NASA TM X-53052, May 26, 1964, (Doc. #99000124).

(4) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, III", NASA TM X-53533, November 3, 1966, (Doc. #99000125).

(5) Key, C. F., NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen, IV", NASA TM X-53773, August 23, 1968, (Doc. #99000126).

(6) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, January 15, 1963, (Doc. #99000152).

(7) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, February 1, 1966, (Doc. 99000153).

(8) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Beryllium Copper

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, pressures to 3600 psig

(1) Company Practices

(a) Bourdon tubes in pressure gauges above 800 psig.

(b) Rupture discs in oxygen cylinder valves.

(c) Inlet and outlet valves on some reciprocating liquid oxygen pumps.

(d) Design Engineering Standard 531.2, p. 3, Oct. 1963, (Doc. #99000022).

(e) The references listed below in most tests for compatibility list metals without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 67, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 14, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Stainless Steel ASTM A269 304

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F pressures to 3000 psig.

(1) Company Practices

(a) Tubing in storage vessel piping systems.

(b) The references listed below in most tests for compatibility list stainless steel without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

a. Company Research

(1) Bailey, B., "Ignition Limits of Some Stainless Steels in an Oxygen Atmosphere." Project 00-7-3480-51.00, APCI Technical Memorandum No. 114, (Doc. #99000188).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 69, 70, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000153).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 15, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Bronze ASTM B61 or B62

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, pressures to 3000 psig.

(1) Company Practices

(a) Valve bodies and valve trim for pipe line, oxygen compressor, and air separation plants.

(b) Sintered bronze filters in regulator inlet connections.

(c) Design Engineering Standard 579.3, Jan. 1963, (Doc. #99000183). (Specification for various valves used in systems)

(d) The references listed below in most tests for compatibility list metals without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 67, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 14, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Brass sheet or plate, ASTM B36

a. Specific Oxygen Environment

Gaseous oxygen, ambient temperatures, pressures to 1500 psig.

(1) Company Practices

(a) Impingment plates in carbon steel oxygen transmission lines where flow is into the side of a fabricated tee in lines larger than 6" in diameter.

(b) Design Engineering Standard 578.60.3, Note 3, September 1969, (Doc. #99000030).

(c) The references listed below in most tests for compatibility list metals without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 67, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 14, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Monel, ASTM B164

a. Specific Oxygen Environment

Gaseous or liquid oxygen, ambient temperature to -279°F, pressures to 3000 psig.

(1) Company Practices

(a) Tees used in carbon steel oxygen lines up to 6" in diameter where the flow is into the side port.

(b) Piping downstream of some pressure control valves in critical velocity areas.

(c) Valve forgings in critical velocity areas of oxygen transmission systems.

(d) Reciprocating liquid oxygen pump rods.

(e) Suction strainers for oxygen compressors.

(f) Valve trim in critical velocity areas of oxygen transmission lines.

(g) Design Engineering Standard 578.60.3, Note 3,

(h) The references listed below in most tests for compatibility list metals without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 67, 68, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 14, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Stainless Steel ASTM A351 Gr CF8

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient temperature to -297°F, pressures to 1500 psig.

(1) Company Practices

(a) Cast stainless steel valve bodies and valve trim in specified applications in oxygen systems.

(b) Design Engineering Standard 579.3, Jan. 1963, (Doc. #99000183). (Specification for various valves used in systems.)

(c) The references listed below in most tests for compatibility list stainless steel without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

a. Company Research

(1) Bailey, B., "Ignition Limits of Some Stainless Steels in an Oxygen Atmosphere." Project 00-7-3480-51.00, APCI Technical Memorandum No. 114, (Doc. #99000188).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 69, 70, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 15, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Stainless, 9% Nickel Steel, ASTM A353GB

a. Specific Oxygen Environment

Gaseous and liquid oxygen ambient temperature to -297°F, pressures to 250 psig.

(1) Company Practices

(a) Inner vessel of cryogenic liquid storage containers.

(b) The references listed below in most tests for compatibility list stainless steel without identifying ASTM number or grades. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

a. Company Research

(1) Bailey, B., "Ignition Limits of Some Stainless Steels in an Oxygen Atmosphere." Project 00-7-3480-51.00, APCI Technical Memorandum No. 114, (Doc. #99000188).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 69, 70, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 15, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Copper Tube ASTM B88

a. Specific Oxygen Environment

Gaseous and liquid oxygen, ambient Temperature to -297°F, pressures to 900 psig.

(1) Company Practices

(a) Interconnecting pipe systems in oxygen plants

(b) Design Engineering Standard 574.1, May 1962, (Doc. #99000161).

(c) Design Engineering Standard 574.2, Jan. 1964, (Doc. #99000162).

(d) Design Engineering Standard 574.10, Jan. 1964, (Doc. #99000163).

(e) Design Engineering Standard 574.50, Nov. 1968 (Doc. #99000164).

(f) Design Engineering Standard 574.51, Nov. 1968 (Doc. #99000165).

B. Information Sources

1. Company Practices

c. Based on Research & Development of Others.

(1) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 12, January 15, 1963, (Doc. #99000152).

(2) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 14, February 1, 1966, (Doc. 99000153).

(3) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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IA6a-33

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Carbon Steel - (Non Oxygen Service with possible exposure to oxygen).

a. Specific Oxygen Environment

Exposure is to air excepting where leakage from system occurs. Exposure is then to gaseous oxygen at ambient temperature and atmospheric pressure.

(1) Company Practices

(a) Flanges of ASTM A181 Gr 1 material in transmission and piping systems

(b) Studs of ASTM A193 Gr B7 or A307GrB material

(c) Nuts of ASTM A194 GrH material

(d) Oxygen regulator adjusting springs and spring buttons.

(e) Outer shells of storage tanks and highway tankers of ASTM A7 material

(f) Design Engineering Standard 578.10.2, October 1966, (Doc. #99000169).

(g) Design Engineering Standard 578.10.3, June 1962, (Doc. #99000170).

(h) Design Engineering Standard 578.10.4, January 1964, (Doc. #99000171).

(i) Design Engineering Standard 578.10.5, January 1964, (Doc. #99000172).

(j) Design Engineering Standard 578.10.6, June 1962, (Doc. #99000173).

(k) Design Engineering Standard 578.10.9, June 1962 (Doc. #99000184).

(l) Design Engineering Standard 578.60.3, September 1969, (Doc. #99000030).

(m) Design Engineering Standard 578.60.4, September 1969, (Doc. #99000031).

(n) Design Engineering Standard 578.60.5, September 1969, (Doc. #99000032).

(o) Design Engineering Standard 578.60.6, September 1969, (Doc. #99000033).

(p) The references listed below in most tests for compatibility list steel or steel alloys without identifying ASTM number or grade. However, we interpret the references as being applicable to the various ASTM numbers and grades as a class.

B. Information Sources

1. Company Practices

a. Company Research

(1) Foster, R. H., "Cold Test of 1/2" Safety Valve with Carbon Steel Spring, W.O. #10-7071, Project 00-5-3246-51.12" Technical Memorandum No. 79, April 27, 1965, (Doc. #99000185).

(2) Kehat, E., "Burning of Steel Pipes in a Flowing Oxygen Stream." April 17, 1961, (Doc. #99000187).

(3) Bailey, B., "Ignition Limits of Carbon Steel in Oxygen-Nitrogen Atmospheres", IWO LB-0043, APCI Technical Memorandum No. 112, May 8, 1968, (Doc. #99000187).

(4) Kehat, E., APCI Safety, Hazards and Explosion Testing Ucon Type Lubricants, Steel Pipes, APCI MAR 87-0-8820, April, 1961 (Doc. #99000059).

c. Based on Research & Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 69, 70, December 4, 1963, (Doc. #99000128).

(2) Jackson, J. D., W. K. Boyd, and P. D. Miller, Defense Metals Information Center, Battelle Memorial Institute, "Reactivity of Metals with Liquid and Gaseous Oxygen," DMIC Memorandum 163, p. 23, January 15, 1963, (Doc. #99000152).

(3) White, E. L., and J. J. Ward, Defense Metals Information Center, Battelle Memorial Institute, "Ignition of Metals in Oxygen," DMIC Report 224, p. 15, February 1, 1966, (Doc. 99000153).

(4) Dean, L. E. and W. R. Thompson, Aerojet-General, "Ignition of Metals and Alloys," American Rocket Society Journal, p. 917-923, July 1961, (Doc. #99000154).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Spheroidal graphite Iron (Continental standard GGG 38).

a. Specific Oxygen Environemnt

Gaseous oxygen, ambient to 320°F, pressure up to 600 PSIG

(1) Company Practices (APL)

(a) High Pressure casing for O_2 Turbo Compressors.

(b) Cylinder heads and jackets for High Pressure O_2 Reciprocating Compressors.

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Silver

a. Specific Oxygen Environment

Gaseous oxygen, ambient to 320°F pressures up to 600 PSIG.

(1) Company Practices (APL)

(a) Oxygen turbo compressor labyrinths.

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Novonox Stainless steel alloy
To DIN (German National Standards), Composition:
5% Cr, 17% Ni, 4% Cu, Niobium Stabilizer, balance Fe.

a. Specific Oxygen Environment

Gaseous oxygen, ambient to 320°F, pressures up to 600 PSIG.

(1) Company Practices (APL)

(a) Oxygen turbo - compressor Impellers.

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Muntz Metal 60/40 Type, Composition: Cu 58 - 61%, Zn 38.5 - 42%, Pb 0.35 - 0.9%

a. Specific Oxygen Environment

Gaseous oxygen, ambient to 320°F pressures up to 600 PSIG.

(1) Company Practices (APL)

(a) Oxygen Turbo compressor
Cooler tube plates

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IA6a-38

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Metals, alloys, solders, and surface treatments

1. Alpha brass tube Type TCL 100 or DTD 5019 (Tungum Company Limited U.K.). Composition: Copper 86%, Alum. 1.2%, Nickel 1.4% Silicon 1.3%, Iron 0.25%, Lead .05%, Tin 0.1%, Manganese 0.1%. Total other impurities 0.5%, Zinc Remainder.

a. Specific Oxygen Environment

Gaseous and liquid oxygen, 100°F to -297°F, pressures up to 3000 PSIG.

(1) Company Practices (APL)

(a) Oxygen manifold piping

(b) Oxygen bottling facilities

(c) Small standard plant cold box piping

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IA7a-1

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Chemicals, solvents, and miscellaneous

1. 1,1, dichlorothane

a. Specific Oxygen Environment

None. Exposure may be to gaseous or liquid oxygen, ambient temperature to -297°F, pressures to 300 psig if solvent is not completely removed from equipment or parts before introducing to oxygen service.

(1) Company Practices

(a) Solvent agent for hydrocarbon decontamination of small parts used in oxygen systems.

B. Information Sources

1. Company Practices

a. Company Research

(1) Kehat, E., "Development of Standard Ignition Test Progress Report -- Project #87-0-8821", dated Jan. 3, 1962, (Doc. #99000136).

(2) Bassler, E., "Cleaning for Oxygen Service" Jan. 1960, (Doc. #99000096).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Chemicals, solvents, and miscellaneous

1. 1,1,1, Trichloroethane

a. Specific Oxygen Environment

None. Exposure may be to gaseous or liquid oxygen, ambient temperature to -297°F, pressures to 3000 psi if solvent is not completely removed from equipment or parts before introducing to oxygen service.

(1) Company Practices

(a) Solvent agent for hydrocarbon decontamination of small parts used in oxygen systems.

(b) Safety Standard 609.1, page 2, June 1964, (Doc. #99000051).

B. Information Sources

1. Company Practices

a. Company Practices

(1) Kehat, E., "Development of Standard Ignition Test Progress Report -- Project #87-0-8821," dated Jan. 3, 1962, (Doc. #99000136).

(2) Bassler, E., "Cleaning for Oxygen Service" Jan. 1960, (Doc. #99000096).

c. Based on Research and Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen,"MTP-P&VE-M-63-14, p. 78, December 4, 1963, (Doc. #99000128).

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IA7a-3

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Chemicals, solvents, and miscellaneous

1. Chloroform

a. Specific Oxygen Environment

None. Exposure may be to gaseous or liquid oxygen, ambient temperature to -297°F, pressures to 300 psi if solvent is not completely removed from equipment or parts before introducing to oxygen service.

(1) Company Practices

(a) Solvent agent acceptable for hydrocarbon decontamination of small parts used in oxygen systems.

(b) Laboratory applications

B. Information Sources.

1. Company Practices

a. Company Research

(1) Kehat, E., "Development of Standard Ignition Test Progress Report -- Project #87-0-8821," dated Jan. 3, 1962, (Doc. #99000136).

(2) Bassler, E., "Cleaning for Oxygen Service," Jan. 1960, (Doc. #99000096).

c. Based on Research and Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 78, December 4, 1963, (Doc. #99000128).

Air Products and Chemicals INC.

February 21, 1972

IA7a-4

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Chemicals, solvents, and miscellaneous

1. Carbon Tetrachloride

a. Specific Oxygen Environment

None. Exposure may be to gaseous oxygen ambient temperature, and atmospheric pressure if solvent is not completely removed from equipment or parts before introducing to oxygen service.

(1) Company Practices

(a) Use of carbon tetrachloride prohibited in all areas of activity excepting as authorized in certain laboratory applications.

(b) Safety Gram No. 68, Carbon Tetrachloride, Feb. 21, 1969, (Doc. #99000106).

B. Information Sources

1. Company Practices

a. Company Research

(1) Kehat, E., "Development of Standard Ignition Test Progress Report -- Project #87-0-8821," dated Jan. 3, 1962, (Doc. #99000136).

(2) Bassler, E., "Cleaning for Oxygen Service" Jan. 1960, (Doc. #99000096).

c. Based on Research and Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 78, December 4, 1963, (Doc. #99000128).

Air Products and Chemicals INC.

February 21, 1972

IA7a-5

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Chemicals, solvents, and miscellaneous

1. Trichloroethylene

a. Specific Oxygen Environment

None. Exposure may be to gaseous or liquid oxygen, ambient temperature to -297°F, pressures to 3000 psig if solvent is not completely removed from equipment or parts before introducing to oxygen service.

(1) Company Practices

(a) Solvent agent for hydrocarbon decontamination of small parts used in oxygen systems.

(b) Safety Standard 609.1, page 2, June 1964. (Doc. # 99000051).

B. Information Sources.

1. Company Practices

a. Company Research

(1) Kehat, E., "Development of Standard Ignition Test Progress Report -- Project #87-0-8821," dated Jan. 3, 1962, (Doc. #99000136).

(2) Bassler, E., "Cleaning for Oxygen Service" Jan. 1960, (Doc. #99000096).

c. Based on Research and Development of Others.

(1) Key, C. F. and W. A. Riehl, NASA-GCMSFC, "Compatibility of Materials with Liquid Oxygen," MTP-P&VE-M-63-14, p. 81, December 4, 1963, (Doc. #99000128).

Air Products and Chemicals INC.

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IA7a-6

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

A. Chemicals, solvents, and miscellaneous

1. Methylene Chloride

a. Specific Oxygen Environment

None. Exposure may be to gaseous or liquid oxygen, ambient temperature to -297°F, pressures to 3000 psi if solvent is not completely removed for equipment or parts before introducing to oxygen service.

(1) Company Practices

(a) Air Separation plant wash-out solvent

(b) Solvent agent for decontamination of small parts used in oxygen systems.

(c) Safety Standard 609.1, page 2, June 1964, (Doc. #99000051).

B. Information Sources

1. Company Practices

a. Company Research

(1) Kehat, E., "Development of Standard Ignition Test Progress Report -- Project #87-0-8821," dated Jan. 3, 1962, (Doc. #99000136).

(2) Bassler, E., "Cleaning for Oxygen Service" Jan. 1960, (Doc. #99000096).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

B. Compatibility Check

1. Fire Compatibility

c. Cleaning Procedures

In the cleaning of commercial cryogenic systems, the primary task is to remove those contaminants (such as oil and grease) which create a hazardous condition when oxygen is present. A secondary consideration is the removal of those contaminants which might interfere with operation. Examples of this latter category are particles of grit which can interfere with valve closure, and water which can plug up equipment as it freezes.

Before a system is put in service, a cleaning step takes place in the blowing out of all lines, valves, and packing glands. Heated, dry oil-free air or nitrogen is used for blowing out. To be dry oil-free air, it has to go through a drier and have a dew point of -40°F. Nitrogen is preferred. Despite all reasonable precautions during original cleaning and fabrication, it is surprising to observe the amount of foreign material which is blown out in this manner.

After equipment has been in operation, periodic cleaning is necessary only if it becomes contaminated with a fuel. Normally, this does not occur, but if inspections or evidence of contamination indicate fuel to be present in an oxygen system, prompt cleaning of operating equipment is mandatory. Industrial frequency of inspection, and cleaning of operating equipment varies from annually to never, if there is no specific cause for suspecting contamination.

I <u>Cleaning Procedures</u>

A. Company Practices

1. <u>Initial installation-Construction</u>

a. Carbon steel pipe 3" and larger

(1) Sand blast to remove rust, varnish and mill scale and other foreign matter.

(2) Immerse in a solution to provide an alkaline activated coating to the surface of the work to act as a temporary rust inhibitor.

b. Carbon steel pipe 2 1/2" and smaller

(1) Immerse in a hot solution with a stripper additive to remove varnish and initiate action on rust and scale.

(2) Remove pipe - thoroughly rinse with water.

(3) Immerse again in a hot solution to assure complete removal of rust and scale.

(4) Remove pipe from cleaning solution and rinse with water.

(5) Immerse in a solution to provide an alkaline activated coating to the surface of the work to act as a temporary rust inhibitor.

c. Carbon steel pipelines

(1) Pipe must be supplied with no interior varnish.

(2) Temporary spool pieces and cleaning stations are used to permit specified in place cleaning and inspection.

(3) The interior of all pipe is sand blast cleaned in place by the Klean Kote Inc. method (Kleane Kote Inc. P.O. Box 588, LaPorte, Texas).

(4) The pipe is blown out with dry, oil free air or nitrogen after it is blast cleaned.

d. Aluminum, stainless steel, and copper pipe

(1) Immerse in the proper hot solution and allow to soak in solution for a period of time required for complete removal of soils and contaminants.

(2) Rinse in water using a high velocity stream.

e. Fabricated pipe spools after cleaning shall be capped. Pipelines after cleaning are kept under slight positive nitrogen pressure.

2. Existing Installation-Operations

a. Frequency of cleaning is depending on the following:

(1) Periodic inspections when normal preventive

maintenance is scheduled.

(2) Product sample analysis indicating contaminants.

(3) Normal schedule as determined from past experience.

(4) Abnormal operating conditions, such as, high pressure drops, valve seat leakage, etc.

b. Types of Cleaning

(1) Flushing normally used on complex piping circuits. This method is considered the most practical way to clean a cryogenic piping system that has previously been in service.

The piping prior to using the flushing method must be checked to insure that all low points have suitable drains. The high points need vents to completely fill circuits. Double block and bleed valves are necessary where solution could enter an undesirable circuit.

It is first necessary to warm a system prior to flushing. This is done by blowing the system out using 110°F to 150°F nitrogen or dry oil-free air until the insulation and piping are warm, and then use 90°F nitrogen or dry oil-free air to insure that the whole system is not warmer than 90°F. Normally all relief valves and instrument lines are removed and valves are installed to control flow.

Flushing will require a suitable pump for introducing and recirculating the cleaning solution. Although experience has proven that recirculation is not entirely necessary, it is preferred. If it is not possible to recirculate the solution, it is necessary to allow the solution to remain in the system for one hour. The solution when drained, will be replaced with fresh solvent if appreciably discolored, and reintroduced in the system for another soak. When using the soak or recirculating procedure, it must be kept in mind that all circuits must be completely filled with solution.

Air Products and Chemicals uses methylene chloride for flushing solution. Samples are used to determine the magnitude of contamination. Samples of unused and used solution are gathered for comparison analysis. The quantity of solution introduced along with the quantity that is drained must be recorded to get an indication of how much solution is left in the system. Then other means such as pressurization are used to remove the remaining solution. The total contamination level is based on the sample analysis and the quantity of solution introduced in the system.

The circuits are again blown out after the cleaning solution has been drained. When methylene chloride is used, the circuits are heated to 150°F. and held at this temperature for approximately four hours.

(2) Immersion for small items that are easily accessible.

This method is commonly used as a quick job site emergency method, such as when small parts of a valve are replaced while the system is temporarily shut down. This cleaning usually only requires a clean bucket and a source of nitrogen or dry oil-free air for blowing parts dry.

Methylene chloride or trichlorethylene are the types of cleaning solutions APCI most commonly used for quick cleaning of small parts.

The immersion method is also used extensively for cleaning pipe fittings during initial construction phase. This type of cleaning uses one of the many types of detergent solutions. The type of detergent solution is dependent on the metal to be cleaned.

(3) Spraying or swabbing of large vessels that can be entered.

Surfaces may be sprayed with cleaning solution applied by pressure spray nozzles. This method is used for cleaning tanks when convenient access is available.

Spraying and swabbing is used at times to clean pipes, fittings, and certain parts.

The spraying and swabbing cleaning method can use a chlorinated solvent or a detergent solution depending on the type of metal as well as the size of the aera to be cleaned.

(4) Vacuuming used to clean out loose particles prior to a more thorough cleaning.

(5) Blow-out - most commonly used method when dry oil-free air or nitrogen is available. Vacuuming and Blow-out method discussion.

Vacuum cleaning loose particles, introduced during fabrication, is used when ready access to the surface is possible.

Inaccessible surfaces on systems and/or circuits may be blown free of solid particles. Sufficient velocity and volume shall be provided to accomplish thorough removal of loose particles from both the system and its outlets. Blow-out using nitrogen or dry oil-free air is done prior to most cleaning procedures. It is also used after cleaning with solutions to remove all traces of solvents or detergents that could not be drained. In most blow-outs, the nitrogen or air is heat- to about 10-50°F above the boiling point of the cleaning solution, to assist in complete derime of system.

(6) Vapor cleaning - this is a commercial method requiring special equipment.

Small items may be cleaned in commercial vapor cleaning equipment. Assemblies which contain removable parts shall be disassembled for vapor cleaning.

This type of cleaning is used commonly by suppliers of parts for oxygen compressors, pumps, valves, etc. This cleaning procedure will supply APCI AAA standard cleanliness. (1,2)

c. Degree of cleanliness

(1) APCI Class AA cleanliness (3,4) is for fixed surfaces that come in contact with pure oxygen. It will meet the following requirements.

(a) Visual examination of the direct surface under strong white light shall indicate: no mositure, slag, organic material, or other foreign material, and essentially no corrosion products.

(b) Particulate matter will not exceed 1000 microns and will amount to less than 10 particles between 500 and 1000 microns.

(c) Black light examination shall indicate no hydrocarbon fluorescence. Isolated particles of lint may be acceptable.

(d) A wipe test, shall show no appreciable discoloration and no evidence of oily residue.

(2) Class AAA cleanliness (1,2) is for movable parts such as valves, pumps, etc. that come in direct contact with pure oxygen. Requirements are the same as for Class AA with the following additions:

(a) Particulate contamination will be limited to 500 microns with not more than 25 particles between 175 and 500 microns.

(b) Isolated particles of lint detected by black light must be removed with nitrogen or dry oil-free air.

3. <u>Types of Cleaning Solution</u>

a. <u>Detergents</u>:

(1) <u>Soil and Oil Removal</u>:

(a) <u>Ferrous metals</u> (including stainless steel, invar, and nine-nickel)

#77 Oakite
J.S.T.C. Johar
#4 Johar (low foaming)

(b) Aluminum and Aluminum Alloys

#77 Oakite
J.S.T.C. Johar
#4 Johar

(2) Rust and Scale Removal

(a) Ferrous Metals

#32 Oakite (Hydrochloric base)
Oakite Rust Stripper (Removes paint and varnish)
#13 Johar

(b) All Metals

#31 Oakite (removes oxides and fluxes)
#23 Johar

(3) Deoxidizer and Brightener

(a) Aluminum and Copper

#34M Oakite (Chromic base)
#22 Johar

(4) Rust Retardant

(a) All Metals

Rinsite (also prevents water spotting)

(5) Corrosion Stain Removal

(a) Aluminum and Aluminum Alloys

#160 Oakite (etching material) rinses freely
#21 Johar

Detergent solutions shall not be employed to clean a surface which, through use, will contact oxygen rich atmospheres, unless the cleaned surface can definitely be determined as free of all cleaning solution after rinse.

b. Chlorinated Solvents

(1) Removal of oil, grease, fats, waxes, tar, rubber, sulfur, and resins.

(a) <u>All Metals</u>

Trichlorethylene (conforming to Federal specifications O-1-634A, Type II, and Military Specification MIL-T-7003)

Methylene Chloride (technical grade)

It removes grease, oil solvent residue, lubricating compounds. In addition, its solvent activity permits quick stripping of paint and lacquer films, including latex and the new tough epoxy resin materials.

Equipment cleaned with chlorinated solvents shall be purged with clean, dry air or nitrogen. The purge shall continue until the exhaust can be determined free of solvent vapors when tested with Halogen gas detection equipment.

When ordering, specify inhibited grades of solvent to prevent acidic action on metals where water or water vapors are present. Also, specify that the solvent is for metal cleaning of equipment in oxygen service and that the maximum residue permitted on evaporation is only 0.001% by weight. When drums of solvent are ordered, it is good to specify that all be from the same lot number. This will permit easier and more accurate sampling.

II <u>APCI Experiences and Analysis of Cleaning</u>

A. LOX Tanks

1. <u>Case 1 - Date 1959</u>

Tanks inspected and cleaned after 1-1/2 years of operation. Two tanks were cleaned at this facility. Tank No. 1 had three pounds of dust containing 2.8% by weight of hydrocarbons which ignited in oxygen at 598°F. Tank No. 2 contained 1-1/2 pounds of dust. Small globules of contaminants outlined a liquid level. These tanks have inlet and outlet nozzles on the same end. Tank capacity is 27,000 gallons.

2. Case 2 - Date 1960

Tanks inspected and cleaned after three years of service. Five gallons of dust were removed, but no definite traces of hydrocarbons were found. No lab analysis is available. Tank capacity is 27,000 gallons with inlet and outlet nozzles on the same end.

3. Case 3 - Date 1960

Tanks inspected and cleaned after two years of service. Three pints of dust were removed. Dust residue was found on all surfaces. Fluorescence under black light in form of rings at liquid levels. (Cases 1, 2, 3 from memo dated 1/24/63 from H. H. Master to J. M. Norwood(5)).

4. Case 4 - Date 1963

Tanks inspected and cleaned after 3-1/2 years of service. The tank was washed down with solvent. Analysis of the solvent used indicated a total of 2.125 grams of hydrocarbons which, averaged out on the complete tank surface, would have been about .7 milligrams of hydrocarbons per square foot. This tank is not of the flow-through type and it is cylindrical. Tank capacity is 28,000 gallons. (Memo dated June 26, 1970 from H. H. Master to W. L. Ball (6)).

5. Case 5 - Date 1964

Tanks cleaned after three years of service. The surface of the tank was clean with no visible traces of oil or other hydrocarbons. However, six pounds of extremely fine silica gel were removed from the tank. The analysis of the silica gel indicated 0.6% by weight to be hydrocarbons. This calculates to 0.04 pounds of hydrocarbons in the tank. This tank was fed by anyone of six plants at one time or other. The tank capacity is 27,000 gallons and is of the cylindrical type. This tank prior to inspection and cleaning was what is called a dead-ended tank, that is, with the inlet and outlet nozzles being on the same end of the tank. Piping was changed to make it a flow-through tank. (Memo dated 3/11/64 from A. L. Hatley to R. S. Ray (7)).

The tanks listed are all filled from air separation units. All cases other than case 4, are filled from high pressure cycle plants using expansion engine in series with turbo expanders. Case 4 is fed from a split cycle plant. The time tanks were put in service is known, but the throughput of the tank is not known and cannot be estimated because all these locations have more than one tank. A tank in service for one year could have had more throughput than one is service two years.

There are no firm cleaning schedules for liquid tanks. The air separation units are defrosted and blown out on a three year schedule. Should the defrost indicate an unusually high contamination, tank cleaning would be mandatory.

B. Liquid Oxygen Pumps

1. <u>Case 1</u>

   Inspected and cleaned after 15,000 hours of operation. Contaminants: 1.29 gr. Pump showed some dust and no visible oil.

2. <u>Case 2</u>

   Inspected and cleaned after 2,250 hours of operation. Contaminants: 1.90 gr. Pump showed some dust and no visible oil.

3. Case 3

Inspected and cleaned after an estimated 2,000 hours. Contaminants: 11.1 gr. Pump was black lighted with negative results. No traces of dust reported.

4. Case 4

Inspected and cleaned after 3,100 hours of operation. Contaminants: 3.17 gr. Pump showed some dust and no visible oil.

5. Case 5

Inspected and cleaned after 2,191 hours of operation. Contaminants: 0.34 gr. Pump showed some dust and no visible oil.

In all cases the contaminants were usually assumed to be the same as the lubricant used in the air compressor.

The above mentioned pumps take suction from air separation units. The suction to the pumps has a 100 mesh screen. Cleaning frequencies depend on the type of cycle of the air separation unit as well as past history. Frequencies range from 24 months to 36 months. In newer plants with cleaner cycles (using centrifugal compressors), cleaning is done only if contamination is suspected.

C. Miscellaneous Equipment

Liquid oxygen dump tanks, disposal vaporizers, product vaporizers, and vent stacks are cleaned on a five year maximum interval cycle.

1. Case 1 - 1964

A LOX vaporizer was cleaned after 15 months of service during which a total of 542,486 SCF oxygen was vaporized. The flushing with recirculation method was used. The cleaning solution was methylene chloride. The hydrocarbon contamination analysis showed 0.1056 grams. The contamination accumulating in the vaporizer is negligible as was expected. (Memo from F. K. Kitson to J. J. Mittleman July 1964 (8)).

(1) APCI Class AAA Cleanliness Requirements
APCI Quality Control Layout No. QCL 107F, July 1, 1971 (Doc. #99000082)

(2) APCI Requirements for Vendor Class AAA Cleaning
APCI Quality Control Layout No. QCL 117F, July 1, 1971 (Doc. #99000086)

(3) APCI Class AA Cleanliness Requirements
APCI Quality Control Layout No. QCL 106F, July 1, 1971 (Doc. #99000081)

(4) APCI Requirements for Vendor Class AA Cleaning
APCI Quality Control Layout No. QCL 116F, July 1, 1971 (Doc. #99000085)

(5) Master, H. H., Storage Tank Cleaning
APCI Memo, January 24, 1963 (Doc. #99000089)

(6) Master, H. H., LOX Tanks
APCI Memo, June 26, 1970 (Doc. #99000091)

(7) Hatley, A. L., Cleaning LOX Storage Tank No. 6 - Santa Susana
APCI Memo, March 11, 1964 (Doc. #99000090)

(8) Kitson, F. K., Washout Analysis of Sun Oil Company's LOX Tank Vaporizer
APCI Memo, July 9, 1964 (Doc. #99000092)

(9) APCI Cleaning Requirements for Air Plant Equipment
APCI Quality Control Layout No. QCL 101F, July 1, 1971 (Doc. #99000077)

(10) APCI Cleaning Requirements for Bourdon Tube Type Gages Used for Oxygen Service
APCI Quality Control Layout No. QCL 102F, July 1, 1971 (Doc. #99000078)

(11) APCI Approved Cleaning Agents and Associated Equipment and Supplies
APCI Quality Control Layout No. QCL 103F, December 14, 1965 (Doc. #99000285)

(12) APCI Class A Cleanliness Requirements
APCI Quality Control Layout No. QCL 105F, July 1, 1971 (Doc. #99000080)

(13) APCI Requirements for Vendor Class A Cleaning
APCI Quality Control Layout No. QCL 115F, July 1, 1971 (Doc. #99000084)

(14) Pennsalt Chemicals Corporation, Cleaning of Liquefied Gas Processing Equipment
Pennsalt Technical Bulletin, February 3, 1960 (Doc. #99000093)

(15) Kitson, F. K., Cleaning For Oxygen Service
APCI Memo, August 5, 1963 (Doc. #99000094)

(16) APCI Cleaning and Inspection, Materials for Oxygen Service
APCI Safety Standards 608.1, October 1965 (Doc. #99000050)

(17) APCI Cleaning and Inspection for Equipment in Air Plants and in Oxygen Service
APCI Plant Operations Manual, Section 1.08, April 4, 1967 (Doc. #99000095)

(18) APCI Piping, Valve Procurement and Cleaning Procedure
APCI Design Engineering Standard 579.5, August 12, 1960 (Doc. #99000036)

(19) Bassler, E. J., Cleaning for Oxygen Service
APCI, January 1960 (Doc. #99000096)

(20) Master, H. H., Air Separation Plant Contamination, History, Sampling and Analysis
APCI Plant Managers' Safety Meeting, Creighton, Pa., February 28 and March 20, 1968 (Doc. #99000097)

(21) APCI Exchanger, Plant, and Plant Equipment Solvent Washout Frequencies
APCI Plant Operations Manual Section 5.07, July 15, 1970 (Doc. #99000098)

(22) APCI Plant Solvent Washout, General
APCI Plant Operations Manual Section 1.05, February 20, 1967 (Doc. #99000099)

(23) APCI Byron-Jackson Oxygen Pump Washout Procedure for Analytical Purposes
APCI Plant Operations Manual Section 1.07, July 7, 1970 (Doc. #99000286)

(24) APCI Cleaning
APCI Construction Specification 230.15, page 8, September 16, 1969 (Doc. #99000101)

(25) APCI Cleaning of Carbon Steel Pipe and Fittings; Cleaning Aluminum Pipe, Fittings, Parts and Fabrications; Cleaning Stainless Steel and Copper Pipe, Fittings, Parts and Fabrications; Description of Cleaning Mediums; Inspection of Decontaminated Components; and Pickling of Carbon Steel Pipe and Fittings
APCI Construction Specifications 200.16.1.7 to 200.17.4, Pages 14-20, February 3, 1967 (Doc. #99000102)

(26) Coulson, K. J., and I. Everson, Fire Hazards When Vapor Cleaning With Trichlorethylene (T.C.E.)
APL - Safety Department Information Sheet No. 38, February 10, 1971 (Doc. #99000105)

(27) Schmoyer, W. W., Carbon Tetrachloride
APCI Safety-Gram No. 68, February 21, 1969 (Doc. #99000106)

(28) Kehat, E., Detonation Tests of Oil From Aliquippa Pump Suction Filter Defrost and of Methylene Chloride
APCI Memo, December 11, 1961 (Doc. #99000107)

(29) Smith, H., APCI Solvent and Cleaners--Deviations--Cleaning for Oxygen Service
APCI Safety Standard 629.0.10, June 19, 1961 (Doc. #99000054)

(30) Himmelberger, F., Notes on Liquid Oxygen Contaminants
Missile Program, APCI, January 6, 1958 (Doc. #99000108)

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

B. Compatibility Check

1. Fire Compatibility

The cleaning procedures followed by APL are essentially the same as the ones followed by APCI. These procedures and related ones are covered in the following documents:

(1) APL, Construction Specifications for Piping Erection Testing and Cleaning, APL Engineering Specification M.02, Rev. 2, April 19, 1971 (Doc. #99000397).

(2) APL, Solvent Washing of Piping Systems, APL I.G.D. Engineering Manual EM 56-06, Rev. 0, July 3, 1971, (Doc. #99000398).

(3) APL, General Procedure foe Decontamination of Static Tank and Road Vehicle Assemblies for O_2 Service, APL Quality Control Procedure No. Q.10. Rev. 0, (Doc. #99000399).

(4) APL, Manufacturing Quality Procedure for Degreasing of Pipework, APL Quality Control Procedure No. Q.11. Rev. 0, (Doc. #99000400).

(5) APL, Manufacturing Quality Procedure for Internal Cleaning of Aluminum Tankers and Static Tanks for Oxygen Service, APL Quality Control Procedure No. Q.12. Rev. 0, (Doc. #99000401).

(6) APL, Manufacturing Quality Procedure for Internal Cleaning of 9% Nickel and Hi-Proof Stainless Static Tanks for Oxygen Service, APL Quality Control Procedure No. Q.13, Rev. 0, (Doc. #99000402).

(7) APL, Aloclene 100 and Applied Chemicals 5.57, APL, February 5, 1972, (Doc. #99000403).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

B. Compatibility Checks

1. Fire Compatibility

d. Quality Control

(1) Fire Hazards

(a) procedures

(b) specification

Machining and fabrication controls to reduce ignition and fire hazards involve primarily the cleaning of accessible and inaccessible surfaces prior to or after assembly.

Machined parts constituting rotating or moving pieces are cleaned (after machining) of sulfurized machining lubricants in accord with APCI Class AAA Cleanliness Requirements, Quality Control Layout, QCL107F, Jul 1971 (Doc. #99000082).

This is usually accomplished by immersing in agitated solvent solutions, such as methylene chloride solution. (Refer Pecklam, H. M., and Hauser, R. L., The Martin Company, "Compatibility of Materials with Liquid Oxygen", proceedings of the 1958 Cryogenic Engineering Conference, Advances in Cryogenic Engineering, Vol. 4, Paper A-3, p. 26-46, Plenum Press, Inc. (N.Y.), January 1959 (Doc. #99000189).

Fixed machinery parts are clenaed in a similar manner under slightly less stringent inspection conditions to APCI Class AA Cleanliness Requirements, Quality Control Layout, QCL106F, July 1971 (Doc. #99000081).

Fabrication poses problems on inherent cleanliness in areas such as a) backup strips, b) angle stiffeners, c) cleaning of vessels prior to final closure of the inner vessels, d) brazed aluminum assemblies, e) brazed copper assemblies.

Prior to insertion of weld ring type backup strips in an aluminum or stainless steel piping assembly, the surfaces of both the backing ring and the adjacent pipe are power sanded to a clean bright finish.

Angle stiffeners whose flat edges bear against the plate are fully fillet welded on both sides so that the fayint surfaces are completely encased and never see the product fluid or gas.

Prior to final closure of vessels without manway openings the internals of the vessels are washed with an acceptable solvent and examined to either:

a) APCI Class B Cleanliness Requirements, Quality Control Layout, QCL104F, July 1971 (Doc. #99000079),

or b) APCI Class A Cleanliness Requirements, Quality Control Layout, QCL105F, July 1971 (Doc. #99000080),

dependent on the final product, and as indicated in:

APCI Cleaning Requirements for Air Plant Equipment, Quality Control Layout, QCL101F, July 1971 (Doc. #99000077).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

B. Compatibility Checks

1. Fire Compatibility

d. Quality Control - APCI

(2) Programs

(a) policies

(b) practices

APCI Quality Manual determines cleanliness requirements for all phases of manufacture and for all purchased material and equipment. These requirements are self-explanatory and are covered by the following documents:

(1) APCI Cleaning Requirements for Air Plant Equipment, Quality Control Layout, QCL101F, July 1971 (Doc. #99000077).

(2) APCI Cleaning Requirements for Bourdon Tube Type Gages Used for Oxygen Service, Quality Control Layout, QCL102F, July 1971 (Doc. #99000078).

(3) APCI Class B cleanliness Requirements, Quality Control Layout, QCL104F, July 1971 (Doc. #99000079).

(4) APCI Class A Cleanliness Requirements, Quality Control Layout, QCL105F, July 1971 (Doc. #99000080).

(5) APCI Class AA Cleanliness Requirements, Quality Control Layout, QCL106F, July 1971 (Doc. #99000081).

(6) APCI Class AAA Cleanliness Requirements, Quality Control Layout, QCL107F, July 1971 (Doc. #99000082).

(7) APCI Requirements for Vendor Class B Cleaning, Quality Control Layout, QCL114F, July 1971 (Doc. #99000083).

(8) APCI Requirements for Vendor Class A Cleaning, Quality Control Layout, QCL115F, July 1971 (Doc. #99000084).

(9) APCI Requirements for Vendor Class AA Cleaning, Quality Control Layout, QCL116F, July 1971 (Doc. #99000085).

(10) APCI Requirements for Vendor Class AAA Cleaning, Quality Control Layout, QCL117F, July 1971 (Doc. #99000086).

(11) APCI Brazed Aluminum Heat Exchanger Cleaning Requirements, Quality Control Layout, QCL119F, July 1971 (Doc. #99000087).

It should be noted that the brazed aluminum heat exchanger cleaning is performed to remove flux, in particular, and contaminants, in general, in order to protect against corrosion, as well as against ignition and fire hazard.

The following references are of interest in relation to cleaning requirements for oxygen service:

(1) APCI Requirements for Vendor Class B Cleaning, Quality Control Layout, QCL114F, July 1971 (Doc. #99000083).

(2) APCI Requirements for Vendor Class A Cleaning, Quality Control Layout, QCL115F, July 1971 (Doc. #99000084).

(3) APCI Requirements for Vendor Class AA Cleaning, Quality Control Layout, QCL116F, July 1971 (Doc. #99000085).

(4) APCI Requirements for Vendor Class AAA Cleaning, Quality Control Layout, QCL117F, July 1971 (Doc. #99000086).

(5) APCI Requirements for IPD Specified Paint Systems, Quality Control Layout, QCL120F, July 1971 (Doc. #99000088).

(6) Compressed Gas Association, "Equipment Cleaned for Oxygen Service," CGA Pamphlet G-4.1, March 1959 (Doc. #99000198).

(7) Kehat, E., "Hazard Level of Hydrocarbon Films in Systems Containing Liquid and Gaseous Oxygen," Advances in Cryogenic Engineering, Vol. 1, pp. 163-169, 1962 (Doc. #99000199).

(8) Ball, W. L., "Hazard Level of Hydrocarbon Films in Oxygen Systems," AIChE-CEP Tech. Manual, Safety in Air and Ammonia Plants, Vol. 4, pp. 16-20, 1962 (Doc. #99000200).

(9) Walde, R. A., "Relationship of the Chemical Structure of Cutting Oils to Their Oxygen-Compatibility," AIChE-CEP Tech. Manual, Safety in Air and Ammonia Plants, Vol. 7, pp. 21-23, 1965 (Doc. #99000201).

(10) Lapin, A., Discussion with Mr. E. Lucas-IPD Inspection, Regarding APCI Cleanliness Requirements, APCI Memo, July 22, 1971 (Doc. #99000221).

(11) Lapin, A., Telephone Conversation with Mr. William McCormick regarding Requirements for Vendor Class AA and Class AAA Cleaning, APCI Memo, July 22, 1971 (Doc. #99000222).

(12) Kehat, E., "Hazard Level of Hydrocarbon Films in Systems Containing Liquid and Gaseous Oxygen," Cryogenic Engineering Conference, Ann Arbor, Michigan, USAF Contract AF33(616)6730, August 15-17, 1961 (Doc. #99000303).

(13) Frederick, L. G., D. R. Latshaw, APCI Analytical Report on Fluorescence of Various Types of Oils -- Mobil DTE-105, Texaco Cappella - A, Cellulube 550, Fluorolube, Sears Thread Cutting Oil, July 15, 1971 (Doc. #99000311).

(14) ASTM Standard Pictorial Surface Preparation, ASTM Standards for Painting Steel, ASTM-D2200-67, 1967 (Doc. #99000339).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Materials Compatibility

B. Compatibility Check

1. Fire Compatibility

d. Quality Control - APL

(2) Programs

(a) Policies

(b) Practices

The following references represent APL practices relative to cleanliness and quality control requirements for equipment used in oxygen service:

(1) APL, Acceptance Test for Class B Cleanliness, APL Engineering Specification A.01, Rev. 0, May 12, 1969, (Doc. #99000360).

(2) APL, Acceptance Test for Class A Cleanliness (High Purity Clean), APL Engineering Specification A.02, Rev. 0, May 12, 1969, (Doc. #99000361).

(3) APL, Acceptance Test for Class AA Cleanliness (Oxygen Clean), APL Engineering Specification A.03, Rev. 0, April 1, 1971, (Doc. #99000362).

(4) APL, Degreasing Acceptance Tests for Oxygen Service Compressors, APL Engineering Specification K.02, Rev. 0, June 23, 1969, (Doc. #99000363).

(5) APL, Valves - Oxygen Service: Minimum Decontamination and Test Requirements, APL Engineering Specification L.06, Rev. 0, July 7, 1969, (Doc. #99000364).

(6) APL, Construction Specification for Piping Erection, Testing and Cleaning, APL Engineering Specification M.02, Rev. 2, April 19, 1971, (Doc. #99000365).

(7) APL, Specification for Oxygen Service Vessel Fabrication (Designed by APL Fabrication by Vendor), APL Engineering Specification C.03, Rev. 2, July 26, 1971, (Doc. #99000366).

(8) APL, Specification for Oxygen Service Pressure Vessel Fabrication (Designed and fabricated by the Vendor), APL Engineering Specification C.04, Rev. 2, July 26, 1971, (Doc. #99000367).

(9) APL, Brazed Core Extended Surface Heat Exchangers, APL Engineering Specification E.02, Rev. 4, June 28, 1970, (Doc. #99000368).

(10) APL, Shell & Tube Type Cooler, Other Than for O_2 Service (APL Plants), APL Engineering Specification E.04, Rev. 1, June 1, 1971, (Doc. #99000369).

(11) APL, Shell & Tube Type Coolers for O_2 Service, APL Engineering Specification E.05, Rev. 1, June 1, 1971, (Doc. #99000370).

(12) APL, Centrifugal Cryogenic Pumps, APL Engineering Specification, G.03, Rev. 0, April 1, 1971, (Doc. #99000371).

(13) APL, Pressure Gauge - Oxygen Service, APL Engineering Specification J.07, Rev. 0, June 18, 1969, (Doc. #99000372).

(14) APL, Pressure Regulating Valves for Oxygen Service, APL Engineering Specification J.15, Rev. 0, June 18, 1969, (Doc. #99000373).

(15) APL, Relief Valves, Warm Gas Service, -20°F +100°F, APL Engineering Specification J.18, Rev. 0, June 18, 1969, (Doc. #99000374).

(16) APL, Transfer Hose for Cryogenic Liquids, APL Engineering Specification L.11, Rev. 0, July 7, 1969, (Doc. #99000375).

(17) APL, Flexible Hoses for Charging and Discharging Manifolds Oxygen Service, APL Engineering Specification L.12.1, Rev. 0, July 7, 1969, (Doc. #99000376).

(18) APL, Unsintered P.T.F.E. Tape, APL Engineering Specification L.14, Rev. 0, July 8, 1969, (Doc. #99000377).

(19) APL, Cryogenic Liquid Hose Couplings for Use in the U.K., APL Engineering Standard LS.08, Rev. 0, October 21, 1969, (Doc. #99000378).

(20) APL, Expanded Perlite, APL Engineering Specification N.01, Rev. 0, January 1, 1970, (Doc. #99000379).

(21) APL, Mineral Wool, APL Engineering Specification N.02, Rev. 0, January 2, 1970, (Doc. #99000380).

(22) APL, Insulation - Preformed Cellular Glass Section for Pipelines, APL Engineering Specification N.05, Rev. 0, October 1, 1970, (Doc. #99000381).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

B. Compatibility Checks

2. Structural Materials Compatibility

APCI experience with oxygen service has been with both metallic materials, and non metallics for gaskets and packing.

a. (1) Chemical reactions and alloy modifications due to oxygen diffusion are not known to affect material strength, and therefore are not a factor considered in the selection of metallic materials for oxygen service.

(2) Material composition is not a factor, but both mechanical and thermal properties are. The change in mechanical and thermal properties with temperature are considered.

(3) Metallurgical changes such as embrittlement at lower temperatures is a factor with all construction materials. However, this is due to the low temperatures produced by cryogens, with no special consideration for oxygen.

(4) Coatings and claddings are not factors considered for oxygen service because there is no need for them.

(5) Exposure to secondary reagents is not a factor for oxygen service because of a low probability of being exposed to them.

b. Structures and support systems are designed to safely accomodate the dimensional changes produced by temperature differences between ambient to low temperature operation. This is generally accomplished by providing flexibility between structures to minimize interaction forces.

c. Notch-sensitivity is a factor in material selection, and is indicated by tests on a notched tensile specimen or by means of a notched-impact specimen. The latter is in general use and is required by the ASME Pressure Vessel Codes (1,2). The notch in the impact specimen represents the stress raiser which may be present in the as-built structure, or developed during subsequent operation. Operating experience indicates that code rules governing design, material examination, and weld acceptance standards have been sufficient to minimize failures due notch sensitivity.

d. Fabrication and welding is carried out in accordance with the ASME Pressure Vessel code (1,2) rules with satisfactory results. Inspection meets the National Board requirements (3).

e. Materials and parts suitability controls are carried out in accordance with the ASME Pressure Vessel Code rules with satisfactory results.

f. Composite materials have not been used for pressure carrying parts for oxygen service.

g. As indicated earlier, APCI has had experience with non-metallic valve inserts and butterfly and ball valve seats and seals. Kel-F Teflon, and glass-filled Teflon have been satisfactory, particularly for tight shut-off conditions. APCI's Design Engineering Standard 578.60.1 (4) on oxygen piping should give APCI's current practices. This should be an excellent document for describing somewhat completely materials and conceptual requirements. Also the CGA's Oxygen Pipeline Subcommittee rough draft of March 30, 1971, "Assembly of Industrial Practices Used For Gaseous Oxygen Transmission and Distribution" (5), should be a fine reference document.

h. References

(1) American Society of Mechanical Engineers, Pressure Vessel Division, ASME Boiler and Pressure Vessel Code Section VIII, 1971 (Doc. #99000210).

(2) American Society of Mechanical Engineers, Welding Qualifications, ASME Boiler and Pressure Vessel Code 1971 (Doc. #99000211).

(3) National Board Inspection Code, A manual for boiler and pressure vessel inspectors, The National Board of Boiler and Pressure Vessel Inspectors, Columbus, Ohio, 1968 (Doc. #99000212).

(4) APCI, Oxygen Piping, APCI Design Engineering Standard 578.60.1, April 24, 1972 (Doc. #99000028).

(5) Compressed Gas Association, Assembly of Industrial Practices Used for Gaseous Oxygen Transmission and Distirbution, CGA Docket 70-11, March 22, 1972 (Doc. #99000345).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

B. Compatibility Check

2. Structural Materials Compatibility

a. Relationship of Material Strength to Maximum Stress Over the Working Temperature Range as Affected by:

(1) Chemical reactions and alloy modifications due to oxygen diffusion,

and (2) Materials composition and property changes

No consideration is given to the effect of chemical reactions and possible alloy modifications due to oxygen diffusion. Testing of copper tubing and lead-tin solders after ten years of intermittent cryogenic service have given no indication of deterioration of material properties. Stainless steels and aluminum alloy which form inner cryogenic vessels of insulated systems have shown no appreciable deterioration of vacuum after eight-ten years of service and it is felt that appreciable diffusion would be evident in this period of time. It is not considered, on this basis, that significant changes in properties take place in the above alloys. Thermal cycling of highly strain hardened stainless steel under experimental conditions has been found to produce transformation of up to 15% of the normally austentic structure to martensite.

However, no service failures have occurred which can be attributed to these factors.

(3) Metallurgical changes such as embrittlement

No known failures have occurred by any suspected embrittlement phenonenon thought to be associated with oxygen diffusion.

(4) Effects of coatings and claddings

While some fear existed in the early 9% nickel steel vessels that dissimilar weld metal and reinforcement pad material would provide dangerously different expansion coefficients, results of several years' service tend to indicate otherwise. The inconel type filler metals in use as weld metal for the 9% nickel steels have taken part in no field type failures. Similarly, clad material would appear to offer no great disadvantage, providng the properties of both the cladding and the material being clad were compatible with the temperature of operation.

Experimental and service history has been obtained with the Aluminum-Stainless Steel roll bonded transition piece, and the Aluminum-Copper-Stainless Steel brazed transition piece, and the Aluminum-Copper-Stainless Steel brazed transition pieces. Under modest loads, no degradation of bond takes place, even after several hundred cycles from ambient to cryogenic conditions. Similarly, the silver welded alum-stainless steel transition has shown exceptionally good resistance to stresses imposed by cycling.

(5) Compatibility losses through exposure to secondary reagents which are natural to systems or introduced by accidents.

Failures of materials in rich or lean gaseous oxygen service is typified by "wet atmospheres" with traces of chlorides. Upon condensation in the system, an accumulation of chlorides can occur which may seriously affect stainless steels, and the brasses commonly used for condenser tubing, and could cause failure usually by a stress corrosion mechanism. The same conditions on aluminum alloys results in a rather general corrosion pattern.

Improper materials selection or improper protection of materials on the water side of heat exchangers produces galvanic couples which results in premature failures of shells, baffles, etc.

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

B. Compatibility Checks

2. Structural Materials Compatibility

c. Notch sensitivity of materials over temperature range of use as affected by:

(1) Thermal Fatigue

No specific information.

(2) Allowable defect size (fabrication or material fault)

and (3) Allowable crack growth and rate of crack growth

Allowable defect sizes, where measured, have been in accord with ASME Code, Sec. VIII, Para. UW-51, (Doc. #99000210) and its associated porosity standard. No failures have occurred which are attributable to residual defects of this size. Investigations regarding allowable crack growth and rate of crack growth have been non-existent except for some preliminary studies referred to below which show growth of cracks in an aluminum alloy at ambient temperatures under cyclic loads:

Erdogan, F. and R. Roberts, "A Comparative Study of Crack Propagation in Plates Under Extension and Bending" Proceedings of the First International Conference on Fracture, Vol. 1, p. 341-362, 1965 (Doc. #99000213).

Roberts, R. and F. Erdogan, "The Effect of Mean Stress on Fatigue Crack Propagation in Plates Under Extension and Bending," Presented at the ASME Winter Annual Meeting, Pittsburgh, Pa., November 12-17, 1966 No. 67-WA/Met-2 (Doc. #99000214).

Loushin, L. L., W. J. Lambertin, and A. J. Polmer, "An Application of Fracture Mechanics to Safe Life Design in Cryogenic Pressure Vessels", Esso Research and Engineering Company, Report No. EE.26ER.70, August 24, 1970, (Doc. #99000215).

Tafuri, J. C. and R. Roberts, "Fatigue - Crack Growth Rates and Fracture Toughness Study of Welded Aluminum Alloy 5083", Presented at the ASME Winter Annual Meeting, November 29 - December 3, 1970, Paper No. 70-WA/PVP-5 (Doc. #99000216).

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October 28, 1971
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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

B. Compatibility Checks

2. Structural Materials Compatibility

d. Fabrication and Welding (Include guide to material and weld defect repairs).

Material and welding defect repairs are required when defects are more serious than those allowable in ASME Code, Section VIII, Para. UW-51 or UW-52 (Doc. #99000210), (whichever is applicable).

In all cases, the defect is removed by grinding (using aluminum oxide or silicon carbide wheels, high speed burrs, or a file) and the area in question is examined by either a dye penetrant or radiographic technique to insure removal of the defect prior to rewelding. Even with visual and dye penetrant techniques, however, defeat recognition and removal sometimes escapes the operator and repetitive repair welding of the same area is required. In these instances the aluminum alloys tend to over-age, or segregate, and hot cracking of the adjacent parent material can take place. A cure for this condition is sometimes a local annealing or solution treating operation. By the same token, 9% nickel steel impact properties can be seriously affected by repetitive welding operations in a localized area. Stainless Steels are remarkably free of any of the above troubles.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

I. Material Compatibility

B. Compatibility Checks

2. Structural Materials Compatibility

e. Materials and parts suitability controls

(2) Vendor procedures on purchased equipment

Vendor procedures for fabrication are similar to APCI in that the code and cleaning requirements, where imposed, regulate fabrication.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

A. Overpressure

1. Safety relief valves are installed in accordance to APCI Piping Group Memo #19 (1).

2. Thermal relief valves are always installed in any section of cold piping which lies between two valves.

3. Low point drains are generally provided to minimize trapped liquids.

4. Refer to Review Forms IIA4-1 and IIA4-2.

5. Structural loads on venting systems are determined as per APCI Piping Group Memo #19 (1).

6. Piping is designed to ANSI B31.3 "Petroleum Refinery Piping" (2) or ANSI B31.5 "Refrigeration Piping" (3) to guard against failure from overpressure. For a treatise on failures due to defects see: THIELSCH, HELMUT "Defects and Failures in Pressure Vessels and Piping" (4) Reinhold.

7. Velocities in gaseous oxygen systems are limited to a maximum of 200 feet per second. Surges on pressure waves should be avoided and the piping system designed for what is considered an economical pressure drop.

   Flow of liquid should be controlled so there is not a great rate of change in velocities in the system to minimize pressure surges (commonly known as water hammer). Refer to bibliography on Water Hammer (5), for additional information.

B. Cited References

1. APCI, Safety Relief Valves, Location and Piping Design Considerations, APCI Piping Group Memo #19, November 3, 1966 (Doc. #99000346).

2. ANSI B31.3, Petroleum Refinery Piping, American National Standard Institute (Ex American Standard Association), 1966 (Doc. #99000347).

3. ANSI B31.5, Refrigeration Piping, American National Standard Institute (Ex USA Standard), 1966 (Doc. #99000348).

4. Thielsch, Helmut, Defects and Failures in Pressure Vessels and Piping, Reinhold Publishing Corporation, New York, 1965 (Doc. #99000349).

5. APCI, An Analysis of Water Hammer in Cryogenic Transfer Lines, The Mississippi Test Facility of the George C. Marshall Space Flight Center, National Aeronautics and Space Administration; APCI, February 28, 1964 (Doc. #99000358) (Bibliography p. 86 only).

C. Additional References

1. APCI, Pressure Vessels -- Gaseous Oxygen Storage Cylinder, APCI Design Engineering Standard 515.1.3, October 17, 1960 (Doc. #99000016).

2. APCI, Pressure Vessels -- Vessel Design Basis and General Standards, APCI Design Engineering Standard 510.1, August 1962 (Doc. #99000018).

3. APCI, Pressure Vessels -- Materials of Construction, APCI Design Engineering Standard 510.1.4, June 1962 (Doc. #99000019).

4. APCI, Pressure Vessels -- Shell Design, APCI Design Engineering Standard 510.2, February 1965 (Doc. #99000020).

5. APCI, Pressure Vessels -- Head Design, APCI Design Engineering Standard 510.3, August 1962 (Doc. #99000021).

6. APCI, Instrumentation -- Special Requirements for Safety and Relief Valves, APCI Design Engineering Standard 537.9, July 1965 (Doc. #99000024).

7. APCI, Piping -- Extended Bonnet Valve Code, APCI Design Engineering Standard 579.4, April 1963 (Doc. #99000035).

8. APCI, Plant Components, Cold Boxes, APCI Safety Standards 607.1.5, January 1963 (Doc. #99000045).

9. Kitson, F. K., Rupture Discs Manufactured LOX Tankers by Ametek, APCI Memo, June 22, 1971 (Doc. #99000314).

10. Compressed Gas Association, Safety Relief Device Standards PT-3, Compressed Gas Storage Containers, CGA Pamphlet S-1.3, 1966 (Doc. #99000315).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

A. Overpressure

4. Integrity of Insulation

I. Shop Fabricated LOX Storage Tanks

These tanks are of double wall construction with the annular space filled with Perlite insulation and evacuated to 10 microns pressure. The integrity of the insulation is not affected by the internal pressure of the inner tank except in the case of failure or leakage of the inner tank. To prevent overpressuring of the inner tank, pressure relieving devices are installed using the following design criteria.

A. Safety Valves are set at 100% design pressure and sized to relieve the largest of the flows listed below.

1. LOX vaporized due to normal heat leak boil-off.

2. Gas volume equal to maximum filling rate (vent valve assumed closed).

3. Maximum gas flow for pressurization valve failure in wide open position.

B. Rupture disc set at 120% of design pressure and sized to relieve the largest of the flows listed below minus the safety valve capacity.

1. Vessel exposed to fire with Perlite in the annular space but no vacuum. The amount of LOX vaporized is calculated using the equation in paragraph 4.3.5 in CGA Pamphlet S-1.3 Safety Relief Device Standards, Part 3, Compressed Gas Storage Containers (Doc. #99000315).

2. LOX vaporized due to heat leak assuming vacuum is lost in the annular space. Heat leak will increase up to 350 times that of a tank with the design vacuum in the annular space.

The outer tank is protected by a spring loaded lift plate to relieve overpressures above 2-3 psi in the annular space.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

A. Overpressure

4. Integrity of Insulation

II. Field Fabricated, flat bottom LOX Storage Tanks

These tanks are of double wall construction with the annular space filled with Perlite and purged with nitrogen. The integrity of the insulation system on these tanks are affected in the same way as for the shop fabricated tanks (IIA4-1). The pressure relieving devices for the inner tank are sized using the following design criteria.

A. Pressure - Vacuum relief valves are used to protect the inner tank.

1. The pressure setting is 5 psig and the valve is sized to relieve the largest of the operating conditions listed below.

a. LOX vaporized due to normal heat leak boil-off plus LOX flashing in tank under filling conditions.

b. Relief of gas volume equal to maximum filling rate (vent valve assumed closed)

2. The vacuum setting is 1/2 oz. and the valve is sized for a gas volume equal to maximum pump-out rate.

B. Pressure - Vacuum relief valves are used to protect the outer tank.

1. Pressure setting is 2" H_2O and valve is sized to relieve the maximum nitrogen purge flow with purge control valve failing wide open or the expansion of the purge gas due to an exterior fire.

2. Vacuum setting is 1" H_2O and valve is sized to handle the variations the annular space gas volume due to ambient thermal cycling.

November 1, 1971

IIB-1

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

B. Disposal of Vented Gases

1. Company Practices

a. Air Plants

Although NASA is not interested in air separation plants in this particular study, our policy of segregating various defrost, disposal and reactivation lines to vent stacks may be applicable to some of their operations. Basically, this is merely an isolation of pure oxygen or oxygen rich vent manifolds and stack from other vents which have or may possibly contain incompatible materials. Refer to APCI Safety Standard 607.1.12, Pages 7 and 8(1).

b. Safety Valves

Safety valve discharges are piped outdoors where such equipment may be in buildings or confined areas. Safety considerations for the vent area are to include adequate ventilation to prevent oxygen concentrations or hazards to personnel. Personnel hazards would include flammability possibilities, cryogenic burns and harmful effects of high velocity gases directed on individuals.

Safety valve discharges can be manifolded and extended to a safe area providing the piping manifold is sized to prevent excessive back pressure on the valves which would effect the relief setting. Cases have been considered on individual basis whereby individual safety valve discharge vents or manifolded systems are tied into the proper defrost, disposal or reactivation stacks (mentioned above) to extend discharges to a safe or safer distance without duplicating long piping runs. All manifold valves must be piped properly, including unions on the discharge piping, so they can be removed for repair, replacement or checks.

Safety discharges must be protected from weather and other possible adverse effects. If discharges are not manifolded, they must have an elbow facing downward (but not in areas frequented by personnel) in the discharge part or have a pipe nipple with the bottom outboard end cut off at a 45° angle.

Further details are in Safety Standard 607.1.12(1) and Design Engineering Standard 578.60.1(2).

c. Product Loading Areas

Operations Department has installed systems in loading areas where gas vented from highway tankers being filled can be a hazard to operators, equipment and in some cases to third parties where the activities are located reasonably close to public thoroughfares, to handle these vented gases. Climatic conditions (little or no wind velocity, high humidity, etc.) can increase the hazards as vapors tend to remain in the area and close to the ground.

These systems consist of a flexible hose attachment on the tanker vent which connects to a manifold piped to a 500-gallon aluminum tank. A vent stack off the top of the tank extends from 20 feet to 30 feet above grade depending on the location and magnitude of the problem. The primary purpose of the 500-gallon tank (92483D)[3] is to act as a "buffer" in the event a tanker is inadvertently permitted to overflow. Secondary purpose is to use it as a dump tank for off-specification liquid or discarding residual liquid in a tanker that is to be converted to another product.

Some refinements to the system, depending again on the location, overall problem and the fact that the loader may not always be in the immediate area, are:

1. An air blower (generally 1700 CFM) is set on the tank and discharges, at an angle, into the stack so as to act as an eductor. This air serves to dilute the gas concentration and also to heat the vapors to prevent their "dropping" to the ground level. Actuation of the blowers varies according to needs. Where frequent service is required it is kept operating, for all practical purposes, constantly. Others turn it on as necessary. A number of locations have a temperature-actuated switch with a sensing bulb in the stack. The temperature switch is set to the lowest temperature practical below that of expected low for the geographical location.

2. Level switches (usually set at about 5 inches) are piped into the side of the tank, near the bottom, where loaders may leave the immediate area. This switch is set to actuate an alarm to warn the loader that the tanker is overfilled and passing liquid into this tank. The loader would be expected to get back to the loading pad and immediately shut the fill valve. Where the loader may be an appreciable distance away, the switch would also stop the blower to prevent a possible reaction should the liquid reach the blower dischange before the fill valve is shut. Where the tank is used for disposal of liquid, a by-pass switch may be necessary to take this switch out of the blower and alarm circuits during this operation. A red warning shall indicate it is on by-pass and in this case, the loader should not be permitted to leave the area.

3. Most facilities have more than one product loaded at the same site. Separate manifolds are used for each product, but they do tie into a common tank. The separate manifolds are to preclude the possibility of reverse flow of one product into another and is particularly important where oxygen may back into a high-purity nitrogen tanker where 25 ppm or less oxygen is standard. The blower-eduction system supplements this control in that its operation tends to clear out all vapors and, depending on the number of simultaneous loadings, may effect a slight negative pressure within the tank. Another back up system for cross contamination is a swing check valve where each tanker ties into the manifold system with the flexible hose. These check valves are on all systems.

4. Storage tank vents, relief valve discharge piping, and pump cooldown lines have been tied into these dispersal system tanks where necessary and convenient.

All new facilities are required to have some dispersal system for trailer vents in load areas. Where multiple usage is practical, the above system need not be incorporated. The Wharton plant has a large capacity dump tank for discharging off-specification liquid during startup periods. This doubles as a trailer load system vent. At Lone Star a product vaporizer (cooling water as a vaporizing medium) has a separate coil for dumping liquid from the hydrocarbon and guard adsorbers when they are to be reactivated. The tanker vapor lines are teed into the circuit, pass through the vaporizer, and go to an existing stack.

We are presently in a program for automating loading systems whereby the shutoff valves are actuated by a liquid level switch on the trailer. For these systems, the dispersal tank with the blower and the level switch are a compulsory part of the automation. In addition to providing safe venting conditions, the system provides a backup for the automation. If the fill valve fails to close on the tanker contained circuitry, the overflow operates the dispersal tank switch which in turn interrupts the power to the fail-close automatic valves and also sounds an alarm and shuts off the blower. The "Auto-Load" systems are described in some detail in H. H. Master's memoranda dated March 22, 1971(4) and April 5, 1971(5).

In addition to direct safety aspects, the trailer venting system has a direct economic advantage in that it reduces the curb stop and pad deterioration caused by cold gases and liquids. Also, accidental spills have resulted in the necessity for tire replacement numerous times and amounts saved in this respect are not calculable but are known to have been high.

d. Disposal Problems

Problems related to the disposal of cryogenic vapors are covered in APCI Safety - Gram No. 17 (6), H. H. Master's paper subject "Product Vapor Hazards"(7), J. B. Gayle's paper subject "Fire Incident in an Oxygen Cloud"(8), and A. Lapin's paper subject "Oxygen Diffusion in the Atmosphere for Liquid Oxygen Pools" (9, 10).

References

(1) APCI, Air Separation Plant, Piping, Valves and Safety Relief Devices, APCI Safety Standard 607.1.12, October 1962 (Doc. #99000046).

(2) APCI, Oxygen Piping, APCI Design Engineering Standards 578.60.1, April 27, 1971 (Doc. #99000028).

(3) APCI, LOX and LIN Vapor Disposal Tanks (500 Gal.), APCI Drawing 92483D, Rev. B, September 30, 1968, (Doc. #99000247).

(4) Master, H. H., "Lathrop Auto-Load System," APCI Memorandum to W. J. Scharle, March 22, 1971, (Doc. #99000248).

(5) Master, H. H., "Auto Load Systems," APCI Memorandum to W. J. Scharle, April 5, 1971, (Doc. #93000249).

(6) APCI, A Misty Problem, APCI Safety Gram No. 17, August 10, 1962, (Doc. #99000250.)

(7) Master, H. H., "Product Vapor Hazards," APCI (Doc. #99000251).

(8) Gayle, J. B., "Fire Incident in an Oxygen Cloud," Fire Journal, pages 76-78, 81, Jan. 1971 (Doc. #99000252).

(9) Lapin, A. and R. H. Foster, "Oxygen Diffusion in the Atmosphere from Liquid Oxygen Pools," Advances in Cryogenic Engineering, Vol. 13, pp. 555-565, 1968 (Doc. #99000599).

(10) Lapin, A. and R. H. Foster, "Oxygen Diffusion in the Atmosphere from Liquid Oxygen Pools," Compressed Gas Association, Air Separation Plant Safety Symposium, pp. 12-23, Chicago, Illinois, April 23, 1969 (Doc. #99000600).

Air Products and Chemicals INC.

February 12, 1972
IIB1-1

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

B. Disposal of Vented Gases

1. Cleanliness of disposal system (compatibility with oxidizer).

Report IIB1-2 covers our approach to this question including conformance to Safety Standard 608.1[1]. This standard limits particulate size and quantity to an acceptable value to prevent plugging of operating equipment and to eliminate particle friction as a source of ignition. Additionally, these values are acceptable for most commercial applications involving control valves, orifices, etc.

Materials utilized in disposal and vent systems are limited to corrosion resistant types such as copper, brass, austenitic stainless steel and monel. Objective here is to maintain the cleanliness level originally achieved while utilizing materials suitable for cryogenic temperatures. Design Engineering Standard 578.60.1[2] reflects this philosophy.

2. Proximity of other activities to vents which may be endangered by oxidizers, dilution methods for safe concentrations.

Our basic philosophy is to vent far enough away from personnel areas or operating equipment to permit natural dilution to safe limits. Distances are indicated by following standards:

578.60.1[2]	Vents from oxygen compressors
607.1.12 (page 9)[3]	Vaporizer vents

Vaporizers are designed to vent cold gas. Vent piping must be directed away from carbon steel components to prevent cooling below -20°F.

Relative locations of vents, drains and defrost stacks are covered by Safety Standards 605.1.3[4], Air Separation Plant Layout.

3. References.

(1) APCI Cleaning and Inspection, Materials, Oxygen Service, APCI Safety Standards 608.1, October 1965 (Doc. #99000050).

(2) APCI Oxygen Piping, APCI Design Engineering Standards 578.60.1, April 24, 1972 (Doc. #99000028).

(3) Kitson, F., APCI, Plant Components, Air Separation Plant, Piping, Valves and Safety Relief Devices, APCI Safety Standards 607.1.12, October, 1962 (Doc. #99000046).

(4) Ball, W. L., Criteria Air Separation Plant Layout, APCI Safety Standards 603.1.3, January 6, 1961 (Doc. #99000043).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

B. Disposal of Vented Gases

1. Cleanliness

The approach to cleanliness of oxygen piping is covered in detail in APCI Construction Specifications. A typical example would be the APCI Construction Specifications, General Construction and Equipment Erection, Oxygen Compression System, El Segundo, Calif. Section 200.0 to 200.20, Revised November 17, 1969 (Doc. #99000338). Additional requirements are found in APCI, Cleaning and Inspection of Materials in Oxygen Service, APCI Safety Standards 608.1, October 1965 (Doc. #99000050).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

B. Disposal of Vented Gases

4. Procedural arrangements

APCI criteria for the design of oxygen piping are covered by APCI Design Engineering Standards 578.60.1 for oxygen piping dated April 27, 1971 (Doc. #99000028).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

C. Coupling to Other Systems

1. Isolation arrangements for keeping oxidizers out of adjacent systems; considerations of operational errors or leaks through valves.

   Leakage of oxygen to nitrogen is normally prevented by use of double check valves (Circle Seal series 232B with Viton O-ring seals) located between manual double block valves (ball type with Teflon seals). The chamber between the block valves is vented to the atmosphere through a vent valve and check valve. The check valve is utilized to prevent entrance of contaminants during extended periods when the vent valve is open.

   Where nitrogen gas is utilized for purging hydrocarbon systems and the gas originates in a vessel common to the oxygen (distillation column), a special isolation system is utilized to prevent backflow of hydrocarbons into the oxygen column in case nitrogen pressure diminishes below normal levels. Automatic double block valves are utilized with an automatic vent valve between them. Actuation is by loss in pressure or loss of nitrogen purity.

   Accidental contamination of oxygen piping and instruments with oil is normally prevented by segregated piping and instrumentation so that oil leakage cannot occur around oxygen containing components.

2. Temperature coupling to adjacent systems; cooling, cold condensate, leakage of cool liquids on adjacent systems.

   Basically, we normally employ stainless, aluminum and copper for the portion of systems operating below -20°F and for warmer piping up to an alarm switch set to warn operator of falling temperatures below -5°F. Thereafter, carbon steel is usually utilized unless maintaining cleanliness during construction or during operation is a problem.

   Compressors, which are vulnerable to liquid carryover from a liquid source, are protected by a liquid trap in addition to a temperature alarm and shutdown systems.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

D. Spills and Leakage

The general rule is to repair oxygen gas or liquid leaks immediately. If leaks are minor and in a relatively safe area, and it is not practical to fix them immediately they would be fixed at the first opportune moment. For bad leaks in hazardous areas, of course, the leak is to be fixed immediately. Minor leaks where there is a real potential hazard, such as a cracked fitting which could break completely, would be repaired immediately.

No leaks are to be repaired until all pressure in the appropriate circuits has been bled down. When torches or welding are necessary for repairs, circuits must be purged with nitrogen and tested for 21% oxygen or less atmospheres. Also, hot work requires positive blank of source of oxygen. Positive blanks include complete disconnect of line by mechanical means, blank inserted between flanges, or two block valves with a bleed to atmosphere between them. Naturally, all tools and fittings should be cleaned appropriately before use and the area should be cleaned and dried after work has been completed.

Our main area of concern regarding spills is in the load-unload areas. There have been a number of major spills, generally due to truck pulling out before disconnecting the transfer hose. All of the newer facilities have remote operated shutoff valve on storage tank lines in the event there is line breakage. Older plants are under investigation and no decisions have been made in this matter. Presently there are 31 LOX tanks in this load-unload category, 11 of which have remote shut off valves. There have been a number of incidents where drivers have pulled away and torn up our loading area lines. However, all were caught and handled immediately so no major incidents resulted. Generally, the manual valve was closed and damage repaired as necessary. One such recent happening was at a location where they had a remote valve but this was on a LIN system.

The majority of our loading areas have water deluge systems installed, manually actuated, which would serve to vaporize spilled liquid and at least prevent propagation of a fire in the event we had such a problem. Details are in APCI "Deluge System LOX Loading Facility", Safety Standard 630.2.6, Jan. 1964 (Doc. #99000055).

APCI, "Check List, Air Separation Plant, Operation", Safety Standard 610.1.5, February 16, 1961 (Doc. #99000218), has two items on the check list regarding spill hazards. One (Page 10) indicates the loading area pad is to be sloped to permit flow to the least hazardous area. The other (Page 9) questions, "Are there remote operating shutoff valves at locations where large quantities of LOX or liquid hydrogen are stored and failure of a tank would present an extreme hazard?"

APCI, "Air Separation Plant, Cryogenic Liquid Disposal", April 1962 (Doc. #99000047), and APCI, "Vaporizer, Cryogenic Liquid Disposal", Design Engineering Standard 514.6.2, May 26, 1961 (Doc. #99000015), are not directly applicable to spills and leakage but have some details on vaporizers and natural disposal.

We have not environmental warning and escape systems, therefore no detection; quantity and response time limits.

It is company and industry policy to keep all oxygen areas and systems free of incompatible materials and ignition sources.

"Handling of Low Temperature Fluids and High Pressure Oxygen", by F. Himmelberger, presented at the Aeronautical Industries Section Program of the National Safety Congress, Chicago, Ill., October 19, 1959 (Doc. #99000219), has some material on spills. All facilities have this article included in their Safety Manuals.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

D. Spills and Leakage

1. Drainage and Ultimate Disposal Arrangements

a. At production plants the Industrial Gas Division is responsible for the conversion of transport equipment from one service to another (e.g. LOX to LIN) and for disposal of off-purity product. This general category of disposal would be intentional and would be performed in the following manner if the production facility has a vapor collection system. The liquid product would be transferred at a controlled rate into the plant tanker vapor collection system for vaporization and dispersal through a vent stack provided with a blower which safely disperses the vapor into the atmosphere. If a vapor collection system is not provided at the production facility, the liquid product is drained onto a clean gravel area at a controlled rate to avoid producing a large vapor plume and a large area with a high oxygen concentration.

b. Safe venting and control of leakage during transfer of LOX product at consumer sites is achieved by eliminating the possibility of product from contacting combustible materials. It is IGD practice to install bulk oxygen storage systems in accordance with company criteria based on the applicable codes, NFPA #566, "Installation of Bulk Oxygen Systems at Consumer Sites", 1965 edition (Doc. #99000190). This code and Air Products' criteria requires that liquid oxygen be transferred over noncombustible surfaces, thus, any leakage of liquid oxygen or small spillage would be safely vaporized. The noncombustible surfaces referenced above are clean gravel or concrete. Where asphaltic paving or possible hydrocarbon on gravel or on earth are under the transfer hose connections or valving, an aluminum drip-pan is provided during the transfer operation. It has been Air Products' experience that the relatively small quantity of vapor associated with LOX transfer procedures do not pose a problem.

NFPA #566, 1965 edition has been revised in May 1971, in accordance with the "Ammendments" to NFPA No. 566, (Doc. #99000191) and will be designated as NFPA #50.

c. Gaseous oxygen storage systems are also covered by NFPA pamphlet #566; however, the problems of leakage are significantly less than with LOX.

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

D. Spills and Leakage

2. Separation of Incompatible Materials and Ignition Sources in Disposal Systems

NFPA #566 (Doc. #99000190) lists quantity distance criteria to maintain flammable and combustible storage at a safe distance from the oxygen bulk storage system. Similarly, ignition sources are restricted from the immediate area of the oxygen bulk storage system. It is the intent of the NFPA code to prevent storage of combustible materials and combustible structures at an inadequate distance from the storage system to preclude the exposure of the oxygen storage system to a fire.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

D. Spills and Leakage

3. Environmental Warnings and Escape Systems

Due to the practical maximum storage at consumer sites, perhaps 20,000 gallons of LOX, (average 2,400 gals) there is not a necessity for any specific or general requirements for environmental warnings and escape systems. Each oxygen bulk storage system is placarded with a warning "Oxygen - No Smoking or Open Flames."

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

D. Spills and Leakage

4. Detection: Quantity and Response Time Limits

Due to the practical maximum storage of 20,000 gallons of liquid oxygen with the average storage being 2,400 gals, a detection system is not provided at consumer facilities. NFPA pamphlet #566 (Doc. #99000190) requires that storage systems be located in well ventilated areas and places a restriction on the number of fire walls and locations of fire walls that may be used and would restrict ventilation (see Section 5-1-11).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

E. Contaminants Accumulation

The procedures for solvent evaporation technique, and for extraction of ether soluble material and oil content determination are covered in:

Latshaw, D. R., "Oxygen Safety Review Check List", May 4, 1971 (Doc. #99000217)

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

1. Production to storage, storage to system, storage to transport, transport to system.

   Liquid production to storage is normally accomplished through gravity feed to low pressure tanks operating at 2-3 psig. Piping material may be austenitic stainless, copper or aluminum. Insulation is by rockwool in ducts for multiple lines or Foamglas for one or two lines. Liquid oxygen or nitrogen may be carried in a common duct. Inclusion of liquid hydrocarbons is not permitted. Small plants often utilize a vacuum jacketed transfer system or a batch transfer system to minimize heat leakage.

   Storage to system often requires elevated pressures necessitating the use of centrifugal pumps. Storage to transport also requires pumping equipment due to operating pressures of the storage and the normal elevation of transport tankers. Transport to system is usually accomplished by pressurizing the tanker (to approximately 25 psig) or by on-board pumps for higher pressures.

   Safety requirements relative to storage and loading areas are covered by Standard 607.2.1.1(1). Deluge systems are covered by Standard 630.2.6(2).

2. References.

   (1) Ball, W. L., Plant Components, Storage, Converter System, and Cryogenic Liquids, APCI Safety Standards 607.2.1.1, April, 1962 (Doc. #99000048).

   (2) Kitson, F. K., APCI, The Protection Equipment, Deluge System, LOX Loading Facility, APCI Safety Standards 630.2.6, January, 1964 (Doc. #99000055).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

1. Production, Storage to System, Storage to Transport, Transport to System Loading and Unloading Procedures for Liquid Oxygen Transfer are Listed in Air Products' Safety Standards 635.19, Pages 3, 4, 5, and 6.

a. APCI, Loading and Unloading Operations, APCI Safety Standards 635.19, February 1968 (Doc. #99000194).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

1. Systems

Field Fabricated Cryogenic Liquid Storage Tanks.

APCI procedure for the design and fabrication of large Cryogenic Liquid Storage Tanks is covered in detail in the following references:

1. APCI Standard Specification for a Field Fabricated Cryogenic Liquid Storage Tank (Flat Bottom), APCI No. 99820A, September 15, 1971 (Doc. #99000341).

2. APCI Job Specification 310,000 Gallon Capacity LOX/LIN Storage Tank, APCI No. 71-2775-16.10-1A, September 16, 1971 (Doc. #99000342).

3. American Petroleum Institute, Recommended Rules for Design and Construction of Large, Welded, Low-Pressure Storage Tanks, API Standard 620, Fourth Edition, February 1970 (Doc. #99000343).

4. International Conference of Building Officials, Uniform Building Code, 1970 Edition, Volume I (Doc. #99000344).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

1. Systems

The following documents describe some of the APL oxygen transfer methods, several typical installations, and the Operations Department overhaul procedures for liquid pumps:

(1) APL, Centrifugal Oxygen Compressor Manual, Hattingen Plant, APL (Doc. #99000410).

(2) APL, LOX installation at Customer Sites, APL, I.G.D. Engineering Manual, No. EM 40-01, Rev. 0, July 19, 1971 (Doc. #99000411).

(3) APL, Procedure for Filling Cryogenic Tanker by Pump at Carrington, APL, I.G.D. Engineering Manual, No. EM 50-01, Rev. 0, May 27, 1971 (Doc. #99000412).

(4) APL, Procedure for Filling Cryogenic Tankers by Pump at Bracknell, APL, I.G.D. Engineering Manual, No. EM 50-02, Rev. 0, May 27, 1971, (Doc. #99000413).

(5) APL, Procedure for Filling Cryogenic Tankers by Pump at Stoke-On-Trent, APL, I.G.D. Engineering Manual, No. EM 50-03, Rev. 0, May 5, 1971 (Doc. #99000414).

(6) APL, Purge Procedure for Cryogenic Liquid Container, APL, I.G.D. Engineering Manual, No. EM 52-02, Rev. 0, June 3, 1971, (Doc. #99000415).

(7) APL, Procedure for Cylinder Filling and Quality Control (Standard Purity Gases), APL, I.G.D. Engineering Manual, No. EM 55-01, Rev. 0, July 2, 1971 (Doc. #99000416).

(8) APL, Procedure for the Installation of a Cryogenic Tank, APL, I.G.D. Engineering Manual, No. EM 60-01, Rev. 0, May 19, 1971, (Doc. #99000417).

(9) APL, Operations Department, Overhaul Procedure, New Malden, APL C 155/9.5 (Doc. #99000418).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

2. Pipeline Transportation

O_2 pipelines are presently designed in accordance with the following:

a. ANSI B31.8, Gas Transmission and Distribution Piping System, American National Standard Institute (Ex USA Standard), 1968 (Doc. #99000350).

b. Title 49. Transportation, Part 192 - Transportation of Natural Gas and Other Gas by Pipeline: Minimum Federal Safety Standards -- Establishment of Minimum Standards, Federal Register, 35, No. 161, August 19, 1970 (Doc. #99000351).

c. Title 49. Transportation, Part 192 - Transportation of Natural Gas and Other Gas by Pipeline: Minimum Federal Safety Standards -- Establishment of Minimum Standards, Filing of Inspection and Maintenance Plans, Federal Register, 35, No. 205, October 21, 1970 (Doc. #99000352).

d. Title 49. Transportation Part 192 -- Transportation of Natural Gas and Other Gas by Pipeline: Minimum Federal Safety Standards -- Establishment of Minimum Standards, Odorization of Gas, Federal Register, 35, No. 220, November 11, 1970 (Doc. #99000353).

e. Title 49. Transportation, Part 192 - Transportation of Natural Gas and Other Gas by Pipeline: Minimum Federal Safety Standards -- Establishment of Minimum Standards, Miscellaneous Amendments, Federal Register, 35, No. 223, November 17, 1970 (Doc. 99000354).

f. Title 49. Transportation Part 192 - Transportation of Natural Gas and Other Gas by Pipeline: Minimum Federal Safety Standards -- Establishment of Minimum Standards, Corrosion Pitting; Notice of Public Hearing, Federal Register, 36, No. 126, June 30, 1971 (Doc. #99000355).

g. Title 49. Transportation Part 192 - Transportation of Natural Gas and Other Gas by Pipeline: Minimum Federal Safety Standards -- Establishment of Minimum Standards, Requirements for Central Corrosion, Federal Register, 36, No. 126, June 30, 1971 (Doc. #99000356).

h. Title 49. Transportation Part 192 - Transportation of Natural Gas and Other Gas by Pipeline: Minimum Federal Safety Standards -- Establishment of Minimum Standards, Extension of Time for Confirmation or Revision of Maximum Allowable Operating Pressure, Federal Register, 36, No. 176, September 10, 1971 (Doc. #99000357).

i. Public Law 90-481

j. Compressed Gas Association, Assembly of Industrial Practices Used for Gaseous Oxygen Transmission and Distribution, CGA Docket 70-11, Third Draft, March 22, 1972 (Doc. #99000345).

Liquid oxygen transfer systems are designed in accordance with:

ANSI B31.3, Petroleum Refinery Piping, American National Standard Institute (Ex American Standard Association), 1966 (Doc. #99000347).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

2. Pipeline Transportation

APL Oxygen pipeline design concepts and criteria are described in the following documents:

(1) APL, Oxygen Pipelines, APL Engineering Standard LS.30/1, Rev. 0, July 1, 1970, (Doc. #99000404).

(2) APL, Design and Safety Standards for Carbon Steel Gaseous Oxygen Transmission Lines, APL Engineering Standard LS 30/2, Rev 1, December 1, 1970, (Doc. #99000405).

(3) APL, Piping Selection Sheet-Carbon Steel-Warm Oxygen Service 150 PSIG (CSO 1.5), APL Engineering Standard LS.31/1, Rev. 0, June 12, 1970, (Doc. #99000406).

(4) APL, Piping Selection Sheet-Carbon Steel-Warm Oxygen Service 275 PSIG (CSO 2.7), APL Engineering Standard LS.31/2, Rev. 0, January 29, 1970, (Doc. #99000407).

(5) APL, Piping Selection Sheet-Carbon Steel-Warm Oxygen Service 500 PSIG (CSO 5.0), APL Engineering Standard LS.31/3, Rev. 0, June 12, 1970, (Doc. #99000408).

(6) APL, Piping Selection Sheet-Carbon Steel-Warm Oxygen Service 720 PSIG (CSO 7.2), APL Engineering Standard LS.31/4, Rev. 0, June 12, 1970, (Doc. #99000409).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

2. Road, Railroad, Barge, and Pipeline Transportation

a. Pressure Relief

The majority of relief devices on LOX tankers and LOX railcars at Air Products have a set pressure of 25 psig and a road safety relief valve set for 15 psig. Several tankers also have safety relief valves with a set pressure of 40 psig and several pumpers have a set pressure of 80 psig. Rupture discs are also provided on the above cryogenic transport equipment which are rated for approximately 1-1/2 times the safety relief valve setting. The relief devices for tankers are designed in accordance with the criteria listed in CGA Pamphlet Number 341 "Tentative Standard Insulated Tank Truck Specification CGA-341 For Cold Liquefied Gases" 2nd Edition, 1970, (Doc. #99000195).

Gaseous oxygen tube trailers containing D.O.T. tubes are provided with frangible discs in accordance with CGA Pamphlet Number S-1.1 "Safety Relief Device Standards, Part 1 - Cylinders For Compressed Gases" 5th Edition, 1969, (Doc. #99000196).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

2. Road, Railroad, Barge, and Pipeline Transportation

b. Contamination Control

Contamination control is insured by Air Products' Quality Assurance Program which monitors on a monthly to four month basis, the product produced at the production facilities and in storage at the cylinder filling facilities. This program is described in detail in the following documents:

(1) APCI Quality Control Program, District Operations Manual, Section 6.3, July 1965 (Doc. #99000223).

(2) Scott, D. J.,"Analyses Required on Quality Control Samples", May 10, 1968 (Doc. #99000224).

(3) Ent, W. L., "Revisions to IGD Quality Assurance Cost Procedures", including "Schedule for Submitting Routine Product Samples", October 17, 1966 (Doc. #99000225).

(4) APCI Analysis Requirements Summary, District Operations Manual, Vol. I, Section 6.3.2, March 1970 (Doc. #99000226).

Assistance is rendered to customers to insure that the customer system is suitably cleaned for oxygen service prior to introduction of oxygen into a new system.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

2. Road, Railroad, Barge and Pipeline Transportation

c. Oxygen Dispersal From Vents and Lines

Liquid oxygen tankers were initially designed with vents extending down to the rear or forward of the control cabinet. It was believed a number of years ago that this was the safest means of disposing of venting oxygen. Within the past several years, design of new tankers have safety relief device vents directed up and back to vent oxygen at an approximate elevation of eight feet above grade. This has substantially reduced the concentration of oxygen enriched atmospheres close to the ground and provided better dispersal of the vapor into the atmosphere.

Gaseous oxygen tube trailers are provided with vent stacks which discharge oxygen straight up into the air above the heigth of the highest tubes on the tube trailer. Weather protection caps are installed on the vent stacks.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

2. Road, Railroad, Barge and Pipeline Transportation

d. Vehicle Accident Procedures

Accident procedures are included in APCI, Fire Extinguishment, APCI Safety Standards 635.30, pages 1, 2, and 4, February 1968 (Doc. #99000197).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oyxgen Transfer

2. Road, Railroad, Barge and Pipeline Transportation

e. Vibration and Controlled Sloshing

Vibration of tankers in over the road use is minimized by certain inherent factors in tanker design and by careful selection of the running gear. The inner tank vibration is dampened by perlite insulation and by the inner tank supporting system utilizing phenolic materials as thermal barriers. Piping is guided to permit contraction and eliminate unwanted movement resulting from road vibration. Careful selection of commercially available running gear to obtain minimum vibration transmitted to the chassis.

A number of years ago liquid oxygen tankers were provided with approximately three transverse baffles and one additional longitudinal baffle. In striving to achieve lightweight designs and as the longitudinal baffle did not appear to contribute significantly to tanker operation, it has been deleted from recent designs with no detectable adverse effect. The more recent designs include baffles that are a perforated conical design with a hole in the center with an approximate 50 percent open area. A design to minimize the effect of sloshing and obtain maximum tanker capacity with lightweight design is difficult.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

3. Malfunctions and Failures

a. Oxygen pressure gauge failure on March 23, 1964 in Emmaus Plant. Questionable history and the gauge used because it had not been labeled for oxygen service. Man received bruise on left hand. Refer to memo, Schmoyer, W. W., "Specialty Gas Gauge Failure," April 13, 1964 (Doc. #99000257).

b. Hose rupture and fire on test gauge equipment at our Shakopee, Minnesota cylinder fill facility on June 9, 1968. Rubber hose should not be used in oxygen service. Man received second degree burns to his face and arms. He was wearing safety glasses. Refer to memo, Hubbs, M. H., "Test Gauge Equipment Failure, Shakopee, "June 12, 1968 (Doc. #99000284).

c. APCI, Memo by B. J. Berrettini, "LOX Pump Fires and Explosions," dated June 26, 1970 (Doc. #99000258), Summarizes causes and similarities of seven different APCI/APL transfer pump energy releases.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

3. Malfunctions and Failures

The following information identifies several APCI incidents involving oxygen transfer equipment or instrumentation. APCI reports and documents covering these incidents more fully are also identified by date and Document #.

Date	Doc. #	Author	Equipment	Description
6/28/61	99000274	E. Kehat	Gauges	Tests on orifices to be installed in oxygen service gauges to prevent personnel injury in the event of an energy release or over-pressure rupture of gauge bourdon tube.
8/2/61	99000275	F. K. Kitson	Gauges	Report of requirements for purchasing new gauges and modifications of old gauges to protect personnel in the event of a rupture.
1/64	99000049	W. W. Schmoyer	Vacuum System	Safety Standard 607.2.2.5 on cylinder evacuation system to prevent contamination of fill manifold and cylinders.
7/65	99000270	W. W. Schmoyer	Regulator	Report on operation, use, hazards and general accident causes of regulators.
12/15/67	99000277 99000278	W. L. Ball M. H. Hubbs	Loading	Two reports on an incident whereby a loader's eye was probably saved by glasses when a hammer chip shattered his glasses when tightening a liquid connection.
6/4/68	99000281	M. Hubbs	Cylinder Fill	Cylinder safety blew on fill manifold. Force broke pigtail and fill manifold, breaking adjacent cylinder loose.

Date	Doc. #	Author	Equipment	Description
12/30/68	99000265	H. H. Master	Pumps	Competitor pump fire had indicated foreign material may have been cause. Reviews our position and specifies suction screens be installed where still necessary.
1/24/69	99000266	H. H. Master	Pumps	Same as above but directing and instructing managers to accomplish screen installations.
2/27/70	99000273	H. H. Master	Meter	Near miss report where uncompatible material was used in a ring balance meter in oxygen service and action taken to check and eliminate existing and future problems.
1/19/71	99000276	F. K. Kitson	Vacuum System	Vacuum system arrangement to prevent water from getting into cylinders where Nash water-seal compressor is utilized.
1/26/71 2/19/71	99000267 99000268	R. D. Stompler	Pumps	Review reasons and status of modifications to Operations Department pump to prevent recurrence of a similar pump failure at Puerto Rico. Modifications to lube system addition of suction screens and protective barriers.
2/8/71	99000279	H. H. Master	Loading	Driver pulled away from load area with hose still connected. Stopped in time to prevent line or hose breakage.

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

3. Malfunctions and Failures

The following information identifies several incidents which occurred with other oxygen equipment together with reports and documents covering these incidents in greater detail.

Date	Doc. #	Author	Equipment	Description
6/26/61 7/7/61	99000259 99000260	S. H. Duffala W. L. Ball	Compressor	Two reports on the 6/21/61 Linde oxygen compressor fire at Great Lakes Steel. Three men were killed. Since all three on site were killed, there is some question on the cause, but it is known they were having trouble with the compressor.
8/62	99000280	M.C.A.	Pump Filter	Report of a missile pad incident where contaminants in a pump filter were probably initiated by a foreign particle at high velocity. The resulting release caused a massive LOX spill.
10/21/63	99000261 99000261A	W. L. Ball J. J. Rendos	Pump	Reflux pump on the Airco plant at Butler, Pa. exploded and killed one man. Piping and pump believed to have contaminants.
1965	99000262	S. W. Cowles	Pumps	1965 AIChE meeting paper on four separate fires experienced at Armour Agricultural Chemical Company.
1966	99000263	J. J. Rendos	Pumps	Report on cause of two pumps fires experienced by Airco on 5/21/66 and 5/23/66.

Date	Doc. #	Author	Equipment	Description
12/29/67	99000264	H. H. Master	Pipeline	Details were limited on an oxygen pipeline filter fire at a steel mill in India where six people were killed.
6/70	99000269	H. Bauer W. Wegner K. F. Windgassen	Pumps	Article from Cryogenics on tests made for causes of pump fires. Includes mechanical problems, relation of various metals to combustion possibilities and intensity, and drop hammer tests on chips of metals and assembly materials.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

3. Equipment Malfunctions and Failures

The two main categories of machinery used for oxygen transfer are compressors and pumps. Malfunctions and failures with these devices have led to numerous design features and operating techniques to prevent failures or at least to prevent serious damage and personnel injury. Most failures have been diagnosed sufficiently to enable action to be taken to prevent recurrence, however, some failures have been unexplained and the resulting action has been protective rather than preventive. Some potential failures are impossible to prevent and these cases are necessarily handled by protective measures.

Materials of construction for compressors and pumps often are not completely compatible with oxygen and under certain conditions will burn. In most instances there is no substitute material which is both compatible with oxygen and which will satisfy the design requirements. In some instances the cost of more compatible materials is prohibitive. Silver is used in limited quantities for shaft seals with some makes of compressors but the high cost has caused some manufacturers to use cheaper less compatible materials. Compressors cast of bronze would be more compatible with oxygen than when cast of iron but the costs and manufacturing difficulties prevent this selection.

Oxygen Compressors Most compressors used by industry for oxygen have been either reciprocating or centrifugal. Generally reciprocating compressors are used for small to moderate flow rates where low to moderate pressures are required. For high flow rates and high pressure a centrifugal and reciprocating compressor are often used in series. Centrifugal compressors require at least 500 CFM actual flow at the last stage of compression for reasonable performance and are generally limited to about 500 psig discharge pressure. Applications with less flow or with higher pressures are usually accommodated with reciprocating compressors.

Potential equipment malfunctions and failures are designed out of the compressor as much as possible during the procurement and design stage. Not all compressor manufacturers are knowledgeable on oxygen compressors and thus the selection of potential suppliers is the first step. Proper purchasing specifications are necessary to fully describe the duty and design features required. Oxygen compressor suppliers have certain standard features of construction but rely on customer specifications to complete the design. Customer specifications aside from process duty requirements are basically experience factors to be applied to the compressor design. The compressor supplier does not usually receive full feed back information on the operation of the compressor as does the operator. Thus the compressor operator reflects experience factors in specifications for new equipment.

Reciprocating Compressors Reciprocating compressors have been used for many years in oxygen service but until recent years mostly small high pressure units. Prior to the advent of Teflon, and similar materials, for piston rings and piston rod packing most compressors were operated with a soap-water solution for lubrication or used carbon-graphite sealing materials and wear parts. Also in use has been the labyrinth type piston compressor and the diaphragm type compressor.

Present day reciprocating compressors are mostly Teflon ring construction of labyrinth piston construction with a few diaphragm compressors used for low flow high pressure applications.

Some of the notable malfunctions and failures on reciprocating oxygen compressors in recent years which have been "designed-out" are listed below:

Incorrect assembly of compressor cylinder valves such that intake valves were installed in discharge ports. This condition results in recompression in the cylinder and generates excess heat and a high potential for a fire. APCI specifications require a valve design such that an intake valve will not fit into a discharge port.

Foreign objects entering cylinders have caused scoring of cylinders with resultant excess heat and potential fire. Impacting of foreign objects could also cause a fire. APCI specifications require line filters in front of compressors to prevent entrance of foreign objects.

Foreign objects can also be in the form of broken parts from the compressor itself such as valve parts falling into the cylinder. APCI specifications require vibration switches which function on high acceleration or "shock" forces and which shut down the compressor. Experience has shown that the initial impact of the piston with the foreign object causes less damage than the subsequential damage caused by continued operation. Continued operation is likely to cause heat and a resultant fire. For this reason vibration switches must be set to trip the compressor instantly, upon sensing a malfunction, in order to be effective.

Non-lubricated cylinders using Teflon or similar materials for self-lubricating rubbing or sealing parts are subject to unpredictable wear rates. Since the self-lubricating material generally separates moving metal parts the wearing out of the material can cause metal to metal contact with high friction heat and potential fire. Self-lubricating piston rings are sometimes supplied with an expansion ring to help hold the piston ring against the cylinder bore. In the event of piston ring failure or high wear the expander can come in contact with the cylinder bore. Since the expander is usually spring steel it can cause scoring and heat and a potential fire. APCI specifications prohibit the use of expanders.

Piston rider rings which support the weight of the piston and guide the piston in the cylinder can wear and allow metal to metal contact. Constant monitoring of this wear is difficult and requires disassembly of the compressor. APCI specifications prohibit the use of expanders.

Piston rider rings which support the weight of the piston and guide the piston in the cylinder can wear and allow metal to metal contact. Constant monitoring of this wear is difficult and requires disassembly of the compressor. APCI specifications require a rider band design that will not operate as a seal ring and thus should not wear out before the normal piston rings. Horizontal compressors are specified to have a detector to sense a lowering of the piston rod. The lowering of the rod will indicate wear of the piston rider rings or wear of the crosshead and shows inspection is necessary.

Temperature indication within the compressor system is very useful to detect problems. Interstage gas temperature indicators will detect cooling problems, compressor cylinder valve problems or piston ring leakage. On compressor cylinders with many valves an individual temperature pickup is mounted on each valve to detect a broken or leaking valve.

<u>Centrifugal Compressors</u> Centrifugal compressors are being used more in recent years due to larger volumes of gas to be transferred. High rotating speeds are necessary with centrifugal compressors since the pressure is developed by kinetic energy. Because of the high rotating speeds, accidental rubs between the rotor and case are likely to produce a fire.

The materials used for construction of a centrifugal compressor are generally a compromise between oxygen compatible materials and materials having proper mechanical design properties. The compromise materials must be such that they are compatible with oxygen in the normal mode of operation but may not necessarily be compatible in the event of a malfunction of internal rub during operation. The prime example of this condition is the common use of stainless steel alloys for rotors and steel or iron alloys for the case. A high velocity rub between the impeller and the case has caused several fires wherein the impeller has been consumed by fire and the case has burned through. Since compatible materials are not available or are prohibitively expensive the compressor is designed to minimize the chances of a rub.

Probably the greatest cause for a fire in a centrifugal compressor is having a rub between an impeller and the case. The compressor design should be such that if a rub does take place the rub should occur at a small diameter section where the rubbing velocity is low. Shaft seals are generally a labyrinth type and do experience rubs since they are designed for small running clearances. These seals are small diameter and of thin cross section with narrow edges such that a rub will generally not cause a fire. The labyrinth blades dissipate the friction heat from the rub adequately to keep the temperature of the materials below their ignition point. Conversely a rub of the impeller at high velocity at a massive section will concentrate the friction heat and ignite the rubbing materials.

APCI specifications require materials of construction and certain running clearances to help design out potential fire causes. Additional preventive measures are taken by instrumenting the compressors to detect malfunctions as they develop and thus take corrective action before a rub takes place. Several of the more important instruments in use are:

1. Temperatures - All interstage gas temperatures before and after intercooling, bearing temperatures and cooling water temperatures. All of these temperatures indicate the condition of the compressor and are of primary importance when used to indicate a change taking place.

   High gas temperatures are not necessarily harmful in themselves but the temperature effect on the compressor parts could cause thermal deformations and resulting problems. Of importance is to determine the cause of the temperature rise. APCI connects the compressor discharge temperature indicator to alarm and to shut down the compressor.

   Bearing temperatures are an important indicator of bearing performance. Bearings generate considerable heat and a bad bearing will generally increase in temperature. The bearing heat is removed with the circulating lubricant and thus the bearing temperature also gives an indication of lubricant flow.

2. Vibrations - Rotor vibrations relative to the compressor case and rotor axial position relative to the case are constantly monitored and the instruments designed to alarm and to shut down the compressor. The rotor vibrations are very indicative of the mechanical condition of the compressor. The vibrations will indicate rotor ununbalance or looseness, rubs between the rotor and case, bearing problems, and drive coupling problems. Any vibration increase from the normal acceptable level is reason for investigation. APCI standard procedure is to have the vibration instruments sound an alarm at a vibration level 0.5 mils above normal and shut down the compressor at a level 1.5 mils above normal. If a gradual vibration level increase is occurring the compressor will be manually shut down at a level of 1.0 mils above normal.

   Axial position of the rotor in the case is maintained by the thrust bearings. A shift of the rotor can allow side contact of the impeller in the case with the previously mentioned fire potential. The position instruments are set to alarm and to shut down the compressor if the rotor moves beyond the limits normally allowed by the thrust bearing.

   Vibration monitoring equipment of the proximity probe type, which does not touch the observed shaft, is relatively new and has been very helpful in diagnosing high speed centrifugal compressors. APCI has been able to diagnose many potential problems and perform corrective work prior to a failure with the aid of these vibration sensors. We believe several previous unexplained compressor fires could have been prevented through the use of this type equipment. Because of their importance all APCI centrifugal oxygen compressors are now equipped with radial and axial vibration monitors.

3. Anti-Surge Control - Centrifugal compressors are subject to a condtiion called surge. Surge occurs when the back pressure imposed on the compressor is greater than the compressor is capable of producing and occurs at different pressure values depending upon the flow rate through the compressor. When surge occurs there is a rapid pressure change withing the compressor that usually results in a change in axial force on the rotor and can also reverse the direction of thrust on the bearings. Thrust bearings are usually capable of withstanding repeated surging but it is an aggravated condition and there are many cases of compressor failure caused by surging. Since the surging causes an axial movement a side rub on an impeller is likely and on an oxygen compressor it would probably cause a fire.

All APCI oxygen compressors are equipped to automatically vent or bypass the compressor discharge flow at operating conditions approaching surge. Additional vents will also automatically vent to atmosphere in the event of a shut-down so that the stored volume of gas in the compressor will vent quickly enough to prevent any surge conditions while the compressor is slowing down.

Oxygen Pumps Most pumps used by industry for oxygen have been either reciprocating or centrifugal. Generally reciprocating pumps are used for small to moderate flow rates and for higher pressures. Centrifugal pumps are used for most all flow rates where low to moderate pressures are required.

Oxygen pumps, both reciprocating and centrifugal, are a specialty item and are available from a limited number of suppliers. The special design features, cleanliness requirements and relatively small sales volume makes them unprofitable for most pump suppliers.

Materials of construction are similar for both typs of pumps and fall into the category of acceptable low temperature materials, namely nickel alloys, copper alloys and aluminum. Generally the nickel alloys are used where high strength is required, copper alloys where rubbing contact is expected and aluminum where light weight is required. The copper alloy generally used is bronze and is the most compatible with oxygen of the low temperature metals. Nickel alloys are generally the 300 series stainless steel or Monel.

Oxygen pumps are generally a simple device with few controls or instruments. Most pumps have only a suction and discharge pressure gage to monitor their performance. Oxygen pump usage is mostly for transfer operations where the liquid oxygen is transferred from one storage vessel to another and often from a pressure vessel to a higher pressure vessel or pipe line. This transfer duty is mostly on intermittent operation.

Malfunctions and failures of oxygen pumps are probably due more to the intermittent mode of operation than for any other reason. Starting and stopping of any mechanical device is generally considered detrimental to its long term performance, but with oxygen pumps this condition is greatly exaggerated. Some of the past failures of record and reasons for failure are listed below and it can be seen how intermittent operations affects the pump. Not all failures have been explained and this fact indicates the need for more instrumentation and controls on oxygen pumps. APCI is now working on new standards for oxygen pumps and will attempt to achieve better pumps and better operating techniques.

Air Products and Chemicals INC.

January 23, 1972
IIF3-4 (continued)

Centrifugal Pumps A centrifugal pump is usually trouble free so long as the shaft bearings and shaft seals are intact. Many probelms can develop to cause failures and these will be discussed; but we consider bearings and seals as the greatest problems.

1. Bearings - The pump impeller must rotate at a rapid rate in the pump housing in order to develop pressure. Accidental contact between the rotating impeller and the pump case will cause friction heat and even in a liquid oxygen environment can cause a fire. Most known fires and explosions of centrifugal oxygen pumps were due to impeller rubs and most of these rubs were due to failed bearings. Very few pumps are installed with any instrumentation to monitor the condition of the bearings.

   Low speed pumps 3600 RPM and below generally have grease lubricated bearings and are not a general problem when properly maintained. Higher speed pumps are either grease lubricated or oil lubricated and do have bearing problems. Oxygen pumps generally use oxygen compatible fluorinated lubricatns which are inferior to premium petroleum lubricants and do not adequately protect against rust and corrosion within the bearings. Pumps can rust in the bearing area while inoperative and fail prematurely during operation. Fluorinated lubricants are also subject to breaking down and forming acidic products when subjected to excess heat and moisture. These conditions can develop in a pump bearing housing with certain bearing failure as a result. Most pumps use a small amount of lubricant and as a result have very little reserve supply to account for any leakage. Oil lubricated pumps rely on circulation of lubricant with most pumps not equipped to monitor the lubricant flow.

   Some pumps have their bearings lubricated with the pumped liquid oxygen and it is critical to maintain liquid in the bearings. The friction heat of the bearings will tend to vaporize the liquid and the bearings can fail under this condition. For this type pump, it is critical to maintain sufficient NPSH to prevent cavitation and thus prevent flashing in the bearings.

   Temperature indicators are a good device to monitor the condition of bearings not lubricated with the pumped liquid. Bearings generally increase in temperature as they wear and will rapidly increase in temperature while failing. High temperature switches are a good device to detect bearing failure and to shut down the pump prior to an impeller rub occurring.

2. Shaft Seals - Oxygen pump shaft seals are generally exposed to the atmosphere which allows oxygen leakage to safely dissipate. Since the shaft seal gets cold while pumping it can condense moisture which will subsequently freeze and form ice deposits. Intermittent operation allows thawing and refreezing which allows water to penetrate the seal and freeze inside the seal surfaces which can cause seal failure. A dry atmosphere in the seal area is beneficial and if heated, affords additional benefit. Dry heated nitrogen is used to blanket the seal area on installations where nitrogen is available. Installations such as on trailers where dry gas is not available can expect more seal probelms.

3. Suction Screens - Foreign objects entering the pump suction can become lodged between the impeller and case and cause friction heat and fire. All APCI pumps are supplied with suction screens to keep foreign objects from entering the pump.

4. Cleanliness - Oxygen pumps, as well as all oxygen handling equipment, must be clear. Too often mechanics are careless and a pump fire or explosion results.

5. Faulty repair - Incorrect assembly of a pump can readily allow impeller rubs. Oxygen pump maintenance and overhaul is best performed at central maintenance depots or by the pump manufacturer to assure proper assembly and cleanliness.

Reciprocating Pumps Reciprocating pumps are used almost exclusively where high pressures are required for cylinder filling and high pressure storage systems.

The reciprocating pumps operate at slower speeds than centrifugal pumps and have much slower rubbing contact velocity in the liquid oxygen area. Reciprocating pumps generally operate with a plunger in a barrel with packing or seal rings on the plunger to prevent leakage. In the event of malfunction or excess wear accidental rubs between the plunger and barrel rarely create enough friction heat to cause a fire or expolosion. Material selection for the cold end of the pump is important so as to have materials which can best tolerate rubs without creating excess friction heat and metal to metal galling. Bronze alloys are preferred over stainless steel for this consideration.

Pump packing material in recent years has been predominantly Teflon alloyed with various stabilizers and additives. Prior to Teflon, carbon-graphite mixtures with asbestos were used and are still used to a lesser extent.

Cleanliness and proper packing installation are important since the contact area of the packing to the plunger is where the most heat from friction can be expected and where a fire or explosion is most likely to initiate. Operation of a liquid oxygen pump on some other cryogenic fluid such as liquid nitrogen or liquid argon can present a hazard when put back on liquid oxygen service, unless the pump is disassembled and properly cleaned. Minute particles of packing, especially carbon particles, are formed during operation and while on oxygen service are gradually oxidized with no problem. If these particles are formed in a non-oxygen environment and then later exposed to an oxygen environment they will oxidize rapidly and together can result in excess heat with a potential fire or explosion.

Reciprocating pump valves can be a maintenance problem but do not normally present a safety hazard in themselves. Valve failure will cause the pump to stop pumping, however, and continuous operation can develop excess heat within the pump since no liquid flow is present to carry away the friction heat. A discharge pressure switch or flow measuring device set to shut down the pump can monitor against this occurrence.

LOG OF FIRES IN CENTRIFUGAL GASEOUS OXYGEN COMPRESSORS

Mid to Late 1950's - Failure somewhere in South Africa, presumably a Brown Bovari compressor.

1959 - January 15 - McClouth Steel, Detroit, Michigan

Manufacturer	Carrier
Low Pressure Case:	
Model	18 H 3501
Capacity	4,080 cfm
Discharge	94.5
High Pressure Case:	
Model	18 H 3501 I
Capacity	620 cfm
Discharge	399.4 psia
Speed	9500 rpm
Total BHP	1668

The fire occurred in the high pressure casing between the last stage wheel and the balancing piston. The high pressure case burned through and the flames melted and burned through the low pressure cast iron case. The carbon steel shafts apparently were heavily damaged but the cast iron diaphragms showed no evidence of burning. The journal and thrust bearings were not damaged appreciably and apparently did not enter into the combustion reaction.

Air Products and Chemicals INC.

January 23, 1972
IIF3-4 (continued)

1959 - July 10 - Wyandotte Chemical, Geismar, Louisiana

Clark	- Type IM8	2 machines in series
Capacity		3150 cfm at 75°F.
BHP		1050
Speed		9500 rpm
Discharge		225 psig

The reaction was confined to the discharge end seal area only. The previous day leakage was found in a diaphragm water nipple, which was repaired during outage of about 30 hours due to process trouble. Fire occurred during startup when oxygen was bled into the machine after 3-hour run-in with nitrogen.

It is speculated that corrosion products caused by water leakage caused frictional heating and ignition in the balance piston area.

1960 - Montecatini, Novaro Chemical Plant

Make	Demag Turbo Blower (purchased in 1952)
Stages	Three
Inlet Pressure	1 atmosphere
Discharge Pressure	2.5 atmospheres
Speed	10,500 rpm
Speed of Motor	3,000 rpm

A fire reportedly occurred "some time ago" at the referenced facility. The only data available concerns the design of the machine.

1964 - July 17 - Wyandotte Chemical Company, Geismar, Louisiana

Reaction occurred in same machines involved in failure of 1959.

The fire in the oxygen compressor was associated with explosions and fires in other sections of the process system. It is believed that ethylene oxide backflowed through a connection into the process air stream to the air separation plant, went through the air separation plant and into the oxygen compressors. The low pressure case received only minor damage, but the high pressure case was blown apart. The suction bottle of the low pressure machine was split open and the top heat blown about 250 feet away.

1965 - September 26 - Mingo Oxygen Company, Mingo Junction, Ohio

Fire occurred in piping associated with the compressor but did not involve the compressors themselves.

1967 - December - Poland

A Demag unit reportedly failed shortly after startup. Cause believed to be improper/inadequate cleaning after long period of storage.

1968 - Knapsack Gresheim (Division of Messer), Duisburg, West Germany

At this facility five Brown Bovari centrifugal oxygen compressors discharge into a common oxygen main. On a normal shutdown of one of these machines, which had been in operation for seven years, the discharge check valve failed to operate. The operators also had failed to close the manual discharge block valve, which normally is done prior to shutting down the compressor. After coming to rest, the backflow of oxygen caused the machine to rotate backwards. As the lube oil pump does not operate with reverse rotation of the shaft, the main bearings and thrust bearings received no oil and began to overheat, damaging the bearings and the silver labyrinth packings of the sealing glands and impellers. Excessive heating in the bearings vaporized the remaining oil, finally resulting in an air-oil vapor explosion and fire.

Upon closing the discharge block valve, rotation of the machine ceased and the air-oil fire was put out by the operators. Damage was confined to the bearings and labyrinths. Oxygen was not involved in this reaction, which is of a type that under similar circumstances could occur on a compressor regardless of the material being compressed (whether oxidant, fuel or inert).

1968 - June 17 - Shell Chemical Company, Geismar, Louisiana

Manufacturer	Elliott - 24 HB
Discharge Pressure	265 psia
Capacity	1365 acfm (500 T/D)
BHP	945
Speed	19,403 rpm
Bearing Lubrication	Water

This unit was the high pressure case of a two-case train. The unit had been in steady operation for a period of more than four weeks. There was no indication from the operating records of a change of conditions (loss of power, surging, vibration, pressure or temperature change).

Inspection of the casing revealed the most extensive damage in the area of the first stage impeller discharge. The casing had been burned through in four places in the plane of the first stage discharge, and the interstage diaphragm was almost completely consumed. Although the second stage impeller was severely damaged, there was very little evidence of combustion in the second stage. The shaft was not burned nor were the journal bearings or thrust bearings.

1968 - June 27 - Air Products and Chemicals, Inc., Sparrows Point, Maryland

Clark IM3 (High Pressure Case). The inboard journal of the high pressure case is believed to have failed during roll-down of the compressor, metal-to-metal rubbing in the interlocking labyrinth at the balance drum of the high pressure rotor ensuing and causing ignition. The fire broke through at both ends of the high pressure casing and several places in the balance piping. The rotor and high pressure case were damaged beyond repair.

1968 - September - Mekog, Holland

Fire reported in GHH oxygen compressor.

1968 - October - Shell Chemical Company, Geismar, Louisiana

The new Elliott compressor, replacing the unit that burned in June 1968, caught fire and was destroyed the first time an attempt was made to put it onstream.

1968 - December 14 - Air Products and Chemicals, Inc., Weirton, West Virginia

In Clark IM7-3 evidence was found, during regularly scheduled maintenance work, of limited fire damage which possibly occurred during an earlier startup.

1968 - December 27 - Airco, Bethlehem, Pennsylvania

A Demag high pressure casing had fire in discharge volute of last stage.

1969 - Nippon Sanso, Japan

A Demag unit reportedly failed early 1969 or late 1968 in a manner similar to the second Airco Bethlehem fire.

1969 - March 18 - Air Products and Chemicals, In., Middletown, Ohio

A Clark low pressure case, fire beginning in 4th stage, burning through into 2nd stage. Fire occurred during a scheduled shut-down of the compressor.

1969 - April 4 - U. S. Steel, Chicago, Illinois

A Clark oxygen compressor in a Linde plant.

1969 - April 15 - Airco, Bethlehem, Pennsylvania

Fire in same Demag machine that had a fire in December 1968.

1969 - June - August Thyssen Hütte, Duisburg

A GHH centrifugal compressor system. Fire reportedly occurred in the last intercooler causing damage to the intercooler and steel foundations. No damage to the compressor.

1969 - December 5 - Air Products and Chemicals, Inc., El Segundo, California

A Clark high pressure case, Type 161 B 4/4, operating at about 1275 psig, caught fire while being run-in on initial startup.

196? - India

A Clark oxygen compressor reportedly was involved in a serious internal fire at a plant that was being erected by Constructor John Brown (England).

196? - Linde Division of Union Carbide, East Chicago, Indiana

An incident occurred with a Clark 3M4-2MF, 400,000 scfh to 195 psig oxygen compressor.

Machine went down on a general power failure that also shut down driox pumps and the pipe line. Because of cold weather, the fluid in the dash pot on the discharge check valve froze or became so viscous that the valve failed to close. After an elapsed time of about 20 minutes, power to driox pumps was reestablished, the pumps started up, and pressure in the product line was reestablished. Power to the compressor motor and lube oil pumps was not yet on. As the check valve was not closed, oxygen back flowed into the compressor, rotating the rotors backward and without oil to the bearings.

An operator near the compressor noticed the startup of the unit and went to close the manual valve. As this valve was difficult to operate, the man had to close the next valve downstream.

A puff of smoke came out of the lube oil console and one oil drain burned - otherwise the fire was contained inside the case. All seals were out because of friction and fire.

196? - Linde Division of Union Carbide, Gary, Indiana

The Clark oxygen compressor was steam-turbine driven and it was felt that in at least one startup the operators were slow bringing the machine through a critical speed. There was no outward manifestation of difficulty, but when it became necessary to open the case for maintenance reasons, they discovered excessive wear on an interstage labyrinth seal and evidence of contact between the seal and the shaft sleeve, and burning on the shaft sleeve which was stainless instead of monel.

1970 - April - Galatz, Rumania

A fire reportedly occurred during the first week of April on a Demag oxygen compressor. Machines have been running two years. Strainer was installed on these machines made of 18/6 stainless steel in suction line and strainer completely disintegrated, went through machine with resulting fire and destruction of two casings in a three-casing train. The strainers were apparently installed against Demag's advice. No injuries.

1970 - April - Auguste Thyssen Chemical Works near Oberhausen, West Germany

A fire reportedly occurred in a GHH compressor during the first week of April.

References:

1. APCI General Specification for Cleaning for Oxygen Service, APCI No. 550-SD-27A, Revision E6T41, May 15, 1963 (Doc. #99000335).

2. APCI General Specification for Centrifugal Compressors, APCI No. 550-SD-16A, Revision B8551, April 15, 1965, (Doc. #99000336).

3. APCI General Sepcification for Reciprocating Compressors, APCI No. 550-SD-1A, Revision E7361, March 9, 1964 (Doc. #99000337).

4. APCI Construction Specifications. General Construction and Equipment Erection in Oxygen Compression Systems, El Segundo, California, APCI Section 200 to 200.20 incl., Revision November 17, 1969 (Doc. #99000338).

5. APCI, Machinery Field Testing and Reciprocating Oxygen Compressors, APCI Design Engineering Standard 551.1.9.1, February 3, 1971 (Doc. #99000026).

6. APCI, Machinery Field Testing and Centrifugal Oxygen Compressors, APCI Design Engineering Standard 551.2.8.1, February 3, 1971 (Doc. #99000027).

7. APCI, Piping -- Oxygen Compressor Location, APCI Design Engineering Standard 570.6, January 15, 1971 (Doc. #99000029).

8. APCI, Plant Components - Air Separation, Oxygen Compressor, APCI Safety Standard 607.1.2.3, December 1962 (Doc. #99000044).

9. Lapin, A., "Testing of Screens to be Used in Oxygen Compressor Suction," APCI Memo dated July 26, 1971 (Doc. #99000291).

Air Products and Chemicals INC.

December 10, 1971
IIF3a-1

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

3. Equipment Malfunctions and Failures

a. Equipment

(1) Gas Pressure Regulators

1. The following applies to pressure regulators manufactured by APCI and used by its customers.

a. General gaseous oxygen high pressure cylinder and low pressure line station service.

(1) Company Practices

(a) To provide detailed operating instructions to users including the recommendation that the instructions issued by makers of equipment used in combination with APCI regulators be consulted before operating the units in combination.

(b) To provide qualified factory and distributor repair service.

(c) To provide precleaned spare parts kits in sealed, dust-tight containers.

(d) To package regulators prior to shipment in tight closing protective containers and seal body openings to prevent foreign material from entering the interior of the regulators.

(e) To functionally test every regulator for safety and performance prior to final packaging.

(f) To provide regulator assemblers with proper tools and supervision to prevent defects being introduced at this point.

(g) To promote cleanliness throughout the regulator assembly operation, including an initial degreasing step of parts wetted by the gas.

(h) To provide up-to-date design documentation to assemblers to insure the use of proper parts and supplies.

(j) To maintain a high level of quality control of regulator parts through 100% inspection of all significant dimensions and properties prior to their entry into assembly stock.

(k) To thoroughly degrease and deburr all machined parts prior to inspection and stocking.

(l) To provide maximum cleanliness and physical control in the assembly stockroom.

(m) To clearly identify all parts and materials in the stockroom.

(n) To maintain an ongoing program of product evaluation for safety and performance.

(o) To thoroughly investigate all reported malfunctions and failures and to take any corrective action indicated to prevent reoccurrences.

(p) To thoroughly test all new products under controlled conditions simulating those of actual use.

(q) To corroborate design safety of new products through tests by independent agencies such as Underwriters' Laboratories, Inc. Along with initial testing, UL provides a valuable ongoing inplant quality audit service.

(r) To provide and maintain accurate, clear, and up-to-date engineering drawings and specifications and a system for effectively communicating changes to those who will execute them.

(s) To use all available technical information in the selection of the materials of construction and the specific design features of regulators and to keep abreast of new technology which can be applied to improving the inherent safety of regulators.

b. Gaseous oxygen high pressure cylinder and low pressure line station service with oxy-fuel welding, cutting and heating equipment.

(1) Company Practices

(a) All of a (1)

(b) To provide specific instructions pertaining to this service warning of the special precautions necessary to insure safety of operation

c. Discussion:

It is the intent of these practices to prevent equipment malfunction and failures due to:

(1) Improper design

(2) Faulty manufacturing practices

(3) Inadequate cleanliness

(4) Improper use

(5) Improper maintenance and repair

Adherence to these practices is the responsibility of the Gas Equipment Department of APCI. Their efforts are audited by the APCI Corporate Safety Department.

d. Related APCI documents

(1) APCI, Product Test Procedures 1200 Series Regulators, APCI January 30, 1970 (Doc. #99000287).

(2) APCI, Operating and Safety Instructions for Regulators and Compressed Gases, APCI, Welding Products Division, WPD4-70 (Doc. #99000288).

(3) APCI, Set Up and Operating Instructions for Air Products Redi-Set[R] Welding and Cutting Outfits, APCI Form 3424 WPD 003-M-406000 (5M 92569) Rev 3 (Doc. #99000289).

(4) Kokinda, J. J., 1200 Series Regulator -- Materials of Construction - #231-G-120054 (oxygen), Drawing #000-0-407004E, APCI, October 25, 1971 (Doc. #99000290).

(5) APCI, Master Drawing 1200 Series Regulations, APCI Drawing 000-0-407004E, March 4, 1968 (Doc. #99000308).

(6) Compressed Gas Association, Safe Handling of Compressed Gases, CGA Pamphlet P-1, 1965 (Doc. #99000271).

(7) American Welding Society, Safety in Welding and Cutting, USAS Z49.1, 1967 (Doc. #99000272).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

3. Malfunctions and failures

a. Equipment

(3) Valves

x. Avoidance of galling - Bronze or monel globe valves with bronze or monel trim should be used for throttling or bypassing oxygen control valves regulators. When the size of the valve is such that a stainless steel body is the only practical valve available commercially the trim should be bronze or monel. If a Colmonoy 6 hard faced stainless steel seat and disc are used, the disc locknut must be bronze or monel to avoid any galling between a stainless steel stem and disc. Galling occurs readity with stainless steel in dry gas systems.

y. Check valves in O_2 service should be monel or bronze. Wafer swing type with Kel-F disc inserts do an adequate job when used with centrifugal compressors. For reciprocating compressors, a swing check design is inadequate and would break down in a very short time. A reciprocating compressor plate type check valve or valve specifically designed for reciprocating service must be used.

February 18, 1972
IIF3b-1

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

3. Malfunctions and Failures

b. Geisering, Excessive Vibrations, Shock (Thermal and Pressure), Line Surges.

The Bibliography (p. 86) of the APCI Report, An Analysis of Water Hammer in Cryogenic Transfer Lines, The Mississippi Test Facility of the George C. Marshall Space Flight Center, National Aeronautics and Space Administration; APCI, February 28, 1964 (Doc. #99000358), lists several publications and articles covering the subject matter.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

F. Oxygen Transfer

3. Malfunction and failures

c. Insulation system deterioration due to vibrations

Oxygen piping is insulated with cellular glass and urethane insulation. Cellular glass insulation is used to insulate all flanges, valves, pumps, etc. where oxygen process leakage may occur in normal operations. This insulation is used for a minimum horizontal distance of 4 feet and minimum vertical distance of 10 feet on either side of the preceding locations. Urethane insulation is used on the remainder of the piping.

Cellular glass insulation is a friable material and subject to failure by vibration. The interior or bore of the inner layer of insulation is coated with a vinyl base compound to reduce abrasion from vibration and temperature change of piping.

Excessive piping vibrations, however, would be detrimental not only to the insulation system but to other mechanical devices and should be eliminated.

Urethane insulation is not friable and no special vibration cushion is used.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

II. Operational Hazards

G. Fires and Explosions

1. Methods to contain or restrict combustible mixtures.

The application of a safety factor in the design of oxygen process, storage, and handling systems for the temperature and pressure of service, provides a measure of containment for only minor reactions which occur from ignition of combustible mixtures. Containment of catastrophic high energy reactions is not considered in design for practical and economic reasons.

The intent of process design is to restrict, where possible, the entrance of combustible mixtures in oxygen process, storage, and handling systems. The methods through which this can be accomplished are (a) mechanical devices, (b) instrumentation, and (c) operating procedure.

a. Mechanical Devices - Mechanical devices are additions to oxygen systems which provide a measure of protection to restrict combustible mixtures. They may be part of the process design, requirements of codes, requirements of industry practices, or a completely separate auxilliary component for a specific function. These mechanical devices may be manually or automatically operated.

(1) Industry developed standards, although not mandatory, requiring different valve outlet connections on cylinder valves for the different compressed gases contained in cylinders. Corresponding fittings of fill lines and various accessories are in agreement with the cylinder valve outlet connections. The purpose of this standard is to prevent the accidental filling of cylinders with the wrong and possibly hazardous product. Industry practice is published in Pamphlet V-1, Compressed Gas Cylinder Valve Outlet in Inlet Connections by Compressed Gas Association, Inc.(1) and contains the American Standards B57.1-1965(2) and the Canadian Standard B96-1965(3).

(2) Exhibit "A" of Plant Operations Manual, Section 2.02[4], lists the fixed ends of transfer hoses and storage tank connections to be used for the different cryogenic liquid products to prevent intermixing at filling or customer storage sites.

(3) Process design of oxygen producing equipment includes the use of filters, scrubbers, and driers to remove contaminants from the process stream, and the use of hydrocarbon and guard absorbers to handle contaminants which manage to slip through with the process stream. Check valves are used to prevent reverse flow of material and double block and bleed valves are used to isolate circuits where hazardous materials are associated by design with oxygen producing, handling, and storing equipment.

b. Instrumentation - Total hydrocarbon, acetylene spot check, oxygen, nitrogen, and other analyzers are used to continuously or intermittently monitor the various process streams of plants to detect the presence of contaminant materials which might be detrimental to the safety and operation of the equipment. This instrumentation can be tied to alarm and shutdown switches to provide an automatic system for alerting personnel to an impending hazardous situation and for protecting equipment. The area and atmosphere surrounding operation equipment are checked with portable oxygen analyzers at regular intervals or as the operation demands for oxygen enrichment or oxygen deficiency to alert personnel of a potential hazard. An explosimeter is frequently used to check the presence of flammable gases, if the process involved uses these materials.

c. Operating Procedures - Operating procedures have been developed for oxygen process, storage, and handling systems which, in addition to optimum operating efficiency, minimize or eliminate the possibility of combustible mixture formation within equipment. Some important operating procedures to achieve control of combustible mixture formation are listed below:

(1) Safety Standard 626.4.1, Purging Methods, [5] establishes concentration limits concerning purge operations where oxygen or air may possibly be introduced in flammable gas processes or storage systems. The purge media is nitrogen.

(2) District Operations Manual, Section 6.3, Quality Control Program,[6] lists the requirements for the regular scheduled check and double check on products at a specified quality, this control program detects the presence of contaminants which may effect the safe operation or the process handling or storage system. Similar procedures have been included in the Plant Operations Manual to maintain quality of product.

(3) Detailed procedures exist in the District Operations Manual, Section 9.1[7], and the Plant Operations Manual, Section 2.02,[4] for the filling of containers with gaseous and cryogenic liquid products.

2. Avoidance of chemical reactions and flashbacks.

A safety review of APCI process, storage, and handling systems is made for the purpose of determining compatibility with gaseous or liquid oxygen. The possibility of chemical reactions with oxygen are examined during the safety review.

The many different applications in which oxygen is used by other than the producer is an area where a safety review is generally not made excepting where specifically requested. This service is available to customers and when requested, considers the chemical reaction possibility.

A universal application of oxygen is in conjunction with acetylene in the welding and burning of metal processes where piped systems are used to distribute the gases to their points of use. Design of these systems is in agreement with National Fire Protection Association Code No. 51, Welding and Cutting, Oxygen-Fuel Gas Systems[8]. Hydraulic flash arrestors are used in the fuel system to prevent flame from getting back to the supply source. Check valves are used at the individual use points to prevent the intermixing of gases and the formation of flammable mixtures within the system.

3. Avoidance of shock Sensitive Materials.

Materials used in oxygen process, storage, and handling systems must meet the requirements as listed in Safety Standard 609.1, Compatible Materials[9] and must be suitable for the temperature and pressure of the service as specified by applicable professional and industrial codes.

4. Methods to reduce the vulnerability towards internal and external fires.

   a. Quantity-distance requirements of the National Fire Protection Association Code No. 566, Bulk Oxygen Systems at Consumer Sites[10] and NFPA No. 50[11] are used for both gaseous and liquid oxygen storage on customer property.

   b. The same rules (NFPA No. 566) apply at producing facilities with possible expansion of distances between oxygen compressors and other equipment.

   c. In the case of oxygen compressors, inventory dump accessories are provided along with appropriate instrumentation and shut-down devices to vent the oxygen, close the inlet valve, introduce nitrogen into the compressor and piping, and stop the compressor.

   d. An oxygen compressor is always started on nitrogen and the system completely checked prior to introduction of oxygen to the system.

   e. Plant liquid, when product quality or other reasons dictate, is drained and disposed in a location away from main plant components through a vaporizer.

   f. Trailer vents are connected to a vapor disposal system which exhausts the vapors in an area away from plant components or where personnel may be working.

5. Protection provided for adjacent components from internal or external fires.

   a. Personnel protective shields as per Design Engineering Standard 546.1[12A] used around oxygen compressors have a secondary purpose of offering protection to adjacent components.

   b. The above practice is being extended to cover protective shields around plant mounted centrifugal liquid oxygen pumps.

   c. The oxygen compressor control panel position must be in agreement with Design Engineering Standard 546.1[12] requirements and must have a protective roof as per Design Engineering Standard 534.1[13].

d. Operating plant liquid oxygen transfer from storage to rail or highway tanker loading areas are provided with a manually operated water deluge system for fire protection and vaporization of liquid spills.

e. Fire fighting capabilities are provided at strategic locations throughout producing facilities. Fire hydrants, hose houses, hose reels, and fire extinguishers, as specified in Safety Standards 630.2.2[14], 630.2.3[15], 630.2.6[16], and 630.2.2[17].

References

(1) Compressed Gas Association, Compressed Gas Cylinders Valve Outlet and Inlet Connections -- CGA Pamphlet V-1, 1965, (Doc. #99000235).

(2) American Standard, Compressed Gas Cylinder Valve Outlet and Inlet Connections, American Standards Association, B57.1-1965, (Doc. #99000236), published as CGA Pamphlet V-1, 1965 (Doc. #199000235).

(3) Canadian Standard, Compressed Gas Cylinder Valve Outlet and Inlet Connections, Canadian Standards Association, CSA B96-1965, (Doc. #99000237), published as CGA pamphlet V-1, 1965, (Doc. #199000235).

(4) APCI, Filling Procedure for Transportable Cryogenic Containers (250 - Gallon Capacity or Larger) -- General -- APCI Plant Operations Manual, Section 2.02, August 29, 1969, (Doc. #99000238). (Same as D.O.M. Sect. 9.1).

(5) APCI, Purging Methods -- APCI Safety Standards 626.4.1, January 1970 (Doc. #99000240).

(6) APCI, Quality Control Program -- APCI District Operations Manual, Section 6.3, April 1968, (Doc. #99000223).

(7) APCI, Filling Procedure for Transportable Cryogenic Containers (250 - Gallon Capacity or Larger) -- General -- APCI District Operations Manual, Sect. 9.1, April 1966, (Doc. #99000239). (Same as D.O.M. Sect. 2.02).

(8) National Fire Protection Association, Standard for the Installation and Operation of Oxygen-fuel Gas Systems for Welding and Cutting, NFPA No. 51, 1969, (Doc. #99000242).

(9) APCI, Oxygen Compatible Materials -- APCI Safety Standards, 609.1, June 1964, (Doc. #99000051).

(10) National Fire Protection Association, Installation of Bulk Oxygen Systems at Consumer Sites, NFPA No. 566, 1965, (Doc. #99000190).

(11) National Fire Protection Association, Installation of Bulk Oxygen Systems at Consumer Sites, Proposed Amendments Part II to NFPA No. 566, Passed May 1971, to be designated as NFPA No. 50, (Doc. #99000191).

(12) APCI, Personnel Protective Shields, Oxygen Systems -- APCI Design Engineering Standards 546.1, January 15, 1971, (Doc. #99000025).

(12A) APCI, Personnel Protective Shields, Oxygen Systems -- APCI TB-42, Applicable to APCI Design Engineering Standard 546.1, September 30, 1971, (Doc. #99000328).

(13) APCI, Oxygen Control Panel -- APCI Design Engineering Standard 534.1, (to be published)(Doc. #99000243).

(14) APCI, Fire Protection Equipment, Outside Fire Hydrant, APCI Safety Standards 630.2.2, July 26, 1961, (Doc. #99000244).

(15) APCI, Fire Protection Equipment, Outside Hydrant House and Equipment, APCI Safety Standards 630.2.3, June 15, 1960, (Doc. #99000245).

(16) APCI, Fire Protection Equipment, Deluge Systems LOX Loading Facility, APCI Safety Standards 630.2.6, January 1964, (Doc. #99000055).

(17) APCI, Fire Protection Equipment, Inside - Outside, APCI Safety Standards 630.3.2, May 1968, (Doc. #99000246).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

III. Maintenance Program

A. System Check and Inspection Where, Why, and How

1. Structure

Structural inspection is made on a yearly, monthly, or daily task depending on the equipment and location.

Listed below are a few examples as used in the Operations Department.

a. Inspect general condition of piping system. This should include pipe supports for overloading, deflection and cracked welds. The piping is checked for excessive stress or sagging. This is done on a daily task and is a visual inspection.

b. Inspect general condition of enclosures of pumps and cold piping. This is generally considered as cold boxes and cold piping duct work. Over pressure protection devices are provided on these systems. The number and kind of devices and set pressure are based on the configuration, pressure rating, purge pressure, and the type insulation used in the box.

c. Inspect general condition of Lox Storage Tanks. This inspection is depended on the type of tank. The normal structual inspection will include foundations, supports, insulation level, vacuum readings, and general condition.

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

III. Maintenance Program

A. System Check & Inspection Where, Why, & How

2. Leaks

Major liquid and cold gas leaks are repaired immediately because of possible foundation heaving, over pressuring of jacket, or cracking of carbon steel structural members. First indications of leaks are frost spots and changes in purge pressure or cold vapors. A detailed procedure is attached from the APCI Plant Operations Manual section 1.14, Cold Box Leaks, Nov. 10, 1968 (Doc. #99000227). Should the leak occur in a coded vessel APCI Plant Operations Manual Section 6.09, Coded Vessels Repair, November 29, 1968 (Doc. #99000228) must be used. Quality Control Layout Pneumatic Testing QCL105A, July 1, 1971 (Doc. #99000207), and Quality Control Layout, Hydrostatic Testing, QCL117A, July 1, 1971 (Doc. #99000206) are used for testing after the repairs are made.

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

III. Maintenance Program

A. System Check & Inspection Where, Why, & How

3. System Instrumentation and Controls

System instrument and control checks in operations are continuous as readings are taken on hourly basis and a malfunction of most of them will give an alarm and/or shutdown of related equipment. The Plant Operations Manual Section 6.05, Instrumentation Preventive Maintenance, October 30, 1968 (Doc. #99000229) gives inspection procedures and frequencies. The safety relief valves and rupture discs are inspected as per Plant Operations Manual section 6.02, Safety Valves and Rupture Discs, December 8, 1969 (Doc. #99000230).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

III. Maintenance Program

A. System Check & Inspection Where, Why, & How

4. Insulation

Insulation check and inspection is accomplished on a daily visual inspection and in more detail when the preventive maintenance manual requries it.

Insulation of interconnecting lines which contain low temperature streams require insulation to prevent heat input to the stream and to provide personnel protection from cold temperatures.

Insulation for liquid oxygen lines or other lines which may come in contact with liquid oxygen are non combustible to protect against the possibility of a reaction in the event of a liquid leak.

Process lines operating at temperatures colder than the condensing temperature of air are insulated with material compatible with oxygen.

Appropriate weather protection that was applied to the insulation must be maintained.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

III. Maintenance Program

A. System Check and Inspection; where, why, and how

5. General Considerations of the "aging" system

Inspection of Bulk Oxygen Storage Systems. IGD inspection procedures for gaseous and liquid oxygen storage systems at consumer sites are contained in District Operations Manual Volume 1, Section 4.2.3, and Section 4.1.3, respectively.

a. APCI, Maintenance and Inspection Requirements for Customer Bulk Gas Supply System, APCI District Operations Manual, Vol. 1, Section 4.1.3, June 1971 (Doc. #99000192).

b. APCI, Maintenance and Inspection Requirements for Bulk Liquid Customer Installations, APCI District Operations Manual, Vol. 1, Section 4.2.3, May 1969, (Doc. #99000193).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

III. Maintenance Program

A. System Check & Inspection, Where, Why & How

5. Preventive Maintenance Program

All of operations facilities are on a formal P.M. Program. Manuals are issued listing all tasks with a definitive numbering system for each of the tasks. Work required on a monthly or less frequent basis is on an IBM Card and the cards are distributed each month at which time the task is to be performed. The Operations Dept. Preventive Maintenance Report, Feedback Card (Doc. #99000231) is filled in if and when the work is done and returned to the corporate offices. Each month a report is issued indicating compliance in percent of "Normal" tasks and "Downtime" tasks. Man hours expended in each category are also noted. In the event downtime tasks cannot be done due to operating requirements, they can be rescheduled and they are not penalized in the compliance report. Further details are given in the "Plant Preventive Maintenance Control" Document, June 1971 (Doc. #99000232). Also attached are a few representative pages of the PM Manual.

The following lists are representative of maintenance program entries on oxygen equipment or related items. Frequencies of the maintenance tasks are also noted with one period in some cases and with a range of period intervals in others. It must be understood that the frequency is a function of not only the type of the equipment in this category but also its history, process, usage, vendor and construction which may dictate more or less frequent task requirements.

Oxygen Gas Storage

1.	Inspect valves and packing for leaks	Weekly
2.	Inspect general condition of vessels, supports and piping for paint requirements.	1 Year
3.	Check exterior of storage vessels, vessel supports and safety valve equipment. Check shut off valve.	1 Year
4.	Soap test storage bank piping at maximum working pressures.	3 Years

Lox Storage and Piping

1.	Check valve packings for leaks. Inspect boots on extended stem valves.	Daily-Weekly
2.	Inspect relief valve for leakage.	Daily
3.	Inspect interconnecting piping and insulation.	Weekly
4.	Inspect storage tank and crossover for frost spots.	Weekly
5.	Check crossover for oxygen concentration	Weekly
6.	Inspect top of tank and jacket vents.	Weekly
7.	Check and top-off insulation level.	1 year
8.	Check to ensure controller for foundation heating is maintaining its set point. Recalibrate according to manufacturers instructions.	6 mos.
9.	Check vacuum reading and record	1 year
10.	Check purity from top of Lox Storage Tank.	weekly

Lox Pumps

1.	Defrost pump. Clean and inspect pump suction screens. Clean or replace as necessary.	3 mos.-1 yr.
2.	Inspect for pump seal (or packing) leakage. Listen for any unusual noises or vibration. General visual inspection of pumps and motors. Check nitrogen purge flow.	Shift-Daily Daily.
3.	Check oxygen concentration in box.	Weekly
4.	Check pump box for frost spots and general condition.	Weekly-Monthly
5.	Inspect condition of blowout panels on box.	Weekly-6 mos.
6.	Lox Pump (BJ)-Perform solvent wash. Prior to and after solvent wash inspect internal parts with a black light and report observations.	3 yr.
7.	Lox Pump (External, usually transfer pump)-After 500 operating hours overhaul pump replacing bearings as well as other worn parts.	6 mos.
8.	Lox Pump (BJ)-Perform thorough check of entire pump assembly. Replace parts as necessary. Change gear case oil. Perform wash out.	12-36 mos.

9. Lox Pump (BJ)-Rotate shaft by hand one full turn before and after cooldown.	Start up
10. Inspect general condition of pump and piping system for product or oil leaks.	Daily

Vaporizers

1. Check steam regulator valve. Check condensate trap.	3 mos.
2. Inspect all steam piping valves and fittings for leaks. Repair as necessary. Inspect steam drain lines and traps for plugging. Clean as necessary.	Daily-weekly
3. Inspect vaporizer for cracks and general condition. Repair as necessary	Daily
4. Pressure test product oxygen coil	monthly
5. Shift test shell vent for high oxygen. Report and readings greater than 21% oxygen.	monthly
6. Drain water side. Flush out and refill.	6 mos.
7. Wash vaporizer internally. Use methylene chloride.	4 years
8. During freezing weather check water bath temperature, heater on at 35°F and off at 40°F. Check panel heater operation.	Daily
9. Thermal Research Vaporizer checks.	
a. test flame guard system.	Daily
b. test run burner. Allow system temperatures to reach normal operating levels.	"
c. Check flame stability through sight port. Adjust as necessary.	"
d. Visually inspect for leaks and sign of overheating	"
e. Check combustion air blower and circulating water pump for unusual noise or vibration.	"
f. Record one complete set of log readings (reconsider schedule after 3 months)	"

g. Inspect flame scanner lenses for crackes and dirt. Clean or replace as necessary. Inspect spark plug gap setting. Inspect blower discharge sleeve. Perform daily system test after performing the above work. Check for corrosion and requirements for touch-up painting. — Monthly-6 mos.

h. Replace scanner cell. Clean gas filters on combustion and oxygen analyzer. Inspect combustion blower. Clean as necessary. — 1 year

i. Clean water circulating pump suction strainer. — monthly

j. Remove and disassemble burner. Inspect for damage to ceramics and combustion chamber. Split burner at flange just below spark plug and thoroughly inspect ceramics for deposits, cracks and spalling or other damage. Replace scanner cell. — 24 mos.

k. Check tubes, tube supports, baffles and interior of shell for corrosion. Make inspection with burner removed and by removing bottom manhole and section of stock. — 24 mos.

Loading Stations

1. Trailer and railroad loading station lot filters. Inspect and service as necessary. — 6 mos.

2. Inspect all loading connections and hoses for wear or abuse. Replace faulty connections or hoses. — Daily

Cylinder Filling

1. Inspct all copper pigtails for wear and replace as necessary. — Monthly

2. Anneal all copper pigtails — 6 mos.

3. Inspect tube trailer stanchion hoses, tubing and fittings for leaks, damage and proper anchorage. Repair or replace as necessary. — 6 mos.

4. Calibrate all cylinder manifold pressure gauges. — 3 mos.

5. Check and calibrate pressure switches. — 1 year

General

1. Perform visual inspections of all safety valves. Leakers, no seal, illegible or missing date tags, signs of corrosion, etc. will require retest, repair, or replacemnt as necessary. 1 year

Further Details are given in the Following:

a. Plant Preventive Maintenance Control, June 1971 (Doc. #99000232)

b. Monthly Plant Safety Survey, Form 2032, Sect. 5.18 (Doc. #99000233)

c. Kitson, F. K., Approved Alloy Steels in Cryogenic Service, Safety Gram No. 10, Rev. 1, October 25, 1963 (Doc. #99000040).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

III. Maintenance Program

B. Safe Cleaning Procedures for Filters, Traps, and Instruments

<u>Filters</u>

The only standard locations for any numbers of filters or strainers in oxygen service are the suction lines to pumps, suction lines to compressors, discharge lines of high-pressure reciprocating pumps, and in-line product filters for government requirements.

When we were using pumps in plant processes for pumping through heat exchangers to vaporize against incoming air we had suction filters on the suction lines to prevent larger particles of desiccants, solder and any other foreign material from entering the pump. There are a few of these systems still in operation but concept has changed, and we generally do not utilize this process anymore (liquid vaporization from storage, or oxygen gas compressors have succeeded this method). Generally construction was per our print 58521C(1) which has related prints specifying 10 mesh monel wire cloth, which is backed by 304 stainless steel perforated sheets (cylindrical).

We now have screens in all our transfer pumps suction lines. They have 100 mesh stainless steel conical screens. This action was prompted by fires in pumps in Airco at Bethlehem where it was believed foreign material caused the incidents.

Our old high pressure reciprocating pumps, which have graphite packing, have sintered bronze (porex) filters on the discharge side of the pump to prevent graphite and asbestos particles from getting into the exchangers and subsequently into cylinders or other area where it would be undesirable.

Government specifications for LOX require filtration of our product. Where necessary, we install in-line filters on our product hoses used to load trailers for government locations. We are presently using a Pall Trinty Rigimesh (stainless) 10 micron, 98 percent removal, 40 micron absolute removal filter assembly.

All of the above filters are cleaned in methylene chloride or trichlorethylene and blown dry with nitrogen. Air known to be dry and oil free is also permitted for drying.

Traps

I do not know of any so-called traps used in any of our oxygen systems excepting the suction line of the old APCI high-pressure reciprocating pump. At one time we had used brass refrigeration filters here, but later put a U-type "plumbers" trap made from copper return bends or street elbows just upstream of the pump. It was intended only to hold any heavy material, such as solder, in this low point and prevent the foreign material from getting into the pump or the pump valves.

This trap was cleaned initially as part of the original piping and had no further cleaning requirements.

Instruments

Instruments are generally cleaned according to our QCL 116F[(2)]. Design Engineering Standard 531.2[(3)] specified gauges be cleaned to 116F. It also states a decal "Oxygen - Use No Oil" be affixed to the gauge.

The only other formal cleaning procedure for instruments that I could find in manuals and inquiries in the Engineering Department was QCL 102F[(4)], Cleaning Bourdon Tube Type Gages for Oxygen Service.

References

(1) Oxygen Pump Filter Assembly, APCI Drawing #58521C, Rev. B, December 18, 1957 (Doc. #99000234).

(2) APCI Requirements for Class AA Cleaning -- APCI Quality Control Layout No. QCL 116F, July 1, 1971 (Doc. #99000085).

(3) APCI Instrumentation Pressure Indicators -- APCI Design Engineering Standards 531.2, October 1963 (Doc. #99000022).

(4) APCI Cleaning Requirements for Boudon Tube Type Gages Used For Oxygen Service -- APCI Quality Control Layout No. QCL 102F, July 1, 1971 (Doc. #99000078).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

III. Maintenance Program

C. Pressure Testing

The following steps are followed in pressure testing

1. Secure a safety work permit
2. Areas where testing is taking place is to be considered off-limits for personnel except for authorized people doing the work. Rope off the area and display applicable signs.
3. Whenever possible, hydrostatic testing is to be utilized in preference to pneumatic testing.
4. Never test a circuit without a proper relieving device, such as a relief valve or rupture disc, as an integral part of the circuit or vessel.
5. Always use a regulator when pressurizing circuits with high-pressure cylinders.
6. Always use dry and oil-free fittings and lines when pressure-izing oxygen circuits. Also, the pressurizing medium, nitrogen or air, must be dry and oil free.
7. Build up pressure gradually to 50 percent of test pressure and then in increments of 10 percent until test pressure is reached. This is especially important on high-pressure circuits. Hold a proof pressure for at least five minutes and then reduce 10 percent before "moving in" for soaping and visual inspection.
8. Stand clear of equipment while it is being pressurized.
9. Never stand in line with pipe corps, plugs, or blinds which can blow loose under pressure.
10. Before pressurizing circuits, be sure all valves are set properly and know where vent valves are located in the event that quick venting of pressure is necessary.
11. The pressure gauge must be visible to the operator when pressurizing a vessel or circuit. In cases where the operator cannot see a gauge, a second person observing the gauge must relay signals to the ooperator.

12. After pressurizing a circuit, wait several minutes before attempting to check lines or soap test. Remember, some flux can hold high pressure temporarily.

13. Be careful when venting and relieving pressures. Be sure all personnel are clear. Anchor all lines to prevent "whipping". When possible, vent upward rather than at lower levels.

14. If a circuit is left pressurized, warn all personnel at charge of shifts and leave signs reading "Danger - Under Pressure" in conspicuous places. Hourly checks are to be made by qualified persons to check the equipment and guard against over-pressure due to temperature.

15. Never walk away from an unfinished solder joint, threaded joint, etc. because of a rest break or shift change. Always finish the joint.

16. Be sure fittings, valves, and piping for the hookup are suitable for pressures involved.

Other Sources of Information

1. POM 1.03, Safety Control Procedure - TagOut, and POM 1.04, Safety Control Procedure - Safety Work Permit has some relationship with pressure testing as they are procedures to prevent inadvertent pressurizing of vessels or circuits not intended to be part of the test. Also, tagging of the valves serve as warnings to those individuals not part of the actual work. See attachments. These POM procedures are the same as Safety Standards 626.3.3 and 625.3.5.

2. POM procedure 6.09, Coded Vessel Repairs, outlines Operations Department action on coded vessels including pressure test. QCL 117A, Hydrostatic Testing - General and QCL 105A, Pneumatic Testing - General, are attachments to this POM procedure which are Manufacturing Department procedures used in conjunction with our work.

APCI References:

1. APCI Safety Control Procedure - Tagout, APCI Plant Operations Manual Section 1.03, February 15, 1967 (Doc. #99000202).

2. APCI, Safety Control Procedure - Safety Work Permit, APCI Plant Operations Manual Section 1.04, February 16, 1967 (Doc. #99000203).

3. APCI, Coded Vessel Repairs, APCI Plant Operations Manual Section 6.09, November 29, 1968 (Doc. #99000204).

4. Maryland Casualty Company, APCI Field Inspection Contract with Maryland Casualty Company, APCI Plant Operations Manual Section 6.09, Attachment 1, August 27, 1969 (Doc. #99000205).

5. APCI, Hydrostatic Testing - General, APCI Qaulity Control Standards QCL 117A, October 20, 1958 (Doc. #99000206).

6. APCI, Pneumatic Testing - General, APCI Quality Control Layout QCL105A, July 1, 1971(Doc. #99000207).

7. Smith, H. W., APCI Safety Control Procedures -- Tag Out Procedures, APCI Safety Standards 626.3.3, May 1962 (Doc. #99000208).

8. Smith, H. W., APCI Safety Control Procedures -- Air Separation Plant Safety Work Permits, APCI Safety Standard 626.3.5, June 19, 1961 (Doc. #99000209).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

IV. System Emergencies

APCI Safety Standard 626.3.8, Emergency Procedures, May 1962 (Doc. #99000053), is the guideline for establishing specific emergency procedures for each company location considering the function of the facility and the number of people employed. The emergency conditions considered are equipment malfunction or failure, human failure, extreme climatic conditions, or national emergency.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

IV. System Emergencies

A. Safety Training and Area Placarding

1. Safety Training

a. Safety Meetings

Safety Standard 625.0.1[1] (duplicated as POM 5.16[2]) requires at least one safety meeting each month. This is generally complied with and all personnel are covered by the most practical scheduling. Reports on the meetings are submitted to the Operations Safety-Service Manager where they are reviewed and recorded for compliance. Non-compliance is questioned and reported to Operations management as necessary.

Generally, plant management is spokesman at the meetings. Experts from the corporate offices may hold the meetings occasionally on subjects in which they are more proficient. Also, technicians (mechanical or electrical, etc.) assigned to a range of plants may speak on safety problems in their particular fields and theories of same so a better understanding of the equipment and operating principles may prevent accidents.

Topics can be a wide range of general industrial, personnel protective, equipment or process divisions. The facilities' current problems would be given priority. Second priority would be recent problems at other plants which may be directly related to the facilities' operations. Plant managers are kept posted on these problems in order to insure distribution of pertinent information. If very important, this is done immediately by telephone. Other means of relaying the information are by memos, Safety-Grams or Safety Bulletins.

Plant incidents ranging from near accidents to accidents and their investigations are reported on standard forms. Monthly reports on injuries are reported to the Safety Department. Serious incidents are covered immediately by phone. Details for this reporting are in Corporate Administrative Procedure 1.5[3], Safety Standard 625.0.1[1] and Plant Operations Manual 5.16[2], 5.18[4], and 5.21[5]. These procedures and associated reports are used to obtain and relay information to applicable locations.

Quality control topics are also used occasionally as safety meeting material. There is some relationship with oxygen and other gases production as the mixing with other gases, lack of sufficient purity, and end uses could result in reactions hazardous to personnel and property. Low oxygen purity or inadvertent filling of oxygen containers with another gas could directly result in loss of life; for instance, in hospital breathing usage.

b. Printed Material

Facilities are provided with periodicals and safety papers as applicable to their operations. All facilities subscribe to National Safety Council material. Technical papers are purchased and distributed.

At one time the American Institute of Chemical Engineers annual symposium report on Safety In Air and Ammonia Plants was distributed to all facilities. However, the last four (there are twelve volumes) were essentially all limited to the ammonia plant and distribution was limited to New Orleans and a few key personnel in the Operations offices.

All facilities have copies of the Plant Operations Manual, one section of which is devoted entirely to safety. Operators have their own copy of this POM in the control room with the Safety, Quality Control, and Operations sections for their review and reference. Many times the new or revised procedures are covered formally in safety meetings.

Each facility also has two binders, one specifically for the AIChE symposium reports and another for all Safety-Grams and Safety Bulletins issued by the Safety Department. The Safety Manual also contains copies of miscellaneous technical papers applicable to our work.

For the last ten years all employees have been issued a pocket size Operations Safety Manual for ready reference. It includes the following sections:

Safety Organizations
General Safety Rules
Properties of Products
Safe Handling of Cryogenic Liquids
Safe Handling of Compressed Gases
Plant Operation and Maintenance Safety
Maintenance and Shop Procedures
Plant Housekeeping
Protective Clothing and Equipment
Chemicals
First Aid Instructions
Fire Protection
Office Safety

This pocket manual has been revised several times and reprinted. However, this past year it was decided to discontinue its use when the present supply is exhausted. Company growth, expanded operations, diversified products, etc. now make it impractical to include even the main items as revisions and additions are needed constantly. The POM does this job better and since it is available in all control rooms and is a looseleaf manual, it fills the bill adequately.

2. Area Placarding

Main placarding at air separation facilities are the No Smoking signs. Generally, there is no smoking permitted except in offices, control rooms and locker rooms, but areas of increased hazards may have additional reminders.

Other placards used as applicable are listed below:

a. Fire Extinguishers - May have bright red paint at the actual hanging area to facilitate location in emergencies and also act as an indicator to the fact that one belongs at that location so replacement can be expedited if necessary.

b. "Authorized Personnel Only" - Generally used in electrical bays only and in the immediate areas of oxygen compressors. Oxygen compressor areas are so posted to reduce personnel exposure to fire possibilities. Also, authorized personnel are familiar with the compressor and must first check operating conditions to be sure they are satisfactory before they spend any appreciable amount of time in the area.

c. "Danger, Do Not Stand in Front of Cabinet While Motor is Being Started" - These signs are posted on motor terminal boxes containing switches, lightning arrestors and capacitors rated 2500 volts or higher. There have been several incidents of explosions of this type of equipment. One man was hurt quite seriously in one case.

d. "Danger, High Voltage" - As applicable.

e. "Danger - No Smoking, Matches or Open Lights" - Or similar sign in storage battery areas where hydrogen may be emitted.

f. Exits - As applicable for more remote escape routes.

g. "Danger Caustic" and "Danger Acid" - As necessary to applicable areas for purifier or water treatment.

h. "Caution, May be High in Oxygen" - For areas, such as in storage tank skirts where there may possibly be oxygen leaks and/or concentrations. Also, nitrogen tanks indicate there may be an asphyxiating atmosphere.

A good many other signs for normal industrial safety considerations are used, such as:

Fire Hose
Emergency Shower
Safety Glasses and Hard Hats Must be Worn
Visitor's Parking
Visitors Must Apply at Office
Chemicals Goggles Must Be Worn in This Area

3. References

(1) APCI, Industrial Safety Policy, APCI Safety Standards 625.01, October 3, 1961, (Doc. #99000241).

(2) APCI, Industrial Safety Policy, APCI Plant Operations Manual Section 5.16, October 30, 1968, (Doc. #99000253).

(3) APCI, Accidents Reporting, APCI Corporate Administrative Procedure, No. 1.5, April 1, 1968, (Doc. #99000254).

(4) APCI, Safety Reports and Forms, APCI Plant Operations Manual, Section 5.18, March 3, 1970, (Doc. #99000233).

(5) APCI, Accident Reporting, APCI Plant Operations Manual, Section 5.21, May 8, 1968, (Doc. #99000255).

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

IV. System Emergencies

B. Warning Devices

Warning devices for oxygen systems vary with process, application and vendors variations of similar equipment. However, most of the systems have some general applications. Unless otherwise noted, the summary below is for general applications.

Compressors - Oxygen

1. Process Stream

a. Low pressure switch and alarm upstream in the suction of a centrifugal compressor to recycle the compressor if suction pressure decline continues to sub-atmosphere level. For reciprocating compressors, it will not recycle but will alarm and shut down.

b. A low temperature switch and alarm on suction piping of any compressor taking suction from a possible cold source. Setting shall be based on area climate but in no case shall it be set below -5°F.

c. A high temperature indicator-switch and alarm shall be provided on each stage discharge upstream of the cooler. Maximum permissible alarm and shutdown settings shall be 340°F and 350°F respectively. Each producing facility shall establish a lower setting when operating temperatures indicate this is possible. Alarm and shut down points shall then be 10°F and 20°F respectively above maximum normal summertime operating temperature.

2. Lubrication

a. For centrifugal compressors, a high oil temperature indicator-switch, bulb type shall be installed in the oil return header from the bearings to the oil sump. The switch shall be connected to the alarm on the oxygen compressor instrument panel. The intent of this requirement is to warn the operator of excessive oil temperature due primarily to insufficient water flow.

b. For reciprocating compressors, the high oil temperature indicator switch shall be in the oil return line from the cooler to the sump.

3. Motor

   a. The motor winding temperature indicator shall be located on the main instrument panel. A switch shall automatically shut down the compressor on excessive temperature.

   b. The motor cooling air temperature switch shall actuate an alarm located on the oxygen compressor panel in case of excessive temperature.

   c. Water-cooled motors shall be protected against internal water leakage from overhead coolers by a liquid-level switch connected to an alarm on the oxygen compressor panel or by a bottom drain continuously open to atmosphere.

4. Cooling Water

   a. A pressure switch shall be connected to actuate an alarm located on the main instrument panel, in case of abnormally low water pressure in the water pump outlet header.

   b. Loss of cooling tower fan operation shall be indicated by an alarm located on the main control panel.

5. Seal Gas System (centrifugal compressors only) - A labyrinth system with nitrogen as a sealing gas is an integral part of centrifugal compressors to prevent bearing lubricating oil from reaching oxygen systems. Generally, at least a double protection is provided by these seal systems.

   a. Pressure switches shall be provided to alarm and shut down the compressor when manufacturers' limits are exceeded for the following conditions.

      Pressure at bearing end is too low
      Pressure at injection part is too low
      Pressure at impeller end is too high
      Differential pressure between impeller and injection part is too low

   b. Seal gas backup system pressure is too low (alarm only)

      NOTE: Backup system is provided in the event primary seal source has problems. Usually, the backup source is a cylinder supply with sufficient storage to get primary system working or shut down the compressor.

6. Rotor Shift (centrifugal compressors only) - A rotor shift device is incorporated to indicate wear on the thrust shoes and if wear is excessive to shut it down. Normally, there is a bleed-through of gas in this system, but as wear on shoes progresses, it will permit it to touch the plunger which actuates a gear and permits a piston to drop. When this piston drops, it stops the bleed-through, builds pressure and actuates the alarm and shut down.

7. Vibration - Centrifugal Compressor

   a. Equipment shall be provided for monitoring radial vibration, axial vibration and axial position of each compressor rotor shaft and of the high speed pinion. This equipment shall be connected to the oxygen compressor instrument panel alarm. A switch shall shut down the oxygen compressor in case of excessive vibration at any point normally connected for continuous monitoring.

   b. Continuously monitored vibration points shall be set for alarm and shut down at initial startup and every major overhaul as follows:

Maximum Normal Vibration	+0.5 mil	Alarm
Maximum Normal Vibration	+1.5 mil	Automatic Shut down

8. Vibration - Reciprocating Compressors

   a. Seismic type vibration switches shall be provided to shut down the compressor when frame vibration amplitude increases to twice the value at the new conditions as accepted by Machinery Engineering. A minimum of one switch per two crank throws is required. Each switch shall be wired to light a yellow light, which will indicate the switch that has shut down the compressor. The light shall be maintained until the switch is reset.

   NOTE: The majority of the above information was extracted from APCI Design Engineering Standard 570.7, APCI Operated Oxygen Compressor System, July 19, 1971 (Doc. #99000256).

Vaporizers

1. Warm discharge side of vaporizers generally go into carbon steel piping. Temperature switches are applied here to sound alarms if piping gets too cold, usually due to

insufficient heating source (water or steam). The liquid source (pump or valve from a pressurized tank) is shut off at the same time the alarm is sounded.

2. Thermal Research Type Vaporizers (Natural Gas Fuel) - Alarms and shut downs for this system are:

   a. Low temperature switches, similar to Item 1 above.

   b. Pressure switch to act in the event the natural gas supply pressure is low or high.

   c. Low pressure switch for air blower.

   d. High temperature switches for the downcomer in case of low water level.

   e. High stack temperature switch, in case stack temperature is too high as a result of low water level.

   f. Low water level switch.

   g. Flow switch to act in case of failure of water pump.

   h. CGA combustible gas analyzer to indicate incomplete combustion. Calibrated 0-2 percent total combustibles in an inert atmosphere.

   i. Fire Eye to indicate no flame condition.

Pumps

1. Some of the older plants had low-pressure alarms on suction side of pumps to indicate loss of feed or low head to the pump. General use was on BJ type pumps.

2. New plants are now getting low current (amps) devices to indicate low suction pressure. Low pressure and low current switches are both to prevent cavitation and subsequent damage to the pumps, particularly bearings and shafts.

Product Lines

1. Some customer feed lines are provided with alarm indicating low pressure. Low pressure could be indicative of failure of some of our equipment, excess demands by the customer or

failure of the line. Excess flow valves are installed at a few older locations and most of the new plants whereby a line failure would also automatically shut off this valve. Excess flow valve is actuated by readout on a flow indicator across an orifice section. Ashland, Cleveland and Los Angeles have such systems. The Cleveland valve prevented a more serious incident some years ago when the customer had a fire in their reducing station and the excess flow valve was actuated.

Storage Tanks

1. Low pressure storage tanks have low pressure alarms, usually set at approximately 1 pisg, to warn operators if there is a tendency to approach vacuum conditions which could cause a tank collapse. Buildup coil system malfunction could result in lowering of pressure, particularly during withdrawal procedures.

General

1. It is our policy to install temperature switches in an area where carbon steel lines may be cooled down to -20°F or lower due to malfunctions of equipment. This is mentioned above for lines downstream of vaporizers, but is applicable in other areas. This same arrangement has been used where expansion of gas may cause excessive cooldown, but general rule here is to use proper materials of construction rather than the switch. Switch is tied into an alarm and/or applicable systems shut down to prevent further cooling.

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IV. System Emergencies

C. Protection

1. Personnel

The adequacy of personal protective equipment is insured by testing and maintenance as required by APCI, Plant Operations Manual 1.12 (1).

a. <u>Eye Protection</u>

Safety glasses must be worn at all times in areas such as operating areas, cylinder filling areas, and near any grinding or cutting operations.

Glasses must be worn by office personnel or visitors when in these areas.

Working around welding operations, flash goggles with side shields must be worn.

Employees who normally wear prescription glasses may obtain safety spectacles, made according to their prescription through the company.

Face shields and chemicals goggles must be worn during mixing or transferring of corrosive materials.

Goggles must be used when using a stationary or portable grinder.

Chemical goggles must be used during any operations requiring the use of solvents or cryogenic liquids. Additional eye and face protection may be required in some locations for special reasons.

References Safety standards Sec. 627.4.2 (2), Safety-Grams No. 1 (3), 29 (4), 30 (5), and 58 (6).

b. <u>Hard Hats</u>

Safety hats-caps must be worn by all operating personnel around machinery, operating areas, and storage areas. The only exempted areas are the office, control rooms, and locker rooms.

Visitors, office personnel, and maintenance men are required to follow the same instructions as above.

Safety hats-caps are excellent protection against falling objects.

The wearing of hard hats is mandatory at all operating facilities.

Reference   Safety Standard Sec. 627.4.1 (7).

c. Safety Shoes

Realizing the importance of safety shoes, the company contributes toward the purchase of safety shoes and recommends their use. Injury records prove the reduction in the frequency and the severity of foot injuries by personnel wearing safety shoes. Safety shoes are not mandatory, but are urged and recommended at all facilities.

Reference   Safety-Gram No. 11 (8).

d. Respiratory Protection

Filter-type respirators are to be used when working in dusty areas or when handling dust-producing materials such as rockwool or perlite.

Respirators equipped with "rebreathers" in which the wearers breath is passed over alkali peroxide to replace oxygen and remove carbon dioxide, should not be used in trichlorethylene service. Reaction of trichlorethylene with the caustic formed during the regenerating reaction leads to the formation of dichloracetylene, which is highly toxic and explosive.

Self-contained or air-line breathing apparatus is to be used in any area where there is a high concentration of solvent vapors or where the oxygen content of the atmosphere is below 18 percent. Life lines will be used except when otherwise instructed. Areas to be considered are, internal cleaning of storage tanks and vessels, and entry of cold boxes with nitrogen atmosphere when using cleaning solvents.

Reference   Safety Standard Sec. 627.3 (9).

e. Hearing Protection

Operations Department has been supplying hearing protection equipment as needed or requested for a number of years. Wearing of this equipment is now mandatory largely where the occupational noise level exceeds 90 decibels as measured on the "A" scale of a standard sound level meter at slow response, regardless of octave band. Sound level surveys are made at each location and safety meetings are held with employees.

Safety meeting outlines include: Reasons for concern, sound measurement, exposure limitations, parts of the ear and their function, and where protection should be worn. Generally, ear plugs are satisfactory, but ear muffs are recommended where noise levels reach 110 decibels. There may be occasions where the decibel level may exceed 130, for these exposures both the ear plug and the ear muff shall be provided and used.

Reference Safety Standard Sec. 627.4.8 (10), Memo Operations Hearing Protection Program, H. Master, Dated 4/7/71 (11), Safety Standard Sec. 625.0.1.2 (12).

f. <u>Gloves</u>

Neopreme or suitable plastic gloves are to be worn during handling of solvents, acid, or other harmful chemicals.

Approved gloves with gauntlets are to be worn during cryogenic liquid transfers or handling.

Approved gloves for electrical service are supplied. These are high voltage lineman's gloves and lineman's leather protector gloves.

Gloves are also supplied for normal every day use.

g. <u>"Check In" Systems</u>

The Safety Department recommends the guidelines listed be utilized in establishing the controls to provide a means of checking on the conditions of personnel who are working alone, performing emergency maintenance work or daily routine operations. Obviously where a "check-in" system can be established with a near-by Air Products facility, customer personnel, or neighboring industry guard service, such an arrangement shall be made. The hazards inherent in the type of work being performed by the individual shall be the criteria used in determining whether a "check-in" system is required.

Flammables-Regularly scheduled operations with one man/shift at any facility handling flammables must be provided with a positive method of "check-in" by the operator. The frequency of "check-in" may vary with the type of system established but must provide a minimum operator "check-in" once every hour.

Oxygen - A "check-in" system for one man/shift operation is required if routine operations necessitate operation from more than grade elevation or if cryogenic liquid loading operations are performed. The frequency of "check-in" shall be a minimum of once every hour.

Maintenance - Maintenance work on systems containing flammable gases will require the presence of more than one person.

Maintenance work on energized electrical systems with voltages up to 250 volts will require the presence of more than one person. Under no circumstances are personnel permitted to work on energized circuits with voltages exceeding 250 volts. Work on de-energized circuits with voltages of 440 volts or above will require the presence of more than one person. The second person need not be an electrical technician.

Acceptable "check-in" systems - The "check-in" system utilized shall be a reliable method of determining the responsiveness of an individual.

The A.D.T. system is used at many facilities. A switch must be actuated every hour or an alarm is flashed in the A.D.T. office. They in turn call the plant and if there is no answer they will investigate or call facility management.

The telephone system, by being called or by calling another facility, or a guard service hourly..

Reference Kitson, F. K., Staffing and "Check-In" Systems for Operating Plants, June 25, 1968 (13).

h. First Aid Instructions

All injuries, no matter how slight, must be reported to facility management, and shall be treated immediately.

A first aid record must be kept of all injuries, their cause, and the first aid treatment.

First aid kits are not a substitute for dispensary or medical treatment. It is merely the first step in preventing a bad situation from becoming worse.

Know the location of stretchers, first aid kits, fire blankets, and other first aid equipment.

Know the emergency numbers or where they can be found for doctor, hospital, and ambulance service.

First aid is no substitute for proper medical attention. Injuries of any magnitude must be referred to a competent physician after first aid treatment.

Minor injuries: treat accordingly as listed under first aid guide or refer to the Red Cross First Aid Manual, which is available in all first aid cabinets. If there is any doubt to the seriousness of the injury, the patient should be driven to the doctor after first aid treatment. Make notations with full particulars on the first aid record sheet.

Serious injuries: call for a doctor and/or ambulance immediately. Be sure to keep the patient warm and lying down. Attend to serious bleeding immediately and give artificial respiration if necessary. Do not move the injured person unless absolutely necessary. Contact management as soon as practical.

i. Evacuation Routes

Management of each APCI facility prepares a plan for quickly evacuating all areas in an orderly fashion and in a minimum of time. The plan, clearly identifying all evacuation routes and exits, is posted at convenient locations in all areas.

Personnel are trained to direct an orderly evacuation and to secure their area before leaving.

The evacuation plan is reviewed and revised every six months or less if conditions arise which warrant changing the plan.

2. References

(1) APCI, Personal Protection Equipment Maintenance, APCI Plant Operations Manual 1.12, April 21, 1967 (Doc. #99000104).

(2) Smith, H. W., Personnel Protective Equipment, Eye Protection, APCI Safety Standards 627.4.2, October 1962, (Doc. #99000316).

(3) APCI, Pressure Gauge Failure, Safety Glasses Save Another Pair of Eyes, APCI Safety-Gram No. 1, June 1, 1961, (Doc. #99000317).

(4) Smith, H. W., Safety Equipment Never Prevents an Accident -- It only Prevents an Injury, APCI Safety-Gram No. 29, August 1, 1963 (Doc. #99000318).

(5) Ball, W. L., Are Safety Glasses Worth the Cost and Effort?, APCI Safety-Gram No. 30, August 9, 1963 (Doc. #99000329).

(6) Schmoyer, W. W., And Then There was Darkness, APCI Safety-Gram No. 58, March 15, 1967 (Doc. #99000319).

(7) APCI, Personnel Protective Equipment, Wearing Apparel, Hard Hats, APCI Safety Standards 627.4.1, June 15, 1970 (Doc. #99000320).

(8) APCI, Safety Shoes, APCI Safety-Gram No. 11, May 14, 1962 (Doc. #99000321).

(9) Smith, H. W., Personnel Protective Equipment, Respiratory Protective Equipment, APCI Safety Standards 627.3, January 1964 (Doc. #99000322).

(10) APCI, Personnel Protective Equipment, Occupational Noise Protective Equipment, APCI Safety Standards 627.4.8, September 1969 (Doc. #99000323).

(11) Master, H. H., Operations Hearing Protection Program, April 7, 1971 (Doc. #99000324).

(12) APCI, Industrial Safety, Occupational Noise, APCI Safety Standards 625.0.1.2, April 9, 1971, (Doc. #99000325).

(13) Kitson, F. K., Staffing and "Check-In" Systems for Operating Plants, APCI Safety Dept. Memo, June 25, 1968 (Doc. #99000326).

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IV. Systems Emergencies

C. Protection

2. Buildings and Adjacent Systems Protection

a. Deluge Systems:

Deluge Systems are used at cryogenic liquid loading facilities where daily transfer operations are conducted on a routine basis.

A spray nozzle is provided at each liquid loading connection. The adjustment of the nozzle depends on available G.P.M. capacity and pressure of fire water system. The nozzle pattern is set for full coverage of the rear of the trailer with sufficient angle to allow for the trailer to be spotted off center from the loading connection. The system is provided with an air operated block valve which is actuated from at least two remote positions or a manual valve when the valve can be located in a safe operating area.

References: Safety Standards Sec. 630.2.6 (1)

b. Barriers:

Protective barriers of single sheet corrugated steel are erected around most stationary liquid oxygen pumps, (B.J. pumps excluded).

The protective barriers are installed in such a manner that the operator will be protected from metal parts, liquid, or a fire in the event of a pump failure and fire.

The protective barriers, for oxygen gas compression systems, vary due to the size and type of compressors, and are fully covered in the APCI Design Standards.

References: Stompler, R. D., LOX Pump Safety Barriers, February 19, 1971 (2)
APCI Design Engineering Standards 546.1 (3)
APCI Technical Bulletin No. 42 (4)

c. Fire Protection:

The guides for fire protection are based, where possible, on National Fire Protection Association Codes, the Insurance Carrier, and The Company Standards. In all instances fire protection at the facilities exceed the requirements of the insurance carrier.

The first consideration for a fire water system is the availability of water, its source, volume and pressure.

Hydrant locations are based on the specific exposure in the facility. Generally, they will be located at least a minimum of fifty feet from the exposure.

Each hydrant has a house and is equipped with double doors which open outwards. The standard equipment for each house includes a spanner and hydrant wrench, hose straps, hose fittings, nozzles, and hoses.

Normally the facilities have a small complement of men, with this in mind the hose equipment provided is designed for ease of handling.

The facilities are instructed to follow the rule of calling outside help first then combating the fire. If help is available naturally fire fighting equipment is put into service while one employee phones for assistance.

Portable fire extinguishers are located according to what is considered to be possible problem areas in the facility. The two types used are the Dry Powder and Carbon Dioxide extinguishers. The inspection of these are on a regular schedule by the employees with the duty rotated to keep each man acquainted with the locations.

Monthly safety meetings are conducted at each facility with each employee explaining the fire fighting equipment along with personnel safety.

References: APCI Operations Safety Manual (5)
APCI Plant Operations Manual, Section 1.13 (6)
C.G.A. Report by M. H. Hubbs, pp. 175-189, Oct. 15 and 16, 1963 (7)
APCI Safety Standards 605.1 (8)
APCI Safety Standards 605.1.3 (9)
APCI Safety Standards 610.1.1 (10)
APCI Safety Standards 625.0.1 (11)
APCI Safety Standards 626.3.8 (12)
APCI Safety Standards 627.4.7 (13)
APCI Safety Standards 627.5.1 (14)
APCI Safety Standards 630.2.2 (15)
APCI Safety Standards 630.2.3 (16)
APCI Safety Standards 630.3.2 (17)

d. References:

(1) Kiston, F. K., Fire Protection Equipment, Deluge System, Deluge System, LOX Loading Facility, APCI Safety Standards 630.2.6, January 1964 (Doc. #99000055).

(2) Stompler, R. D., LOX Pump Safety Barriers, APCI Memo, February 19, 1971 (Doc. #99000327).

(3) APCI, Personnel Protective Shields, Oxygen Systems, APCI Design Engineering Standards 546.1, January 15, 1971, (Doc. #99000025).

(4) APCI Technical Bulletin No. 42 Applicable to Design Engineering Standards 546.1, September 30, 1971, (Doc. #99000238).

(5) APCI, Operations Safety Manual, APCI 20P64 (Doc. #9000330).

(6) APCI, Maintenance of Portable Fire Extinguishers, APCI Plant Operations Manual, Sect. 1.13, March 30, 1967 (Doc. #99000331).

(7) Hubbs, M. H., Fire Protection, Air Separation Plant Safety Symposium, P. 175 to 189, CGA Meeting, Chicago, Ill., October 15 and 16, 1963 (Doc. #99000332).

(8) Ball, W. L., APCI Plant Site Criteria, Air Separation, APCI Safety Standards 605.1, November 10, 1960 (Doc. #99000042).

(9) Ball, W. L., Criteria, Air Separation Plants Layout, APCI, Safety Standards 605.1.3, January 6, 1961 (Doc. #99000043).

(10) Ball, W. L., Check List, Air Separation Plant Site, APCI Safety Standards 610.1.1, November 28, 1960 (Doc. #99000052).

(11) Ball, W. L., Industrial Safety Policy, APCI Safety Standards 625.0.1, October 3, 1961 (Doc. #99000241).

(12) APCI, Safety Control Procedures, Emergency Procedures, APCI Safety Standards 626.3.8, May 1962 (Doc. #99000053).

(13) APCI, Personnel Protective Equipment, Aluminized Heat Protective Clothing, APCI Safety Standards 627.4.7, May 1968 (Doc. #99000333).

(14) APCI, Personnel Protective Equipment, Tonnage Air Separation Plant, APCI Safety Standards 627.5.1, June 14, 1970 (Doc. #9900334).

(15) Smith, H., Fire Protection Equipment, Outside Fire Hydrants, APCI Safety Standards 630.2.2, July 26, 1961 (Doc. #99000244).

(16) APCI, Fire Protection Equipment, Outside Hydrant House and Equipment, APCI Safety Standards 630.2.3, June 15, 1970 (Doc. #99000245).

(17) APCI, Fire Protection Equipment, Inside - Outside, APCI Safety Standards 630.3.2, May 1968 (Doc. #99000246).

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IV. System Emergencies

E. Hazards Protection

One of the prime considerations when locating a new facility is the immediate industry in the area. A survey is made within a substantial radius of the proposed site to eliminate trouble areas that could not be controlled. There are instances where undesirable industry has located next to one of APCI facilities and precautionary measures must be undertaken. Listed below are a few instances where this has occurred and the action taken to protect equipment and personnel.

The Delaware City facility had a chlorine plant built adjacent to it. The first thing that is normally done is to get to know the hazards involved such as possible spills, abnormal process vents and possible line ruptures. This is usually done by a meeting with the new facility management and receiving a firm agreement to be notified immediately in the event of an emergency. APCI has purchased 20 masks which is a sufficient number to protect the maximum personnel in the plant at any one time. The masks are for escape from the area and not for prolonged exposure. Self-contained breathing type masks were purchased for prolonged exposure and are used by operators to secure the facility.

All personnel are advised on the use of the masks and the hazards involved. Escape routes are posted and an alterante gate was installed for emergencies.

The procedures for emergency shutdowns are posted and take minimum time.

The escape type masks are the Willson Double-Cartridge Filter Series 800C with the #43 cartridge. These are for maintenance type personnel and are used for immediate evacuation of the area.

The prolonged exposure type masks are the 272-OVAG-L with full face as manufactured by Acme Protection Equipment Co. This type is effective for an adequate period of time to permit securing the equipment in a safe and orderly manner.

The Alcoa, Tennessee installation had a chlorine storage tank located in the immediate vicinity. The concern again was mainly to supply suitable gas masks and proper instructions to the personnel located at the facility. This installation is a one man operation. The type mask used here is the Scott Scapak, Model 9000 11-03 with an extra cylinder. This gives the man sufficient time to secure the facility in an orderly manner. The Willson

TLGW mask with LG3 cannister case is available for maintenance personnel which could be on site, and they would be expected to evacuate immediately.

The new Martinsville, West Virginia installation had a problem with a neighboring facility venting large amounts of NO_2 gas. The neighbor at the time was having what is considered normal start-up problems and have since remedied these. The neighbor also stores phosgene gas at the facility. We have purchased sufficient number of gas masks and posted emergency procedures.

Where a facility is located in a extreme hazardous area, such as in a storage area containing flammable liquids, we would consider installing a system which would provide a curtain of water between the hazard and the facility. This is of course considered an extreme case.

The protection and precautions taken are decided upon, after the hazards from neighboring facilities are studied. The facilities are equipped with proper type portable fire extinguishers. The larger facilities have fire water loops and hose houses located strategically.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

IV. Systems Emergencies

E. Hazards Protection

The following APL bulletins and reports identify and discuss various problems related to oxygen safety:

(1) Everson, I., Notes for Guidance of Customers Having Air Products Ltd. Oxygen Equipment, APL Safety Department Information Sheet No. 19, (Doc. #99000422).

(2) Everson, I., Fire Hazards in Compressed Air and Oxygen Rich Environments, APL Safety Department Information Sheet No. 33, (Doc. #99000423).

(3) Denison, D. M., An Assessment of the Fire Risks of the Oxygen Environment Experiments, RAF Institute of Aviation Medicine, Farnborough, Hants, FPRC/Memo 217, January 1965, (Doc. #99000424).

(4) Denison, D. M., J. Ernsting, and A. W. Cresswell, The Fire Risks to Man of Oxygen Rich Gas Environments, RAF Institute of Aviation Medicine, Farnborough, Hants, FPRC/Memo 223, July 1965, (Doc. #99000425).

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LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

V. Accident/Incident Investigation and Report

Accidents Involving Spills and Leakage

It has been Air Products' experience that accidents involving liquid oxygen tankers and oxygen tube trailers do not result normally in a loss of product. There have been occasions when the liquid oxygen tanker has been damaged to the extent that transfer from the damaged vehicle was believed to be necessary. If the product cannot be completely transferred into another tanker it is our practice to add liquid nitrogen to the "heel" of liquid oxygen remaining in the disabled vehicle to bring the residual liquid to a liquid air concentration. The remaining heel of liquid air is then discharged to a safe location.

The infrequent LOX spills which have occurred within IGD have not resulted in a serious problem. The most recent occurred on February 24, 1971, when approximately 2,5000 gallons of LOX discharged from a 6,000 gallon tank. The direction of vapor drift and flow was controlled by fire hose streams to prevent the oxygen vapors from drifting toward a residential section. Water was not sprayed on the liquid oxygen.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

V. Accident/Incident Investigations and Reports

Accidents involving oxygen equipment and systems which cause injury to personnel or damage to equipment and property are thoroughly investigated to determine the cause and the corrective action necessary to prevent recurrences.

A. Reporting Requirements

Corporate Administrative procedure requires reporting all accidents to the various managers of departments and divisions, the Corporate President, and the Safety Director. The more serious accident is initially reported by telephone and followed by the appropriate form reporting requirements. The less serious accidents are reported by submitting the forms required. Accidents involving personnel or property of third parties (customer, general public, etc.) are reported by telephone to the responsible managers including the Law Department.

Forms used to report injuries to personnel contain information as required by federal, state or local governments, workmen's compensation; and/or by the insurance carrier. Copies of typical forms are attached. Equipment damage report forms may be memoranda describing the accident or incident.

B. Investigation of Accidents

Each accident involving oxygen and/or oxygen equipment is investigated to determine cause and corrective measures necessary to eliminate or minimize the possibility of recurrence. The extent of the investigation is determined by the type equipment involved and the extent of injury to personnel. The level of investigation for an oxygen gauge failure which caused personnel injury will be greater than a gauge failure which does not involve personnel injury. On the other hand, an accident involving an oxygen compressor or an air separation plant is extensively investigated whether personnel are injured or not because of the economic and technical significance to other Company operating areas.

The investigation of accidents may be made by a competent individual or by teams of specialists, includng consultants, using available techniques in determining the mechanics of reaction which caused the accident.

Accidents which occur to oxygen equipment manufactured, owned, and/or operated by other companies and industries are investigated to the extent possible on information obtained through news media, confidential correspondence, professional society symposiums, and federal agencies.

C. Records

Records are maintained on all accidents pertaining to oxygen and/or oxygen equipment which occur within our Company and users of equipment manufactured by our Company. Records of accidents occurring to other companies are also maintained.

For convenience of identification and record retrieval, categories of oxygen equipment failures have been established as follows:

1. Air Process Plants
   a) General
   b) Reboilers
2. Oxygen Compressors
3. Liquid Oxygen Pumps
4. Oxygen Regulators and Related Equipment (Torches)
5. Piping and Lines
6. Storage Systems
7. Gauges and Instrumentation
8. Highway and Rail Tankers

Summaries of accidents in each equipment category are maintained and periodically reviewed:

D. Summary of Accidents

The attached summaries are identified to be in agreement with the categories established in paragraph "C". The column headings on the summaries indicate the date of accident, location of accident by State or Country, equipment owned and operated either by "APCI" or "other" companies with similar activities, component and/or plant size where applicable, and a remarks column which briefly summarizes the accident. The summary applicable to oxygen regulators and related equipment pertaines only to equipment manufactured by APCI.

1. Air Process Plants

   a) General

   Table VD1a lists accidents to air plants and identifies the component involved where the reaction occurred.

   Analysis of each accident led to recommendations to minimize or eliminate the possibility of recurrence.

   Review of the summary indicates retraining was necessary in the case of the IT/D plants. Limitations on the oxygen content of reactivation nitrogen for the 75T/D plants, plus some procedural and instrument design changes essentially eliminated air drier type of fires. Establishment of plant washout programs minimized the possibility of expansion engine oil absorber reactions. Analyzing contaminant concentrations in process streams and establishing limits of contaminant levels has improved the operating record of air plants. Established preventive maintenance programs has further reduced the possibility of accident recurrence.

b) Reboilers

Table VD1b lists the accidents occurring to air process plant reboilers as a group. The column heading "reboiler type" is letter coded as follows:

A. Shell and Tube (internal to column) Oxygen or crude oxygen is on the shell side and nitrogen gas is condensed in the tubes.

B. Thermo-syphon Reboiler (external to column) Shell and Tube. Oxygen passes through the tubes from bottom to top and nitrogen is condensed on the shell side.

C. Extended Surface (Plate and Fin) Reboilers (external to column). Oxygen passes upwards in its passages and nitrogen passes downward through its passages.

D. Extended Surface (Plate and Fin) Reboilers (Internal to Column). Oxygen passes upwards in its passages and nitrogen passes downward through its passages.

E. Extended Surface (Plate and Fin) Reboilers (Internal to Column). Same as "D" but crude oxygen instead of oxygen.

F. Modified Single Column. Small packed exchangers operating at elevated pressure and attached to a low pressure single column for the purpose of condensing nitrogen reflux streams.

Early plant reboiler failures led to the development of the hydrocarbon analyzer to constantly monitor hydrocarbon in process streams. A quick spot check test for acetylene concentration in plant liquids also came into regular use. Operating changes include disposing of given amounts of plant liquids continuously or at regular intervals to remove contaminants. Some design improvements evolved as a result of reboiler failures.

2. Oxygen Compressors

Table VD2 lists oxygen compressor reactions which have occurred in recent years. A series of reactions have occurred during World War II with water lubricated oxygen compressors and driers due to incompatibility of materials used.

To minimize the damage from reaction, inlet suction screens, vibration detectors, temperature sensors, and automatic inventory dumping valves have been provided. Erection of barriers, and remote operation control are intended to provide protection for operating personnel. Startup and shutdown on nitrogen is routine operating practice.

3. Liquid Oxygen Pumps

Table VD3 lists pump accidents which are identified as plant or trailer mounted and centrifugal or reciprocating pumps.

Contamination or improper materials appears to be the chief cause of reciprocating pump failures. Centrifugal pump failures are related to mechanical failure of bearings and their lubrication which cause interference between pump parts and case. Design changes involving opening of pump clearances and different materials have been made to minimize the accident recurrence potential. A strict preventive maintenance schedule will cause bearings to be changed before they can become a problem.

4. Oxygen Regulator Accidents

Table VD4 lists regulator accidents which have occurred to APCI manufactured equipment. This class of oxygen equipment is widely used by many people from all walks of life. Most accidents have been caused by actions of persons who do not fully understand the hazards associated with the use of oxygen.

Training is thy key to minimizing the possibility of recurrence of this type accident. Improvement in operating instructions and discussions and demonstrations to industry and technical schools are efforts being made to train as many people as possible.

5. Piping and Lines

Table VD5 lists accidents which have occurred in oxygen piping and line systems. Most accidents are associated with persons unfamiliar with the hazards of oxygen. Training becomes the key to minimizing accidents with this class of equipment.

6. Storage Systems

Table VD6 lists only the major storage system failure accidents which are significantly important to total system safety.

7. Gauges and Instrumentation

Table VD7 lists accidents related to gauges and instrumentation failure. Those accidents pertaining to gauges are associated with contamination due to testing media or handling and storage when not in use usually introduced by persons not fully aware of the hazards associated with oxygen service. Training is the key to minimizing these accidents.

8. Highway and Rail Tankers

No entries are made in Table VD8. Highway and rail tankers have been damaged in accidents, however, the damage resulted not from tank failure but rather from involvement in vehicle or train derailment incidents.

AIR PROCESS PLANT ACCIDENTS

Date of Accident	Location of Accident	Equip. Owned or Operated	Plant Size	Plant Component	Remarks
10/56	Virginia	O	1T/D	H.P. Column	Column ruptured by overpressurization through misoperation and violation of safety practices---gagging of a safety relief valve. H.P. column extensively damaged, cold box and low pressure. Column slightly damaged. No injuries.
12/3/56	W. Virginia	O	Tonnage	Disposal Vaporizer	Energy release in a purge stream from condensers occurred in vaporizer coils. Believe contaminant concentrated in coils under restricted flow. Ignition source and contaminant unidentified. Localized damage only. No injuries reported.
7/11/57	California	A	75T/D	Air Drier	Fire in air drier from oxygen enriched reactivation nitrogen and hot drier. Fire occurred after start-up from a cold shutdown. Damage restricted to drier without burn through. No injuries.
7/12/57	California	A	75T/D	Air Drier	Fire in No. 2 oil separator from oxygen enriched reactivation nitrogen and hot drier. Fire occurred after startup from a cold shutdown. Damage restricted to drier without burn through. No injuries. Operational procedure changes eliminated this potential hazard.
3/6/58	Florida	O	1T/D	L.P. Column	Column ruptured by overpressurization. Line(s) from H.P. column believed to be partially restricted. Damage to H.P. column was extensive. One person was slightly injured.
3/30/58	Texas	O	Tonnage	Total Plant	Leaking LOX from drain line impinged upon carbon steel air line which ruptured in trench containing some oil. Extensively damaged the compressor building, including the control room of the plant. Three (3) persons were killed.
2/9/59	California	A	75T/D	Air Drier	A fire occurred in the No. 2 oil separator when process air was introduced in a hot (above 400°F) separator. Minor internal separator damage. No injuries.

AIR PROCESS PLANT ACCIDENTS

Date of Accident	Location of Accident	Equip. Owned or Operated	Plant Size	Plant Component	Remarks
4/21/59	England	O	Tonnage	Cold Box	Explosion in air plant cold box external to process equipment caused extensive plant damage and three (3) fatalities. The reaction was determined to be between LOX and oil soaked rock wool. Reported in AIChE Safety in Air and Ammonia Plants, Volume 2, page 36 (Doc. #99000295), and Volume 5, page 1 (Doc. #99000103).
1/4/61	Germany	O	Tonnage	Total Plant	LOX leak penetrated to smoldering wood flooring underneath cold box plates. Extensive damage to entire plant and 15 fatalities occurred. Reported in AIChE Safety in Air and Ammonia Plants, Volume 4, page 70 (Doc. #99000294).
7/61	England	O	1T/D	L.P. Column	Explosion in top 6 trays of L.P. Column. Details lacking but believe overpressurization involved rather than reaction. Slight damage to cold box. No injuries reported.
8/15/61	Michigan	O	25T/D	Air line at driers	Fire at driers due to customer cross-tie of oxygen and nitrogen lines. Unapproved field modifications. Damage restricted to piping at driers. No injuries.
1/14/62	Texas	O	100T/D	Piping	Explosion and fire in drain valve and defrost header on pure oxygen filter. Equipment damage slight. One (1) fatality.
1/26/62	Florida	O	1T/D	L.P. Column	Column ruptured by overpressurization through mis-operation. Suspected faulty liquid level gauge permitted excessive liquid levels in low pressure column.
5/20/62	England	O	Tonnage	Vaporizer	Reaction between oil and oxygen in LOX disposal vaporizer. One (1) fatality and two (2) injured.
5/26/63	Delaware	A	Tonnage	Expansion Engine Oil Separator	Fire in reciprocating expander oil separator at start of reactivation cycle. No equipment damage or personnel injuries.

AIR PROCESS PLANT ACCIDENTS

Date of Accident	Location of Accident	Equip. Owned or Operated	Plant Size	Plant Component	Remarks
7/12/63	Ohio	A	75T/D	Air Drier	Air drier heated box ruptured from overpressure due to leaking H.P. drier valve. Slight damage confined to the drier accessories. No injuries.
9/63	England	A	100T/D	Air Drier	Drier dust filter involved in fire when air was used to cool down a hot drier vessel. Damage confined to drier filter and piping. No injuries.
12/19/63	Canada	O	Tonnage	Oil Separator	Reaction with air and oil at -265°F in expansion engine oil-knock out pot. Moderate damage to separator and associated piping.
9/17/64	England	A	Tonnage	Argon Plant	Hydrogen reaction with oxygen in Deoxo unit. Faulty operation. Damage sustained to vessel support legs and concrete foundation. No. injuries.
2/3/65	California	A	75T/D	Expansion Engine	Mechanical failure of engine valve spring and higher than normal oxygen content of process gas reacted with oil accumulation in discharge piping. Piping and valve system extensively damaged. Slight area damage to building and other equipment. No injuries.
3/4/65	Delaware	A	Tonnage	Expansion Engine	Reaction in expansion engine oil absorber filter carried into piping system. Damage was restricted to piping system and filter media. No. injuries.
9/2/65	Pennsylvania	A	34T/D	Safety valve header	LOX spilled from unattended automatic plant through hole in S.V. header after SV functioned. Design error.
12/22/65	Michigan	O	Tonnage	Vaporizer	Solvent remaining in vaporizer after being cleaned reacted with oxygen when vaporizer placed in service. The vaporizer was extensively damaged. Two (2) fatalities occurred.
1/67	Illinois	O	Tonnage	Auxiliary Column	Reaction in auxiliary column. Details lacking.

AIR PROCESS PLANT ACCIDENTS

Date of Accident	Location of Accident	Equip. Owned or Operated	Plant Size	Plant Component	Remarks
7/7/67	Delaware	A	Tonnage	Expansion Engine	Reaction occurred in oil separator filter. Damage was confined to filter element within the separator vessel. No injuries.
9/18/67	Pennsylvania	0	Tonnage	Hydrocarbon Adsorber	Reaction in hydrocarbon adsorber area. Reaction between oxygen and retained trichlene solvent from previous washout.
10/6/67	Indiana	0	17T/D	Heat Exchanger Air Header	H.P. Air line ruptured at heat exchanger. Erosion of line caused by water vapor in air circuit. In service 17 years.
1/10/68	Texas	0	350T/D	Heat Exchanger	Reaction in oxygen circuit of coiled tube heat exchange in dead end of header where fuels could accumulate. Damage was restricted to one end of oxygen header. No injuries.

O = Other Companies

A = Air Products & Chemicals

REBOILER REACTIONS

Date of Accident	Location of Accident	Equip. Owned or Operated	Plant Size	Reboiler Type	Remarks
1/11/56	Texas	O	Tonnage	A	Reboiler reaction caused by nitrous oxide - acetylene crystals. Reported in AIChE, Safety in Air and Ammonia Plants, Volume 2, page 31 (Doc. #99000296).
4/18/56	Pennsylvania	O	Tonnage	B	Ethylene and hydrocarbons concentrated in the reboiler and reacted causing extensive damage to air plant cold box, nitrogen wash column cold box, and accessories in the immediate vicinity. Personnel injury occurred.
8/57	Germany	O	Tonnage	?	Reboiler reaction caused by hydrocarbons from hot air compressor.
4/24/58	Canada	O	100T/D	B	Reboiler reaction. Acetylene believed to be involved. Falling oxygen in tubes. A single reboiler tube involved. Reported in AIChE, Safety in Air and Ammonia Plants, Volume 3, page 9 (Doc. #99000297).
1/59	Philippines	O	.6T/D	F	Distillation column reaction. Acetylene in column sump believed to be cause due to acetylene plant location.
2/26/59	Brazil	O	.75T/D	F	Distillation column reaction. Details unknown.
7/15/59	New Jersey	A	6.5T/D	A	Slight reboiler reaction possible due to accumulations of hydrocarbons from poor compressor operation and no plant washout. Only indication of reaction was loss of purity. Slight bulge in reboiler shell at bottom tube sheet. No injuries.
8/28/59	South Dakota	O	1T/D	A	Rupture of joint between high & low pressure column. Insufficient detail to determine cause of reaction.

REBOILER REACTIONS

Date of Accident	Location of Accident	Equip. Owned or Operated	Plant Size	Reboiler Type	Remarks
9/30/59	Canada	0	100T/D	B	Reboiler reaction. Acetylene believed to be involved. Falling oxygen in tubes. Cold box extensively damaged. No injuries. Reported in AIChE, Safety in Air and Ammonia Plants, Volume 3, page 9 (Doc. #99000297).
11/59	Texas	0	20T/D	?	Reboiler reaction. Details unknown.
4/20/60	West Virginia	0	Tonnage	C or D	Reboiler reaction. Dry boiling in oxygen passages. Reported in AIChE, Safety in Air and Ammonia Plants, Volume 3, page 12 (Doc. #99000298).
2/20/61	Mexico	0	2.5T/D	A	Reboiler explosion when contamination reacted due to H.P. oxygen used to unplug lower liquid level line.
3/61	England	0	1T/D	A	Reboiler reaction, cause undetermined.
5/62	West Virginia	0	Tonnage	C or D	Reboiler reaction. Dry boiling in oxygen passages.
8/62	Michigan	0	500T/D	C or D	Reboiler reaction. Dry boiling in oxygen passages.
11/62	Peru	0	.75T/D	F	L.P. Column sump and tray damaged in explosion. Details unknown.
11/63	Ohio	0	Tonnage	C or D	Reboiler reaction. Dry boiling in oxygen passages.
2/64	West Virginia	0	Tonnage	C or D	Reboiler reaction. Dry boiling in oxygen passages.
4/2/64	California	A	75T/D	B	Reboiler reaction. Hydrocarbon concentrated in single tube when dry boiling occurred. Erratic plant operation was only indication of reaction.
7/19/64	England	0	Tonnage	C or D	Reboiler reaction. Details unknown.
10/64	England	0	Tonnage	C or D	Reboiler reaction. Details unknown.
11/6/64	California	A	75T/D	B	Reboiler reaction. Undetermined contamination concentrated in single tube when dry boiling occurred. Loss of purity and H.P. column pressure, and increase of L.P. column pressure only indication of reaction.

REBOILER REACTIONS

Date of Accident	Location of Accident	Equip. Owned or Operated	Plant Size	Reboiler Type	Remarks
1/65	Columbia	O	1.5T/D	A	Condenser reaction destroyed plant. Details unknown.
3/29/65	England	A	200T/D	B	Reboiler reaction in a single tube at liquid level submergence line. Cause undetermined. Loss of purity was only indication of reaction.
2/7/66	Puerto Rico	O	2.5T/D	A	Reboiler tubes crushed, reboiler bulged, liquid level and oxygen drain ruptured. Cause undetermined.
11/20/66	Peru	O	.75T/D	F	Explosion in oxygen subcooler. Details unknown.
1/67	Illinois	O	Tonnage	?	Explosion in side arm column. Details unknown.
10/27/67	California	A	75T/D	B	Reboiler reaction. Contamination concentrated in tube when dry boiling occurred.
8/5/68	California	A	75T/D	B	Reboiler reaction. Contamination concentrated in tube when dry boiling occurred.
10/5/68	California	A	75T/D	B	Reboiler reaction. Contamination concentrated in tube when dry boiling occurred.
12/25/68	California	A	75T/D	B	Reboiler reaction. Contamination concentrated in tube when dry boiling occurred.
3/24/70	Venezuela	O	5T/D	A	Plant exploded. Details unknown.
6/18/70	Jamaica	O	2.5T/D	A	Reboiler explosion believed caused by acetylene in reboiler.
6/9/71	Pennsylvania	O	Tonnage	C or D	Reboiler reaction. Faulty liquid level gauge which indicated 100% submergence instead of actual 85%. Cause dry boiling in the condenser.

O - Other Companies

A - Air Products and Chemicals, Inc.

OXYGEN COMPRESSOR ACCIDENTS

A reaction within an oxygen compression system is usually of short duration although violent. The damage to the equipment is often severe. Usually, any evidence which can be useful in determining cause is destroyed in the reaction.

Date of Accident	Location of Accident	Equip. Owned or Operated	Type of Compressor	Remarks
-	Indiana	0	Centrifugal	Evidence of internal reaction found during normal maintenance.
-	Illinois	0	Centrifugal	Oxygen compressor rotating backward without oil lubrication to bearings. Overheating ignited hot oil vapors.
Early '50	Europe	0	Reciprocating	Four reactions with fire origin in thin top section of 4th stage piston.
Late '50	South Africa	0	Centrifugal	No details.
1950	Europe	0	Centrifugal	Instabilities caused by operating too close to second critical speed.
2/27/58	Michigan	0	Reciprocating	No details.
1/15/59	Michigan	0	Centrifugal	Reaction in high pressure casing between the last stage wheel and balancing piston. No injuries reported. Cause undetermined.
5/59	England	0	Reciprocating	Grease left on valve springs after overhaul reacted with oxygen on compressor startup.
7/10/59	Louisiana	0	Centrifugal	Corrosion products caused by water leakage caused frictional heating and ignition in the balance piston area.
1960	Italy	0	Centrifugal	No details.
2/9/60	California	0	Reciprocating	Third stage oxygen compressor fire ruined the cylinder and blew off one of the valve covers. No injuries.
1960	Europe	0	Centrifugal	Instabilities caused by operating too close to second critical speed.

OXYGEN COMPRESSOR ACCIDENTS

Date of Accident	Location of Accident	Equip. Owned or Operated	Type of Compressor	Remarks
Late '60	Luxembourg	O	Reciprocating	Bolt from cooler area dropped into piston-cylinder area and caused fire.
6/22/61	Michigan	O	Reciprocating	No details. Newspaper report indicates three (3) fatalities.
7/7/64	Louisiana	O	Centrifugal	Reaction believed caused by backflow of flammable fluids from anothr process.
1965	Germany	O	Reciprocating	Broken piston rod caused reaction.
1967	France	O	Reciprocating	Reaction caused by broken piston.
1967	India	O	Centrifugal	No details.
12/67	Poland	O	Centrifugal	Reaction occurred shortly after startup. Improper cleaning after long term storage believed to be cause.
1968	Germany	O	Centrifugal	Oxygen compressor rotating backward without oil lubrication to bearings. Overheating ignited hot oil vapors.
4/68	Scotland	O	Reciprocating	Water and corrosion material from leak in after cooler appears to be part of the cause of the reaction. Worker seriously injured.
6/17/68	Louisiana	O	Centrifugal	Particle appears to have entered compressor intake and caused case to impeller interference. No injuries.
6/28/68	Maryland	A	Centrifugal	High pressure case reaction may be associated with major electrical failure which occurred at the same time.
9/68	Holland	O	Centrifugal	No details.
10/14/68	Louisiana	O	Centrifugal	A fatality occurred when the rebuilt oxygen compressor of June 1968 accident failed upon initial startup.
12/14/68	West Virginia	A	Centrifugal	A routine internal inspection revealed that a reaction occurred at some previous startup without involving the compressor. A labyrinth seal was installed backward.

OXYGEN COMPRESSOR ACCIDENTS

Date of Accident	Location of Accident	Equip. Owned or Operated	Type of Compressor	Remarks
12/27/68	Pennsylvania	O	Centrifugal	Improper cleaning in discharge volute believed cause of fire in discharge of compressor.
3/18/69	Ohio	A	Centrifugal	Low pressure case burn through. Mechanical failure in thrust bearing area caused shaft to shift. Fire started in fourth stage and burned through into second stage.
4/4/69	Illinois	O	Centrifugal	Reaction occurred on startup of compressor.
4/15/69	Pennsylvania	O	Centrifugal	Origin of fire appears to be in the seventh stage of the high pressure case. No injuries reported. Details concerning cause are lacking.
6/69	Germany	O	Centrifugal	Dirty intercoolers believed to be cause.
12/5/69	California	A	Centrifugal	High and intermediate pressure case of compressor burned through causing one (1) fatality and injury to eight (8) others.
1969	Japan	O	Centrifugal	No details.

O - Other Companies

A - Air Products and Chemicals, Inc.

LIQUID OXYGEN PUMP ACCIDENTS

The cause of many LOX pump accidents has been established only with difficulty as most of the evidence needed to determine cause has been destroyed in the reaction.

Date of Accident	Location of Accident	Equip. Owned or Operated	Type of Pump	Trailer of Plant Mounted	Remarks
3/19/57	Canada	0	Centrifugal	Plant	Pump seized resulting in fire.
8/13/57	Ohio	0	-	Trailer	Pump exploded during transfer of LOX. No details.
1/22/60	California	A	Reciprocating	Trailer	Fire occurred while pump under test. Plunger rod material of questionable compatibility. One (1) fatality, two (2) injured.
2/11/60	Pennsylvania	A	Reciprocating	Plant	Involved only the mechanical failure of pump barrel. No combustion reaction involved.
12/60	-	0	Reciprocating	Plant	Pump explosion due to peeling of chrome plating on pump rod and subsequent ignition.
8/28/61	Illinois	0	Centrifugal	Trailer	Tanker fire and explosion believed to have occurred during transfer of LOX to plant storage. Reported in AIChE, Safety in Air and Ammonia Plants, Volume 4, page 49 (Doc. #99000299).
2/1/62	Pennsylvania	A	Centrifugal	Plant	Hydrocarbon accumulation in multi-stage pump. Reaction is discussed in AIChE, Safety in Air and Ammonia Plants, Volume 5, page 41 (Doc. #99000300).
11/12/62	Pennsylvania	A	Reciprocating	Plant	Oil contaminated interconnecting. Tubing was also pressure underrated. Reaction caused injury to to three (3) persons.
3/6/63	Pennsylvania	0	Centrifugal	Plant	Oil contamination in LOX lines and pump ignited upon starting a warm pump. One (1) fatality and three (3) injured. Plant equipment severely damaged in air of reaction. Reported in AIChE, Safety in Air and Ammonia Plants, Volume 6, page 41 (Doc. #99000261A).

LIQUID OXYGEN PUMP ACCIDENTS

Date of Accident	Location of Accident	Equip. Owned or Operated	Type of Pump	Trailer of Plant Mounted	Remarks
10/11/63	Sweden	O	Reciprocating	Plant	Substitution of pump rod material and application of chrome plating to rod caused peeling of plating material which reacted with oxygen to cause fire.
10/24/63	Sweden	O	Reciprocating	Plant	Substitution of pump rod material and application of chrome plating to rod caused peeling of plating material which reacted with oxygen to cause fire.
12/4/63	Maryland	A	Reciprocating	Plant	Mechanical failure of connecting rod due to excessive tightening of pump packing.
12/16/63	England	A	Centrifugal	Trailer	Believe bearing failure caused interference between pump impeler and case with subsequent ignition. One (1) person slightly injured.
5/21/66	Ohio	O	Centrifugal	Plant	Fire in LOX pump caused by thrust bearing failure attributed to water in lubricant. One (1) person injured. Reported in AIChE, Safety in Air and Ammonia Plants, Volume 9, page 5 (Doc. #99000301).
5/23/66	Ohio	O	Centrifugal	Plant	Believe foreign object entered pump and initiated reaction. Pump was replacement for 5/21/66 pump accident. No injuries. Reported in AIChE, Safety in Air and Ammonia Plants, Volume 9, page 5 (Doc. #99000301).
9/2/66	England	O	Centrifugal	Trailer	LOX tanker exploded when submerged LOX pump failed Two (2) people killed and seventeen (17) injured.
10/6/66	Louisiana	O	Centrifugal	Trailer	LOX pump fire during transfer of product to storage.
11/3/66	Germany	O	-	Trailer	Fire started during transfer of LOX from trailer to storage.

LIQUID OXYGEN PUMP ACCIDENTS

Date of Accident	Location of Accident	Equip. Owned or Operated	Type of Pump	Trailer of Plant Mounted	Remarks
12/21/66	Florida	O	Centrifugal	Trailer	Believe foreign object entered pump and initiated reaction.
10/13/67	Pennsylvania	O	Reciprocating	Plant	Fire in pump originating in area of insulating seal and seal nut believed caused by tight pump packing.
2/26/68	Louisiana	A	Centrifugal	Plant	Oxygen from pump packing entered lower motor bearing case where reaction occurred damaging motor.
3/3/68	England	A	Centrifugal	Trailer	Bearing wear caused interference between pump impeller and case.
12/68	Pennsylvania	O	Centrifugal	Plant	Foreign material entered pump and impacted impeller.
12/68	Pennsylvania	O	Centrifugal	Plant	Bearing failure occurred. Pump was stopped before damage to pump internals. No fire occurred.
1/22/69	Germany	O	-	Trailer	Tanker under test when control end caught fire. No other details.
2/26/69	Belgium	A	Centrifugal	Plant	Poor lubrication permitted bearing wear which eventually caused interference between pump impeller and case and subsequent fire. No injuries.
9/69	Delaware	A	Centrifugal	Trailer	Fire in pump restricted to bearing case. Bearing and pump seal failure. No injuries.
10/69	Delaware	A	Centrifugal	Trailer	Fire in pump restricted to bearing case. Bearing and pump seal failure. No injuries.
12/14/69	Pennsylvania	A	Centrifugal	Trailer	Bearing wear caused interference between pump impeller and case.

LIQUID OXYGEN PUMP ACCIDENTS

Date of Accident	Location of Accident	Equip. Owned or Operated	Type of Pump	Trailer of Plant Mounted	Remarks
1/70	England	A	Centrifugal	Trailer	Bearing wear caused interference between pump impeller and case.
5/70	France	A	Centrifugal	Trailer	Bearing wear caused interference between pump impeller and case. Two (2) persons injured in fire.
6/3/70	England	A	Centrifugal	Plant	Bearing wear caused interference between pump impeller and case with subsequent ignition. No injuries.
8/7/70	England	A	Centrifugal	Plant	Parts of pump inlet filter is believed to have entered pump and caused interference between impeller and case with subsequent ignition.
8/17/70	Pennsylvania	O	Centrifugal	Plant	Cause appears to be bearing failure which permitted pump parts interference with subsequent ignition. No injuries.
9/8/70	Puerto Rico	A	Centrifugal	Plant	Pump failure caused by sequence of lubrication failure, bearing failure, rubbing contact, and ignition. No injuries reported.
2/17/71	England	A	Centrifugal	Trailer	Contamination in pump under test believed to be cause of reaction. One (1) fatality and two (2) injured.
3/5/71	England	A	Reciprocating	Plant	Mechanical failure of internal pump parts supplied the source necessary to ignite the pump materials of construction.

O - Other Companies

A - Air Products and Chemicals, Inc.

OXYGEN REGULATOR ACCIDENTS

Reactions which occur in oxygen regulators usually result in complete destruction of the regulator. The reaction usually occurs when the operator is operating his supply valves or adjusting the regulator resulting in injury, usually serious, to the operator. The exposure is initially to thermal burns by hot metal, followed by exposure to oxygen which supports the combustion vigorously. The table lists the area of the regulator involved and the apparent cause of the reaction.

Date of Accident	Location of Accident	Remarks
5/15/67	Texas	No details.
7/14/58	New York	No details.
8/22/58	New York	No details.
1958	New Jersey	Repairs by others.
7/59	New York	No details.
6/20/60	Indiana	H.P. side reaction. Repairs by others.
9/22/60	New Jersey	H.P. side reaction. Cause not determined. Regulator attached to tube trailer. Moderate damage to customer property.
12/9/60	West Virginia	H.P. side reaction. Cause unknown.
9/4/61	Ohio	L.P. side reaction. Cause unknown.
4/24/62	Pennsylvania	Involved in fire but not cause of reaction. Incorrect operating procedures.
6/22/62	Arkansas	H.P. side reaction. Source of fuel from portable acetylene generator believed to be contributory.
6/22/62	Ohio	No details. Oxygen-acetylene outfit in fire.
5/20/63	Maryland	H.P. side reaction. Operating procedure believed to be cause.
11/21/62	New Jersey	L.P. side reaction. Operating procedure believed to be cause.

OXYGEN REGULATOR ACCIDENTS

Date of Accident	Location of Accident	Remarks
8/26/63	Pennsylvania	H.P. side reaction. Dirt in an uncleaned part of system was cause of reaction.
1/27/64	Maryland	Hydrogen in oxygen system reacted. System design was cause.
5/13/64	Pennsylvania	L.P. side reaction. Operating procedure was cause.
5/22/64	Pennsylvania	Improper equipment maintenance was cause.
5/25/64	Pennsylvania	L.P. side reaction. Operating procedure was cause.
7/14/64	Michigan	L.P. side reaction. Equipment in poor repair.
10/31/64	Maryland	3 regulators involved. Hydrogen in oxygen system. System design was cause.
1/65	Oklahoma	Defective regulator was tested with oxygen to determine repairs required. Operator procedure incorrect.
8/30/65	Virginia	No details.
9/65	Virginia	No details.
1/1/66	Georgia	L.P. side reaction. Operating procedure was cause.
3/13/66	Pennsylvania	L.P. side reaction. Operating procedure was cause.
8/27/66	Illinois	H.P. side reaction. Operating procedure appears to be cause.
3/15/67	Virginia	H.P. side reaction. Contamination introduced to regulator during repairs.
5/10/67	Alabama	H.P. side reaction. Contamination introduced during repairs.
5/24/67	Pennsylvania	L.P. side reaction. Operating procedure appears to be cause.
7/25/67	New York	H.P. side reaction. Improper repairs may be cause.
10/21/68	Ohio	Reaction appears to have initiated in H.P. gauge bourdon tube. Cause undetermined.

OXYGEN REGULATOR ACCIDENTS

Date of Accident	Location of Accident	Remarks
4/69	Maryland	L.P. side reaction. No details.
5/69	Maryland	L.P. side reaction. No details. Same regulator as April 1969.
5/29/69	Maryland	H.P. side reaction. Origin of reaction outside of regulator in cylinder valve or valve passages and involved the regulator.
11/69	Michigan	A series of L.P. side reactions caused by improper design of fuel system for cold weather operation.
11/69	Missouri	A series of L.P. side reactions [illegible] n of fuel system for cold weather operation.
1/30/69	Alabama	H.P. side reaction. Contamination introduced through local repair.
10/17/69	Pennsylvania	H.P. side reaction. Origin of this reaction is the oxygen cylinder valve seat.
1/8/70	New Jersey	H.P. side reaction. Cause undetermined.
5/1/70	California	Jetcut machine extensively damaged by back-fire of oxy-fuel mixture caused by incorrect tips and damaged seating surfaces.
5/7/70	Tennessee	H.P. side reaction. Origin of reaction appears to be oxygen cylinder valve seat.
6/23/70	Arkansas	H.P. side reaction. Insufficient details, however, work are contaminated heavily with oil and grease.
11/23/70	Virginia	Poor practice of changing regulator from one product service to oxygen service without complete disassembly and solvent wash.
3/5/71	North Carolina	H.P. side reaction. Origin of reaction is external to regulator.
6/22/71	Michigan	Jetcut machine involved in fire which originated in electrical system. One torch was also defective.

PIPING AND LINE ACCIDENTS

Date of Accident	Location of Accident	Equip. Owner or Operator	Remarks
10/28/58	California	APCI	Leak in transfer hose connection between tanker and storage permitted LOX to penetrate asphalt paving. Explosion occurred when driver jumped from tanker to paving seriously injuring the driver and helper.
12/4/58	California	Other	Fire burned through valve and piping system connected to six (6) high pressure tubes, four (4) of which became projectiles upon release of residual pressure. Evidence of noncompatible materials in the system with an ignition source associated with friction, velocity, and adiabatic compression when a closed valve was opened. No injuries, but serious property damage.
1/9/60	Connecticut	APCI	Rubber high pressure hose ruptured and ignited during transfer of gaseous oxygen from tube trailer to storage system. Material not compatible in oxygen service. Driver was seriously injured.
8/29/61	Ohio	APCI	High pressure stainless steel piping ignited and burned. Oil and carbon steel rod were found in system. Sabotage suspected. No injuries.
7/16/62	Ohio	Other	Regulator station and associated piping feeding oxygen to steel mill furnace seriously damaged when reaction occurred within a system shut-off valve. Compatibility of material in one valve is suspected. An excess flow valve closed off the supply of oxygen to the fire to limit the area of fire involvement.
7/19/62	Kansas	Other	Underground drain system exploded after excess LOX from storage entered drain. Dirt in drain and drain pipe embrittlement.
4/3/63	Tennessee	APCI	High pressure oxygen line ruptured due to reaction of small amount of fuel and incorrect pressure rating of pipe material.
6/12/64	Illinois	APCI	High pressure oxygen flexible transfer line failed at fitting. Field repairs were made incorrectly.
6/64	Minnesota	Other	Failure of piping and manifold system for high pressure oxygen. System fabricated of low pressure pipe, noncompatible material, and valve stems lubricated with hydrocarbon oil. One person seriously injured.

Date of Accident	Location of Accident	Equip. Owner or Operator	Remarks
11/12/64	West Virginia	Other	New carbon steel shop line solvent washed and dried with oil laden shop air. Reaction occurred when oxygen flow was stopped after first use of line.
9/26/65	West Virginia	Other	Fire in suction line to an oxygen compressor occurred when the suction shutoff valve chain operator failed causing the valve to lock partially open. Change of velocity of the gas through the valve is suspected of being ignition source for the valve material. One man fatally injured.
4/29/66	Louisiana	APCI	Damaged and cracked insulation on a liquid hydrogen piping system permitted air to be liquefied against the cold pipe surfaces. Some distillation caused oxygen enrichment of the liquid air which accumulated in the insulation. It is believed some hydrogen leak in the piping system reacted with the oxygen rich air causing damage to the insulation and line. Ignition source is unknown. No injuries reported.
1966	Pennsylvania	Other	Embrittlement failure of 400' of carbon steel line due to excessive draw of LOX from storage and vaporizer system. Temperature control valve on outlet side of vaporizer did not respond quickly enough.
7/12/68	Ohio	Other	Buna "N" seat of ball valve ignited during blowout of new line with oxygen. Incorrect material for the service.
1/21/69	West Virginia	Other	Reaction in high pressure oxygen manifold and piping system possibly due to residual fuel gas in one of cylinders being processed.
4/70	Ohio	Other	Reaction in high pressure oxygen manifold and piping system possibly due to residual fuel gas in one of cylinders being processed.

STORAGE SYSTEM ACCIDENTS

Date of Accident	Location of Accident	Equip. Owner or Operator	Remarks
8/25/64	California	APCI	A check valve installed in the piping of a LOX storage tank lost its bonnet due to improper assembly or working loose during flow conditions. Thirty-four thousand (34,000) gallons of LOX spilled before corrective measures could be taken. Water was effectively used to vaporize the LOX without a reaction occurring.
8/19/66	Florida	Other	Eight hundred thousand (800,000) gallons LOX spilled when flex line segment of pump suction line failed. A large area was affected by the spill including a macadam road. Water effectively vaporized the LOX without incident.
11/26/66	California	APCI	A new 190,000 gallon LOX tank developed a leak in the inner tank during initial filling operations. The leak developed when the tank was about 1/3 full. Product was transferred to tankers and moved to other storage areas without incident or without the loss of any significant amounts of LOX.
5/13/68	Pennsylvania	Other	A weld joint in the LOX fill-drain line of a large storage tank failed. The location of the line in the space between the inner and outer vessels exposed the outer carbon steel vessels to cold product. When failure of the outer shell occurred, approximately 215,000 gallons of LOX spilled into the area. Water was used to vaporize the spilled product without incident. (Ball, W. L., LOX Spill, APCI Doc. #99000220).
2/24/71	Pennsylvania	APCI	A 6,000 gallon tank toppled during filling with LOX when a concrete pad failed. Surface water seeped through a small crack in the pad and eroded the ground beneath the pad. The tank sustained light damage as did the vehicle against which the tank came to rest after toppling. No fire or injuries.

GAUGES AND INSTRUMENTATION ACCIDENTS

Date of Accident	Location of Accident	Equip. Owner or Operator	Remarks
11/26/58	Florida	Other	The product from a LOX tanker was being transferred into storage. A meter onnected in this line was not properly cooled-down when the flow started. The resulting vaporization of LOX caused the meter to overspeed with resulting increase in temperature and ignition of materials. The ensuing fire, supplied by LOX from the trailer, involved two (2) tankers, a 30,000 gallon LOX tank, another vehicle, and support equipment.
4/15/59	Pennsylvania	APCI	A gaseous oxygen flow meter used to measure vaporization from a storage tank was exposed to liquid oxygen temperatures when the storage tank was overfilled. The meter ruptured from metal embrittlement and overpressurization, caused by the vaporizing LOX. No injuries involved. Shrapnel damage existed in the immediate area.
5/23/61	Illinois	APCI	Oxygen test gauge exploded during cylinder testing operation. Using same gauge in several services may have contaminated it. Slight injuries. Safety glasses saved the operator's eyes.
2/4/64	Tennessee	APCI	Oxygen test gauge exploded during cylinder testing operation. Using same gauge in several services may have contaminated it. Slight injuries. Safety glasses saved the operator's eyes.
3/23/64	Pennsylvania	APCI	Oxygen manifold gauge fire and explosion. Hydrocarbon oil used in dead weight tester contaminated gauge which was in daily service for six (6) months prior to accident. Position of gauge above line of sight prevented injury.
2/6/67	Missouri	APCI	Oxygen test gauge failure due to contamination from use in different product service or from cylinder valve seat failure. One man blinded.
6/29/67	Iowa	APCI	The operator failed to read the gauge face label which stated "Do not use in Oxygen Service" because the gauge was dead weight tested with hydrocarbon oil. The gauge exploded when placed in an oxygen cylinder for a pressure check. Safety glasses saved the operator's eyes.
6/12/68	Minnesota	APCI	Test gauge failure due to contamination from use in different product service. A rubber connecting pigtail hose may have also been the source of contamination which contributed towards the reaction.

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

V. Accident/Incident Investigation and Report

The following is a series of APL Safety Bulletins and APL Safety Department Reports related to accidents involving oxygen:

(1) APL, Fire in Oxygen Line, APL Safety Bulletin No. 28, Reprinted January 1968 (Doc. #99000382).

(2) Everson, I., Accident at an Oxygen Charging Manifold, APL Safety Bulletin No. 46, (Doc. #99000383).

(3) Everson, I., Accident Arising from Vented Oxygen Manifolds Connected to a Common Vent Pipe, APL Safety Bulletin No. 75, December 11, 1969, (Doc. #99000384).

(4) Everson, I., More Accidents on Oxygen Equipment, APL Safety Bulletin No. 102, February 8, 1971, (Doc. #99000385).

(5) Everson, I., and J. S. Lanba, Burckhardt Oxygen Compressor Fire at SSPC Rognac Plant 3/2/71 (Abstracted from Report JSL/NB - 1293 by J. S. Lanba), APL Safety Bulletin No. 107, April 14, 1971, (Doc. #99000386).

(6) Gillott, E., and I. Everson, Failure of Brazed Joints in High Pressure Gaseous Oxygen Line at a Cylinder Filling Depot, APL Safety Bulletin No. 114, July 13, 1971, (Doc. #99000387).

(7) Everson, I., and P. Cook, Preliminary Report on Accident at Zelzate Plant 26th February 1969 When an Explosion and Fire Occurred in Burckhardt Centrifugal LOX Pump, Type GB114, No. 29224, APL Safety Department Report No. 16, February 28, 1969, (Doc. #99000388).

(8) Croxford, B. J., I. Everson, and R. Naylor, Report on Explosion of LOX Pump on Tanker 400-11, 7th January, 1970 at John Summers' Steel Works, Shotton. Pump Type GB114, Serial No. 79, APL Safety Department Report No. 26 (Preliminary), January 15, 1970, (Doc. #99000389).

(9) Everson, I., Accident at T. Turner Ltd., Park Lane, Royton, Oldham, Lancs., 11:40 a.m., Saturday, 2nd May 1970, APL Safety Department Report No. 30 (Preliminary), May 5, 1970, (Doc. #99000390).

(10) Everson, I., Investigation of Valve Fires at Texas Instruments Ltd., Bedford, APL Safety Department Report No. 31, Rev. 1, February 11, 1971, (Doc. #99000391).

(11) Everson, I., Explosion and Fire Due to the Cryostar GB114 LOX Pump on an SSPC LOX Tanker, APL Safety Department Report No. 32, July 10, 1970, (Doc. #99000392).

(12) Everson, I., Investigation of Cryostar LOX Pump Explosion at Stoke Plant: 7th August, 1970, APL Safety Department Report No. 34 (Preliminary), August 24, 1970, (Doc. #99000393).

(13) Coulson, K. J., B. J. Croxford, and I. Everson, Report on Explosion of Cryostar GB.114 Pump No. C.75 on Tanker 400-11 17th February 1961 at the Carrington Plant, APL Safety Department Report No. 35, March 5, 1971, (Doc. #99000394).

(14) Ball, W. L., B. Berrettini, I. Everson, and D. K. Griffiths, Recommendations Arising from Explosion of Cryostar GB.114 Pump No. C75 at Carrington 17th February 1961 as Reported in Safety Department Report No. 35, APL Safety Department Report No. 36, March 10, 1971 (Doc. #99000395).

(15) Boynton, M. C. W., G. I. Brown, N. Shepherd, and I. Everson, Explosion on Oxy-Fuel Burner Equipment at Alcan-Booth Aluminum Works, Rogerstone, Newport, Mon. 18th May 1971, APL Safety Department Report No. 37, June 2, 1971, (Doc. #99000396).

(16) Moore, A. A., Report on Service Visit to H. M. S. Eagle, APL Reference X0425, August 18, 1971, (Doc. #99000302).

(17) APL, Experiments with Liquid Oxygen, APL Safety Bulletin No. 25, Reprinted January 1968 (Doc. #99000419).

(18) APL, Lack of Oxygen Kills Two Workmen, APL Safety Bulletin No. 37, Reprinted January 1968 (Doc. #99000420).

(19) Zurawski, J., Report of Investigation Into Burckhardt Centrifugal Pump Explosion and Tanker Fire at Sheepbridge Alloy Castings Ltd. Sutton in Ashfield, Notts., February 5, 1964 (Doc. #99000421).

Air Products and Chemicals INC.

May 12, 1972

LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA

V. Accident/Incident Investigation and Report

The following is a series of APCI Documents covering safety precautions, accidents, and near misses involving oxygen or air separation plants:

(1) Kitson, F. K., Don't Turn a Cylinder Into a Rocket, APCI Safety Gram No. 4C, August 7, 1961 (Doc. #99000001).

(2) Kitson, F. K., Fire in Oxygen Line, APCI Safety Gram No. 5, October 20, 1961 (Doc. #99000002).

(3) Kitson, F. K., Liquid Oxygen Loading, APCI Safety Gram No. 6, November 17, 1961 (Doc. #99000003).

(4) Kitson, F. K., Approved Alloy Steels in Cryogenic Service, APCI Safety Gram No. 10, Revision 1, October 25, 1963 (Doc. #99000004).

(5) Schmoyer, W. W., Oxygen Cylinder Failure, APCI Safety Gram No. 13, June 1, 1962 (Doc. #99000005).

(6) Kitson, F. K., Isolation of Piping Systems, APCI Safety Gram No. 21, October 29, 1962 (Doc. #99000006).

(7) Schmoyer, W. W., Drain Line Explosion, APCI Safety Gram No. 24, January 17, 1963 (Doc. #99000008).

(8) Schmoyer, W. W., Sniff Those Cylinders Before Refilling, APCI Safety Gram No. 31, August 21, 1963 (Doc. #99000010).

(9) Schmoyer, W. W., Vacuum Pump Failures, APCI Safety Gram No. 35, October 4, 1963 (Doc. #99000011).

(10) Schmoyer, W. W., Pressure Gauge Failures, APCI Safety Gram No. 43, May 8, 1964 (Doc. #99000012).

(11) Schmoyer W. W., Human Torches, APCI Safety Gram No. 50C, January 3, 1966 (Doc. #99000013).

(12) Schmoyer, W. W., Oxygen Regulators in the Welding Industry, APCI Safety Gram No. 60C, November 26, 1967 (Doc. #99000014).

(13) APCI, Instrumentation -- Establishing Pressure Settings of Safety Devices, APCI Design Engineering Standard 537.1, April 21, 1959 (Doc. #99000023).

(14) Schmoyer, W. W., Caution--Sniff Testing Cyliders Has Its Hazards, APCI Safety Gram No. 49, March 26, 1965 (Doc. #99000056).

(15) Walde, R. A., Flammability and Explosion Hazards -- Halocarbon, Molylube 99, Molykote Types Z and X-15, CaBosil M-5 Formica Laminate Bonded with a Phenolic Resin, Cutting Oils, Hexadecane, Hydrocarbon Type Cutting Oils, Known as Type Group II, Plant Wash-Out Studies Cellulube 300, Cellulube 220, APCI MAR 87-0-8821, June 1963 (Doc. #99000073).

(16) Walde, R. A., Flammability and Explosion Hazards -- Plant Wash-Out Studies Cellulube 300, DTE 103, Cellulube 200, Recent Fires at DuPont New Johnsonville Plant, Titanium, Titanium Dioxide, Solnus 500, Hydrocarbon Oil, Titanium Tetrachloride, APCI MAR 87-0-8822, August 1963 (Doc. #99000074).

(17) Walde, R. A., Flammability and Explosion Hazards -- Plant Wash-Out Study Cellulube 300, DTE 103, Recent Fires at DuPont New Johnsonville Plant, Solnus 500, Titanium Tetrachloride, APCI MAR 87-0-8822, August 1963 (Doc. #99000075).

(18) Walde, R. A., Flammability and Explosion Hazards -- Plant Wash-Out Studies Cellulube 300, Cellulube 220, APCI MAR 87-0-8822, July 1963 (Doc. #99000076).

(19) APCI, Instrumentation -- Modification to Existing Pressure Gauges Snubber, APCI Design Engineering Standard 531.10.2, December 5, 1961 (Doc. #99000282).

(20) APCI, Safe Handling of Cryogenic Liquids and Associated Equipment, APCI Plant Operations Manual Section 1.17, April 23, 1969 (Doc. #99000283).

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990000010   KITSON,F.K.  APCI  DON_T  TURN A CYLINDER INTO A ROCKET   APCI-SAFETY-GRAM-NO-04C  1P  8/7/61
990000020   KITSON,F.K.  APCI  FIRE IN OXYGEN-LINE   APCI-SAFETY-GRAM-NO-05  1P  10/20/61
990000030   KITSON,F.K.  APCI  LIQUID OXYGEN LOADING   APCI-SAFETY-GRAM-NO-06  1P  11/17/61
990000040   KITSON,F.K.  APCI  APPROVED ALLOY STEELS IN CRYOGENIC SERVICE   APCI-SAFETY-GRAM-NO-10-REV-1  1P  10/25/63
990000050   SCHMOYER,W.W.  APCI  OXYGEN CYLINDER FAILURE   APCI-SAFETY-GRAM-NO-13  2P  6/1/62
990000060   KITSON,F.K.  APCI  ISOLATION OF PIPING-SYSTEMS   APCI-SAFETY-GRAM-NO-21  1P  10/29/62
990000070   SCHMOYER,W.W.  APCI  GASEOUS OXYGEN   APCI-SAFETY-GRAM-NO-23C  6P  1/10/63
990000080   SCHMOYER,W.W.  APCI  DRAIN-LINE EXPLOSION   APCI-SAFETY-GRAM-NO-24  2P  1/17/63
990000090   SCHMOYER,W.W.  APCI  LUBRICANTS AND THREAD COMPOUNDS FOR OXYGEN-SYSTEMS   APCI-SAFETY-GRAM-NO-27  5P  3/22
            /63
990000100   SCHMOYER,W.W.  APCI  SNIFF THOSE CYLINDERS BEFORE REFILLING   APCI-SAFETY-GRAM-NO-31  2P  8/21/63
990000110   SCHMOYER,W.W.  APCI  VACUUM PUMP FAILURES   APCI-SAFETY-GRAM-NO-35  1P  10/4/63
990000120   SCHMOYER,W.W.  APCI  PRESSURE GAUGE FAILURES   APCI-SAFETY-GRAM-NO-43  2P  5/8/64
990000130   SCHMOYER,W.W.  APCI  HUMAN TORCHES   APCI-SAFETY-GRAM-NO-50C  1P  1/3/66
990000140   SCHMOYER,W.W.  APCI  OXYGEN REGULATORS IN THE WELDING INDUSTRY   APCI-SAFETY-GRAM-NO-60C  5P  11/26/67
990000150   APCI  PRESSURE-VESSELS- VAPORIZER AND CRYOGENIC LIQUID DISPOSAL   APCI-DES-ENG-STD-514.6.2  4P  5/26/61
990000160   APCI  PRESSURE-VESSELS- GASEOUS OXYGEN STORAGE CYLINDER   APCI-DES-ENG-STD-515.1.3  3P  10/17/60
990000170   SCHMOYER,W.W.  APCI  LIQUID OXYGEN   APCI-SAFETY-GRAM-NO-54C  6P  1/31/67  P6  REVISED  1/31/68
990000180   APCI  PRESSURE-VESSELS- VESSEL-DESIGN-BASIS AND GENERAL STANDARDS   APCI-DES-ENG-STD-510.1  6P  8/62
990000190   APCI  PRESSURE-VESSELS- MATERIALS OF CONSTRUCTION   APCI-DES-ENG-STD-510.1.4  4P  6/62
990000200   APCI  PRESSURE-VESSELS- SHELL-DESIGN   APCI-DES-ENG-STD-510.2  4P  2/65
990000210   APCI  PRESSURE-VESSELS- HEAD-DESIGN   APCI-DES-ENG-STD-510.3  13P  8/62
990000220   APCI  INSTRUMENTATION- PRESSURE INDICATORS   APCI-DES-ENG-STD-531.2  5P  10/63
990000230   APCI  INSTRUMENTATION- ESTABLISHING PRESSURE-SETTINGS OF SAFETY DEVICES   APCI-DES-ENG-STD-537.1  6P  4/21
            /59
990000240   APCI  INSTRUMENTATION- SPECIAL REQUIREMENTS SAFETY AND RELIEF VALVES   APCI-DES-ENG-STD-537.9  4P  7/65
990000250   APCI  CIVIL-STRUCTURAL- PERSONNEL PROTECTIVE SHIELDS AND OXYGEN-SYSTEMS   APCI-DES-ENG-STD-546.1  9P  1/15
            /71
990000260   APCI  MACHINERY- FIELD TESTING AND RECIPROCATING OXYGEN COMPRESSORS   APCI-DES-ENG-STD-551.1.9.1  14P  2/3
            /71
990000270   APCI  MACHINERY- FIELD TESTING AND CENTRIFUGAL OXYGEN COMPRESSORS   APCI-DES-ENG-STD-551.2.8.1  18P  2/3/7
            1
990000280   APCI  PIPING- OXYGEN-PIPING   APCI-DES-ENG-STD-578.60.1  14P  4/24/72
990000290   APCI  PIPING- OXYGEN COMPRESSOR LOCATION   APCI-DES-ENG-STD-570.6  2P  1/15/71
990000300   APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  150-PSIG-MAX  CARBON-STEEL   APCI-DES-ENG-STD-578.60.3
            3P  9/69
990000310   APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  275-PSIG-MAX  CARBON-STEEL   APCI-DES-ENG-STD-578.60.4
            3P  9/69
990000320   APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  500-PSIG-MAX-OWG  CARBON-STEEL   APCI-DES-ENG-STD-578.60
            .5  3P  9/69
990000330   APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  720-PSIG-MAX  CARBON-STEEL   APCI-DES-ENG-STD-578.60.6
            3P  9/69
990000340   APCI  PIPING- STAINLESS-STEEL VALVES AND MATERIAL REQUIREMENTS   APCI-DES-ENG-STD-579.3.1  2P  5/64
990000350   APCI  PIPING- EXTENDED BONNET VALVE  CODE   APCI-DES-ENG-STD-579.4  3P  4/63
990000360   APCI  PIPING- VALVE  PROCUREMENT AND CLEANING PROCEDURE   APCI-DES-ENG-STD-579.5  3P  8/12/60
990000370   APCI  PIPING- TRANSITION-JOINTS AND ALUMINUM TO STAINLESS-STEEL   APCI-DES-ENG-STD-579.15  2P  9/66
990000380   CAMPBELL,R.W.  TAYLOR,B.W.  APCI  USE OF PERLITE IN AIR-SEPARATION COLD-BOXES   APCI-TB-39  1P  6/14/71
990000390   APCI  INSULATION AND PAINTING- COLD-BOXES THERMAL TANKS PERLITE   APCI-DES-ENG-STD-581.1  4P  5/26/61
990000400   APCI  INSULATION AND PAINTING- COLD-INSULATION AND MINERAL FIBER GRANULATED   APCI-DES-ENG-STD-581.2  2P
            6/26/69
990000410   APCI  INSULATION AND PAINTING- COLD-BOXES, THERMAL TANKS, GLASS WOOL   APCI-DES-ENG-STD-581.3  1P  10/24/6
            0
990000420   BALL,W.L.  APCI  PLANT-SITE CRITERIA- AIR-SEPARATION   APCI-SAFETY-STD-605.1  9P  11/10/60
990000430   BALL,W.L.  APCI  CRITERIA  AIR-SEPARATION PLANT-LAYOUT   APCI-SAFETY-STD-605.1.3  6P  1/6/61
990000440   KITSON,F.K.  APCI  PLANT COMPONENTS- AIR-SEPARATION, OXYGEN, COMPRESSOR   APCI-SAFETY-STD-607.1.2.3  6P  1
            2/62
990000450   WILSON,H.  APCI  PLANT COMPONENTS- COLD-BOXES   APCI-SAFETY-STD-607.1.5  7P  1/63
990000460   KITSON,F.  APCI  PLANT COMPONENTS- AIR-SEPARATION PLANT, PIPING, VALVES AND SAFETY-RELIEF DEVICES   APCI-S
            AFETY-STD-607.1.12  14P  10/62
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990000470 SMITH,H. APCI PLANT COMPONENTS- AIR-SEPARATION PLANT, CRYOGENIC-LIQUID, AND DISPOSAL APCI-SAFETY-STD-607.1.20 3P 4/62

990000480 BALL,W.L. APCI PLANT COMPONENTS- STORAGE, CONVERTER-SYSTEM, AND CRYOGENIC-LIQUIDS APCI-SAFETY-STD-607.2.1.1 3P 4/62

990000490 SCHMOYER,W.W. APCI PLANT COMPONENTS- STORAGE, VACUUM-SYSTEMS, AND COMPRESSED-GASES APCI-SAFETY-STD-607.2.2.5 P1-4 3/65 P5-6 1/64

990000500 APCI CLEANING AND INSPECTION- MATERIALS AND OXYGEN SERVICE APCI-SAFETY-STD-608.1 7P 10/65

990000510 SCHMOYER,W.W. APCI COMPATIBILITY OF MATERIALS- OXYGEN COMPATIBLE MATERIALS APCI-SAFETY-STD-609.1 8P 6/65

990000520 BALL,W.L. APCI CHECK-LIST- AIR-SEPARATION PLANT-SITE APCI-SAFETY-STD-610.1.1 5P 11/28/60

990000530 APCI SAFETY CONTROL PROCEDURES- EMERGENCY PROCEDURES APCI-SAFETY-STD-626.3.8 8P 5/62

990000540 SMITH,H. APCI SOLVENT AND CLEANERS- DEVIATIONS CLEANING FOR OXYGEN SERVICE APCI-SAFETY-STD-629.0.10 1P 6/19/61

990000550 KITSON,F.K. APCI FIRE-PROTECTION EQUIPMENT- DELUGE-SYSTEM AND LOX LOADING FACILITY APCI-SAFETY-STD-630.2.6 3P 1/64

990000560 SCHMOYER,W.W. APCI CAUTION- SNIFF TESTING CYLINDERS HAS ITS HAZARDS APCI-SAFETY-GRAM-NO-49 2P 3/26/65

990000570 GEIST,J.M. APCI CONTROLLED KINETICS EXPERIMENTATION- TEFLON-HOSE APCI-MAR-87-0-8820 1P 5/60

990000580 GEIST,J.M. APCI CONTROLLED KINETICS EXPERIMENTS- TEFLON-HOSES, SUPPORTED BY BRAIDED STAINLESS-STEEL-HOUSING, AND RUBBER-HOSES PLASITE-NO-7122H APCI-MAR-87-0-8820 1P 6/60

990000590 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- UCON-TYPE LUBRICANTS, STEEL-PIPES APCI-MAR-87-0-8820 1P 4/61

990000600 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- STANDARD PRESSURE BOMBS AND SPARK-IGNITION, DOW-CORNING FLUORINATED SILICON-OILS, SHELL POLYURETHANE FOAM (EPON-FOAM-H-60) APCI-MAR-87-0-8820 1P 8/61

990000610 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- SPARK-IGNITION, STANDARD BOMB TEST, LED-PLATE-251, PIPE-DOPE APCI-MAR-87-0-8820 1P 9/61

990000620 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- PINE AND MAPLE WOOD, ACTIVATED CARBON APCI-MAR-87-0-8821 1P 10/61

990000630 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- SILICON-OILS DOW-CORNING-RF-1-0065, SILICON-OILS DOW-CORNING-RF-1-0065, INDOPOL-POLYBUTENE-OIL AMOCO-L-10, INDOPOL-POLYBUTENE-OIL AMOCO-H-100, PENTON, T-FILM-THREAD COMPOUND APCI-MAR-87-0-8821 1P 11/61

990000640 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- CS2 CARBON-DISULFIDE ALIQUIPPA PUMP-SUCTION-FILTER-DEFROST CYL-SEAL SEALING COMPOUND APCI-MAR-87-0-8821 1P 12/61

990000650 KEHAT,E. FOSTER,R.H. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- STANDARD IGNITION TEST METHOD, APL PIPING-RESIDUE, METHYLENE-CHLORIDE APCI-MAR-87-0-8821 1P 1/62

990000660 FOSTER,R.H. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- IGNITION TEST-APPARATUS, FLORUBE-GREASES, EPOXY COMPOUNDS DEVCON-Z-TON AND DEVCON-F, FOAM-TYPE INSULATIONS STYROFOAM AND POLYURETHANE-FOAM-INSULATION, RAYBESTOS-MANHATTAN-PACKING, AND IMPREGNATED ASBESTOS-ROPE MATERIAL APCI-MAR-87-0-8821 1P 2/62

990000670 FOSTER,R.H. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- POLYESTER RESIN IMPREGNATED FIBERGLASS LAVA APCI-MAR-87-0-8821 1P 3/62

990000680 FOSTER,R.H. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- EPON-H-60, POLYCEL-440R, AND STYROFOAM, LUBRICANTS, MOLY-SPRAY-KOTE, AND DRI-LUBE APCI-MAR-87-0-8821 1P 4/62

990000690 FOSTER,R.H. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- HOUDRY FOAM INSULATION, AND HAVEG GLASS-FIBER-REINFORCED PLASTIC APCI-MAR-87-0-8821 1P 6/62

990000700 FOSTER,R.H. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- TALCUM-POWDER AS A LUBRICANT, TARSET, PLASITE APCI-MAR-87-0-8821 1P 7/62

990000710 WALDE,R.A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- OXYGEN-PRESSURE-GAUGE TWF WOOL, SPINTEX-305, MOLYKOTE-TYPE-Z AND TYPE-X-15 APCI-MAR-87-0-8822 1P 3/63

990000720 WALDE,R.A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- KEL-F-POLYMER, NYLON, CUTTING-OILS APCI-MAR-87-0-8822 1P 5/63

990000730 WALDE,R.A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- HALOCARBON, MOLYLUBE-99, MOLYKOTE-TYPES-Z AND X-15, CABOSIL-M-5 FORMICA-LAMINATE BONDED WITH A PHENOLIC RESIN, CUTTING-OILS, HEXADECANE, HYDROCARBON TYPE CUTTING-OILS, KNOWN AS TYPE-GROUP-II, PLANT WASH-OUT STUDIES, CELLULUBE-300, CELLULUBE-220 APCI-MAR-87-0-8822 2P 6/63

990000740 WALDE,R.A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDIES CELLULUBE-300, DTE-103, CELLULUBE-200 RECENT FIRES AT DUPONT-NEW/JOHNSONVILLE-PLANT TITANIUM, TITANIUM-DIOXIDE, SOLNUS-500, HYDROCARBON-OIL, TITANIUM-TETRACHLORIDE APCI-MAR-87-0-8822 3P 8/63

990000750 WALDE,R.A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDY CELLULUBE-300, DTE 103, RECENT FIRES AT DUPONT-NEW/JOHNSONVILLE-PLANT SOLNUS-500, TITANIUM-TETRACHLORIDE APCI-MAR-87-0-8822 2P 9/63

990000760 WALDE,R.A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDIES CELLULUBE-300 CELLULUBE-220

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990000770 APCI CLEANING REQUIREMENTS FOR AIR-PLANT EQUIPMENT APCI-QUAL-CONT-LAYOUT-101F 2P PLUS 5P OF ATTCHMTS 7/1/71
990000780 APCI CLEANING REQUIREMENTS FOR BOURDON-TUBE TYPE GAUGES USED FOR OXYGEN SERVICE APCI-QUAL-CONT-LAYOUT-102F 3P 7/1/71
990000790 APCI CLASS-B CLEANLINESS REQUIREMENTS APCI-QUAL-CONT-LAYOUT-104F 1P 7/1/71
990000800 APCI CLASS-A CLEANLINESS REQUIREMENTS APCI-QUAL-CONT-LAYOUT-105F 3P 7/1/71
990000810 APCI CLASS-AA CLEANLINESS REQUIREMENTS APCI-QUAL-CONT-LAYOUT-106F 3P 7/1/71
990000820 APCI CLASS-AAA CLEANLINESS REQUIREMENTS APCI-QUAL-CONT-LAYOUT-107F 3P 7/1/71
990000830 APCI REQUIREMENTS FOR VENDOR CLASS-B CLEANING APCI-QUAL-CONT-LAYOUT-114F 2P 7/1/71
990000840 APCI REQUIREMENTS FOR VENDOR CLASS-A CLEANING APCI-QUAL-CONT-LAYOUT-115F 2P 7/1/71
990000850 APCI REQUIREMENTS FOR VENDOR CLASS-AA CLEANING APCI-QUAL-CONT-LAYOUT-116F 2P 7/1/71
990000860 APCI REQUIREMENTS FOR VENDOR CLASS-AAA CLEANING APCI-QUAL-CONT-LAYOUT-117F 3P 7/1/71
990000870 APCI BRAZED ALUMINUM HEAT-EXCHANGER CLEANING REQUIREMENTS APCI-QUAL-CONT-LAYOUT-119F 2P 7/1/71
990000880 APCI REQUIREMENTS FOR IPD SPECIFIED PAINT SYSTEMS APCI-QUAL-CONT-LAYOUT-120F 3P 7/1/71
990000890 MASTER,H.H. APCI STORAGE TANK CLEANING APCI-MEMO-63 01/24/63 1P
990000900 HATLEY,A.L. APCI CLEANING LOX STORAGE TANK-NO-6 SANTA/SUSANA APCI-MEMO-64 03/11/64 1P PLUS 1P ATTACHMENT
990000910 MASTER,H.H. APCI LOX TANKS APCI-MEMO-70 06/26/70 1P
990000920 KITSON,F.K. APCI WASHOUT ANALYSIS OF SUN-OIL COMPANY_S LOX-TANK VAPORIZER APCI-MEMO-64 04/9/64 1P PLUS 1P ATTACHMENT
990000930 PENNSALT CORP CLEANING OF LIQUIEFIED-GAS PROCESSING EQUIPMENT PENNSALT-TECHNICAL-BULLETIN 6P 2/3/60
990000940 KITSON,F.K. APCI CLEANING FOR OXYGEN SERVICE APCI-MEMO-63 08/5/63 2P PLUS 9P ATTACHMENTS
990000950 APCI CLEANING AND INSPECTION FOR EQUIPMENT IN AIR PLANTS AND IN OXYGEN SERVICE APCI-POM-SEC-1.08 7P PLUS 3P ATTACHMENTS 4/4/67
990000960 BASSLER,E.J. APCI CLEANING FOR OXYGEN SERVICE 17P 1/60
990000970 MASTER,H.H. APCI AIR-SEPARATION-PLANT CONTAMINATION- HISTORY, SAMPLING, AND ANALYSIS APCI PLANT MANAGERS SAFETY MEETING-CREIGHTON/PENNSYLVANIA 19P 2/28/68 AND 3/20/68
990000980 APCI EXCHANGER, PLANT, AND PLANT EQUIPMENT SOLVENT WASHOUT-FREQUENCIES APCI-POM-SEC-5.07 3P 7/15/70
990000990 APCI PLANT SOLVENT WASHOUT-GENERAL APCI-POM-SEC-1.05 12P 2/20/67
990001000 KEHAT,E. APCI IGNITION TESTS OF T-FILM AND PENTON APCI-MEMO-61 11/28/61 2P
990001010 APCI CLEANING APCI-CONSTR-SPEC-230.15 ON P8 1P 9/16/69
990001020 APCI CLEANING OF CARBON STEEL PIPE AND FITTINGS, CLEANING ALUMINUM-PIPE FITTINGS PARTS AND FABRICATIONS, CLEANING STAINLESS-STEEL AND COPPER-PIPE FITTINGS PARTS AND FABRICATIONS DESCRIPTION OF CLEANING-MEDIUMS, INSPECTION OF DECONTAMINATED COMPONENTS, AND PICKLING OF CARBON-STEEL PIPE AND FITTINGS APCI-CONSTR-SPEC-200.16.1.7 TO 200.16.3.2 P14-20 7P 2/3/67
990001030 MATHEWS,W.D. OWEN,G.G. IMPERIAL CHEMICAL INDUSTRIES LTD SAFETY ASPECTS OF RECONSTRUCTED ICI TONNAGE OXYGEN PLANT AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-5 P1-15 15P 1963
990001040 APCI PERSONAL PROTECTION-EQUIPMENT MAINTENANCE APCI-POM-1.12 7P 4/21/67
990001050 COULSON,K.J. EVERSON,I. APL FIRE HAZARD WHEN VAPOUR CLEANING WITH TRICHLOROETHYLENE (T.C.E.) APL-SAFETY-DEPT-INFO-SHEET-38 2P 2/10/71
990001060 SCHMOYER,W.W. APCI CARBON-TETRACHLORIDE APCI-SAFETY-GRAM-NO-68 1P 2/21/69
990001070 KEHAT,E. APCI DETONATION TESTS OF OIL FROM ALIQUIPPA PUMP-SUCTION FILTER DEFROST AND OF METHYLENE-CHLORIDE APCI-MEMO-61 12/11/61 2P
990001080 HIMMELBERGER,F. APCI NOTES ON LIQUID OXYGEN CONTAMINANTS MISSILE-PROGRAM 10P 1/6/58
990001090 KEHAT,E. APCI DEVELOPMENT OF STANDARD IGNITION TEST APCI-PROJECT-NO-87-0-8820/1 8P 11/17/61
990001100 KITSON,F.K. APCI ASSEMBLY OF OXYGEN REGULATORS T-FILM APCI-MEMO-61 11/30/61 1P
990001110 DINAN,E. APCI OXYGEN COMPATIBILITY TESTS FOR VARIOUS MATERIALS- ABMA THREAD LUBRICANT AND SEALANT, ANDEROL-L-536 RUST-PREVENTIVE LEHIGH CHEMICAL CO-CHESTERTOWN-MD., PERMACEL-RIBBON-DOPE PERMACEL-NEW/BRUNSWICK/NEW/JERSEY, WEST CONCRETE FLOOR TREATMENT WEST CHEMICAL PRODUCTS INC, ALUMINUM-OXIDE, SEAM COMPOUND GEON POLYVINYLCHLORIDE, PLASTIC LEAD SEAL-NO-2-JOHN CRANE APCI-MEMO-59 01/28/59 2P
990001120 ENT,W.L. APCI PUTTI-ROPE ANALYSIS FOR OIL CONTENT AND FLAMMABILITY TEMPERATURE APCI-MEMO-59 12/11/59 1P
990001130 WALDE,R.A. APCI GASEOUS OXYGEN COMPATIBILITY OF CROSSLITE FLUOROCARBON TAPE THREE-M-FLUOROCARBON-TAPE, PERMACEL-TAPE APCI-MEMO-63 07/30/63 1P
990001140 YODER,L. APCI T-FILM THREAD COMPOUND, AUTOIGNITION TEST APCI-ANAL-REP-61-683 APCI-IWO-NO-80-0068 1P 9/18/61
990001150 FREDERICK,L. APCI TEFLON TAPE PERCENT ETHER EXTRACTABLE CONTAMINANTS AND FLUORESCENCE DAMCO-TEFLON TAPE, SANDEM-INDUSTRIAL, CRANE PACKING CO APCI-ANAL-REP-70-368,70-369 1P 10/7/70
990001160 YODER,L. APCI TAPE-SEAL THREAD LUBRICANT AND SEALER- TAPE-SEAL FROM FRIESLAND-PLASTIC COMPANY, PERMACE

L-TAPE APCI-ANAL-REP-60-495,61-3 APCI-IWO-NO-81-0018 1P 1/16/61

990001170 WALDE,R.A. APCI GASEOUS OXYGEN COMPATIBILITY TEST ON MOLY-LUBE-NO-99 APCI-MEMO-63 06/11/63 1P

990001180 HIMMELBERGER,F. APCI PIPING- APPROVED PIPE THREAD SEALANTS APCI-DES-ENG-STD-570.5.1 1P 11/11/60

990001190 SCHMOYER,W.W. APCI REGULATOR THREAD SEALANT MOLYLUBE-N APCI-MEMO-63 10/4/63 1P

990001200 BROPHY,M. APCI OXYGEN COMPATABILITY TESTS- MOLYLUBE-KOTE-AF AND MOLYLUBE-N APCI-R+D-NOTEBOOK-130 P16-7 2P 2/11/63

990001210 MOYSAN,S.R. APCI SAFETY-VALVE-SEAT OXOMAT FLAMMABILITY IN 100-PERCENT GASEOUS OXYGEN APCI-ANAL-REP-61-435 APCI-IWO-NO-10-0858 1P 6/6/61

990001220 BROPHY,M.+ APCI PERMATEX SEALANT-1516- COMPATABILITY TESTS WITH HIGH-PRESSURE OXYGEN APCI-R+D-NOTEBOOK-111 P152 1P 1/63

990001230 BROPHY,M. APCI MOLLY-99 COMPATIBILITY TESTS WITH HIGH-PRESSURE OXYGEN APCI-R+D-NOTEBOOK-130 P3 1P 5/63

990001240 KEY,C.F. NASA-HUNTSVILLE COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN NASA-TMX-53052 34P 5/26/64

990001250 KEY,C.F. NASA-HUNTSVILLE COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN III NASA-TMX-53533 54P 11/3/66

990001260 KEY,C.F. NASA-HUNTSVILLE COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN IV NASA-TMX-53773 50P 8/23/68

990001270 KEY,C.F. RIEHL,W.A. NASA-HUNTSVILLE COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN NASA-TMX-985 72P 8/64

990001280 KEY,C.F. RIEHL,W.A. NASA-HUNTSVILLE COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN MTP-P+VE-M-63-14 94P 12/4/63

990001290 NASA-HOUSTON NONMETALLIC MATERIALS DESIGN GUIDELINES AND TEST DATA-HANDBOOK MSC-02681 380P 5/29/70

990001300 YODER,L. APCI SEALING MATERIALS- FLAMMABILITY IN 100-PERCENT GASEOUS OXYGEN FOAMSEAL-30-45-LIQUID, FOAMSEAL-30-45-DRY, FLEXFAS-82-10-LIQUID, FLEXFAS-82-10-DRY, SEALFAS-MASTIC-31-97-LIQUID, SEALFAS-MASTIC-31-97-DRY, PITTSEAL-III-LIQUID, POROUS-INSULATING-MATERIAL FOAM GLASS APCI-ANAL-REP-61-034 TO 61-40 AND 61-42 APCI-IWO-NO-10-0589 1P 2/3/61

990001310 APCI PROCEDURE TO ESTABLISH ACCEPTANCE OF FIBERIZED MINERAL WOOL INSULATION APCI-QUAL-CONT-LAYOUT-103L 2P 7/1/71

990001320 WALDE,R.A. APCI KEL-F HIGH-PRESSURE OXYGEN COMPATIBILITY- NYLON APCI-MEMO-63 05/17/63 1P

990001330 YODER,L. APCI NYLON-SEAT USED IN K-G REGULATOR- IGNITION-TEMPERATURE IN 100-PERCENT OXYGEN ATM APCI-ANAL-REP-60-496 APCI-IWO-NO-81-0017 1P 1/6/61

990001340 BAUER,E.G. APCI BEHAVIOR OF TRANSITE UNDER COMPRESSIVE-LOADS AT AMBIENT AND LIQUID-NITROGEN TEMPERATURES APCI-TR-53 APCI-IWO-NO-10-1370 20P 8/62

990001350 BROPHY,M. APCI SAFETY TESTS UNDER WO-81-0095 HYLOMAR-UNIVERSAL-JOINTING COMPOUND SQ-32 AND VITON A APCI-IWO-NO-81-0095 1P 4/27/66

990001360 KEHAT,E. APCI DEVELOPMENT OF STANDARD IGNITION TEST METHYLENE-CHLORIDE- DICHLOROETHANE- TRICHLOROETHANE- TRICHLORETHYLENE- CARBON-TETRACHLORIDE- CHLOROFORM APCI-PROJECT-NO-87-8-8821 APCI-MEMO-62 01/3/62 5P

990001370 BROPHY,M. APCI HIGH-PRESSURE OXYGEN COMPATABILITY TESTS WITH SILICONE-RUBBER GASKET COMPOUND- RTV-60-NP-134372-M235 APCI-R+D-NOTEBOOK-111 P149 1P 1/63

990001380 SCHMOYER,W.W. APCI HALOCARBON-WAX-6-25 APCI-MEMO-69 02/6/69 1P

990001390 YODER,L. APCI FLUORO-GLIDE FLAMMABILITY IN 100-PERCENT GASEOUS OXYGEN APCI-ANAL-REP-61-262 1P 4/11/61

990001400 HEATLEY,C.J. DINAN,E.R. APCI INVESTIGATION OF THE FIRE-RESISTANT QUALITIES OF CELLULUBE-220, CELLULUBE-150, UCON-LB285, UCON-LB550, UCON-LB300, UCON-LB170, UCON-HB170, UCON-HB660, AURALUBE-FS, FLUOROLUBE-FS5, KEL-F-LF3, VERSILUBE-F-50, SF81(40)-SILICONE, PYDRAUL-F-9, DOW-CORNING-4 COMPOUND SILICONE, DOW-CORNING-4X COMPOUND-SILICONE, FAIRBANKS-SILICONE-DC-44, MORSE GREASE, ALPHA-CORP-MOLYKOTE-MICROSIZE, MONSANTO-PYDRAUL, GULF-MECHANISM-HYDROCARBON, HAVOLINE-HD-HYDROCARBON, SHELL-2-1176-A-HYDROCARBON, INDOIL CHEMICAL INDOPOL-I-10-POLYBUTENE, INDOPOL-H-300-POLYBUTENE, MOBILE-DTE-105-HYDROCARBON APCI-TM-040 7P 9/18/59

990001410 LATSHAW,D.R. APCI GASKET MATERIAL COMPATIBILITY OF MELRATH MATERIAL WITH OXYGEN COMBUSTION IN OXYGEN AND SOXHLET ETHER-EXTRACTION MELRATH GARLOCK-900 APCI-ANAL-REP-70-026 APCI-IWO-NO-EA-7027 2P 1/30/70

990001420 LATSHAW,D.R. APCI GASKET MATERIALS COMPATBILITY OF GASKET MATERIALS WITH OXYGEN COMBUSTION IN OXYGEN AND SOXHLET ETHER-EXTRACTION GARLOCK-900, KM-226, KM-246 APCI-ANAL-REP-70-013,70-014,70-015 APCI-123 APCI-IWO-NO-X00123 2P 1/30/70

990001430 MOYSAN,S.R. APCI VALVE WASHERS NEW AND USED QUALITATIVE AND QUANTITATIVE OIL ANALYSIS APCI-ANAL-REP-63-1662 AND 1663 APCI-IWO-NO-69-1034 1P 11/6/63

990001440 BALL,W.L. APCI COMBUSTIBLE CONTAMINANT CONTENT IN GRAPHITE IMPREGNATED ASBESTOS-PACKING TEFLON COATED ASBESTOS-BLUE APCI-MEMO-60 09/30/60 2P PLUS 1P ATTACHMENT

990001450 HIMMELBERGER,F. APCI QUALITY CONTROL OF ROCK WOOL APCI-MEMO 2 HIMMELBERGER,F. APCI QUALITY CONTROL OF ROCK WOOL APCI-MEMO-59 11/6/59 2P

990001460 KITSON,F.K. APCI FLAMMABILITY TEST OF GASKETS IN OXYGEN ATMOSPHERES JOHN-CORE-CO, MELRATH-GASKET-CO, VALLEY-FORGE-GASKET-CO LOX TRANSFER FLUOROGREEN-E-600 APCI-MEMO-70 10/23/70 1P

990001470 BASSLER,E. APCI PRODUCTION OF ROCK WOOL BETHLEHEM-STEEL-CO APCI-MEMO-59 11/12/59 2P

990001480 BROPHY,M. APCI PIPE BURNING TESTS APCI-R+D-NOTEBOOK-111 P26-9 4P 4/17/61

990001490 BROPHY,M. APCI TARSET PIPE-COATING THE PLASITE TESTS MANUFACTURED BY PITTSBURGH CHEMICAL CO APCI-R+D-NOTEBOOK-111 P129-32 4P 7/62

990001500 BROPHY,M. APCI PLASITE PROTECTIVE COATING APCI-MEMO-60 06/9/60 2P

990001510 APCI PIPING- PRESSURE RATING TABLES- PLAIN-AND-THREADED-ENDS- RED BRASS-PIPE APCI-DES-ENG-STD-572.1 5P 5/62

990001520 JACKSON,J.D. BOYD,W.K. MILLER,P.D. BATTELLE MEMORIAL INSTITUTE REACTIVITY OF METALS WITH LIQUID AND GASEOUS OXYGEN AD297124 DMIC-MEMO-163

990001530 WHITE,E.L. WARD,J.J. BATTELLE MEMORIAL INSTITUTE IGNITION OF METALS IN OXYGEN DMIC-REPORT-224 33P PLUS APPENDIX

990001540 DEAN,L.E. THOMPSON,W.R. AEROJET-GENERAL CORP IGNITION CHARACTERISTICS OF METALS AND ALLOYS ARS JOURNAL P917-23 7P 7/61

990001550 APCI PIPING- PRESSURE RATING TABLES- PLAIN-AND-THREADED-ENDS ALUMINUM-PIPE APCI-DES-ENG-STD-571.1 5P 10/65

990001560 APCI PIPING-AA.3- COLD-BOX-SERVICE 150F AND BELOW 30PSIG-MAX-OWG ALUMINUM APCI-DES-ENG-STD-571.2 3P 11/67

990001570 APCI PIPING-AA1.5- COLD-BOX-SERVICE 100F AND BELOW 150-PSIG-MAX-OWG ALUMINUM APCI-DES-ENG-STD-571.3 4P 11/67

990001580 APCI PIPING-AA3- COLD-BOX-SERVICE 100F AND BELOW 300-PSIG-MAX-OWG ALUMINUM APCI-DES-ENG-STD-571.4 3P 11/67

990001590 APCI PIPING-IAA4- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 400-PSIG-MAX-OWG ALUMINUM-TUBE APCI-DES-ENG-STD-571.50 2P 11/1/68

990001600 APCI PIPING-IAA9- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 900-PSIG-MAX-OWG ALUMINUM-TUBE APCI-DES-ENG-STD-571.51 2P 11/1/68

990001610 APCI PIPING- PRESSURE RATING TABLES- PLAIN-ENDS COPPER-TUBE APCI-DES-ENG-STD-574.1 5P 5/62

990001620 APCI PIPING-CT2- COLD-BOX-SERVICE 100F AND BELOW 200-PSIG-MAX-OWG COPPER-TUBE APCI-DES-ENG-STD-574.2 3P 1/64

990001630 APCI PIPING-CT4- COLD-BOX-SERVICE 100F AND BELOW 400-PSIG-MAX-OWG COPPER-TUBE APCI-DES-ENG-STD-574.10 3P 1/64

990001640 APCI PIPING-ICT4- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 400-PSIG-MAX-OWG COPPER-TUBE APCI-DES-ENG-STD-574.50 2P 11/1/68

990001650 APCI PIPING-ICT9- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 900-PSIG-MAX-OWG COPPER-TUBE APCI-DES-ENG-STD-574.51 2P 11/1/68

990001660 APCI PIPING-ICT10- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW -1000-PSIG-MAX-OWG COPPER-TUBE APCI-DES-ENG-STD-574.52 1P 4/67

990001670 APCI PIPING-ICT23- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 2300-PSIG-MAX-OWG COPPER-TUBE APCI-DES-ENG-STD-574.54 2P 1/64

990001680 APCI PIPING- PRESSURE RATING TABLES- PLAIN-AND-THREADED-ENDS- CARBON STEEL-PIPE APCI-DES-ENG-STD-578.10.1 6P 10/65

990001690 APCI PIPING-CS2.7- GENERAL-SERVICE -20F TO 100F 275-PSIG-MAX-OWG CARBON STEEL APCI-DES-ENG-STD-578.10.2 4P 10/69

990001700 APCI PIPING-CS7.2- GENERAL-SERVICE -20F TO 100F 720-PSIG-MAX-OWG CARBON STEEL-PIPE APCI-DES-ENG-STD-578.10.3 3P 6/62

990001710 APCI PIPING-CS14- GENERAL-SERVICE -20F TO 100F 1440-PSIG-MAX-OWG CARBON STEEL-PIPE APCI-DES-ENG-STD-578.10.4 4P 1/64

990001720 APCI PIPING-CS20- GENERAL-SERVICE -20F TO 100F 2000-PSIG-MAX-OWG CARBON STEEL-PIPE APCI-DES-ENG-STD-578.10.5 4P 1/64

990001730 APCI PIPING-CS36- GENERAL-SERVICE -20F TO 100F 3600-PSIG-MAX-OWG CARBON STEEL APCI-DES-ENG-STD-578.10.6 3P 6/62

990001740 APCI PIPING- PRESSURE RATING TABLES- PLAIN-AND-THREADED-ENDS- STAINLESS STEEL-PIPE APCI-DES-ENG-STD-578.30.1 7P 5/62

990001750 APCI PIPING-SS2.7- COLD-BOX-SERVICE 100F AND BELOW 275-PSIG-MAX-OWG STAINLESS STEEL-PIPE APCI-DES-ENG-STD-578.30.2 4P 11/67

990001760 APCI PIPING-SS6- COLD-BOX-SERVICE 100F AND BELOW 615-PSIG-MAX-OWG STAINLESS STEEL-PIPE APCI-DES-ENG-STD-578.30.3 4P 11/67

990001770 APCI PIPING-SS12- COLD-BOX-SERVICE 100F AND BELOW 1235-PSIG-MAX-OWG STAINLESS STEEL-PIPE APCI-DES-ENG-STD-578.30.4 3P 1/64

990001780 APCI PIPING-SS17-COLD-BOX-SERVICE 100F AND BELOW 1715-PSIG-MAX-OWG STAINLESS STEEL-PIPE APCI-DES-ENG-STD-578.30.5 3P 1/64

990001790 APCI PIPING-SS30- COLD-BOX-SERVICE 100F AND BELOW 3000-PSIG-MAX-OWG STAINLESS STEEL-PIPE APCI-DES-ENG -STD-578.30.6 3P 1/64
990001800 APCI PIPING-SS36- COLD-BOX-SERVICE 100F AND BELOW 3600-PSIG-MAX-OWG STAINLESS STEEL-PIPE APCI-DES-ENG -STD-578.30.8 3P 1/64
990001810 APCI PIPING-SS7.2- COLD-BOX-SERVICE 100F AND BELOW 720-PSIG-MAX-OWG STAINLESS STEEL-PIPE APCI-DES-ENG -STD-578.30.15 4P 11/67
990001820 APCI PIPING-SSL1.5- LUBE-OIL-SERVICE -20F TO 150F 150-PSIG-MAX STAINLESS STEEL-PIPE APCI-DES-ENG-STD -578.40.1 3P 9/69
990001830 APCI PIPING- INTRODUCTION HAND VALVE-CODE APCI-DES-ENG-STD-579.3 12P 1/63
990001840 APCI PIPING-CS1.5- GENERAL-SERVICE -20F TO 100F 150-PSIG-MAX-OWG CARBON STEEL-PIPE APCI-DES-ENG-STD-578.10.19 2P 6/62
990001850 FOSTER,R.H. APCI COLD TEST OF 1/2-INCH SAFETY VALVE WITH CARBON STEEL SPRING APCI-IWO-NO-10-7071 APCI-PROJECT-NO-00-5-3246-51.12.50 APCI-TM-079 3P 4/27/65
990001860 KEHAT,E. APCI BURNING OF STEEL PIPES IN A FLOWING OXYGEN STREAM APCI-MEMO-61 04/17/61 3P PLUS 7P ATTACHMENTS
990001870 BAILEY,B. APCI IGNITION-LIMITS OF CARBON STEEL IN OXYGEN-NITROGEN-ATMOSPHERES APCI-IWO-NO-LB-0043 APCI-TM-112 6P 5/8/68
990001880 BAILEY,B. APCI IGNITION-LIMITS OF SOME STAINLESS STEELS IN AN OXYGEN-ATMOSPHERE APCI-PROJECT-NO-00-7-3480-51.00 APCI-TM-114 5P 6/24/68
990001890 PECKHAM,H.M. HAUSER,R.L. MARTIN CO COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN METHYL-CHLORIDE, METHYLENE-CHLORIDE, CHLOROFORM, ETHYL-CHLORIDE, DICHLOROETHANE, DICHLOROETHANE, TRICHLOROETHANE POLYMERS, POLYSULFIDE-SEALER, BUNA-N, NEOPRENE, EPOXY-ADHESIVE, PHENOLIC-MOLDED, MELAMINE-MOLDED, POLYESTER-GLASS, NYLON, MOLYBDENUM-DISULFIDE, GRAPHITE, ELECTROFILM-SPRAYABLE-A, DRILUBE-1, TEFLON DISPERSION-T-FILM, HYDROCARBON-GREASE, HYDRAULIC-OIL, CHLORINATED-BIPHENYL-AROCLOR-1254, GRAPHITE-CHLOR-BIPHENYL, VINYL-CHLORIDE, CIS-DICHLOROETHYLENE, TRANS-DICHLOROETHYLENE, VINYLIDENA-CHLORIDE, TRICHLOROETHYLENE, ETHYL-ALCOHOL, METHYL-ETHYL-KETONE, KEROSENE, GLYCERINE, POLYETHYLENE-LOW-DENSITY, POLYETHYLENE-IRRADIATED, POLYVINYLCHLORIDE, POLYETHYLENE-TEREPHTHALATE, MYLAR, POLYTETRAFLUOROETHYLENE, TEFLON, POLYTRICHLOUROVINYLCHLORIDE, KEL-F, POLYHEXAFLUOROPROPYLENE VITON A VINYLIDEND FLUORIDE, POLYDIMETHYLSILOXANE, FLUORINATED-SILOXANE, LS-53, BUTYL-RUBBER, IRON-OXIDES, TALC, ASBESTOS, ALUMINUM-CHIPS, STEEL-WOOL, MAGNESIUM-CHIPS, MAGNESIUM-SHEET, DYE-PENETRANTS, MAGNOGLO-PASTE10 IN KEROSENE, TURCO-DYE-CHECK-STEP-2-LIQUID, TURCO-4499-1, TUCRO-4499-2, TURCO-4499-3, TURCO-4499-5, TURCO-4499-6, ZYGLO-ZLIB-OIL-BASE, ZYGLO-ZL-2-PENETREX, ZYGLO-ZL-22, ZYGLO-ZLX-390, DYE-PROCESS-SOLUTIONS, TURCO-DYE-CHECK PROCESS, ZYGLO-ZE-2-EMULSIFIER, ZYGLO-ZP-5-DEVELOPER, PROTECTIVE-COATINGS, DOW-CORNING-SILICONE, PAINT-ON-GALBESTOS, DOW-CORNING-SILICONE-PAINT-XP-7-1003, GRIP-CLAD-PRIMER, SHERWIN-WILLIAMS-E41A4, SUPER FLAKE-1822, SUPERIOR-GRAPHITE-CO, CALQUARTZ-SODIUM SILICATE, 3M-DC1252-MARKER-PUTTY, DURABLE-MANUFACTURING COMPANY-GASKET MATERIAL, JOHNS-MANVILLE-76 GASKET MATERIAL, CLOTH-ASBESTOS, GLASS-COTTON-ALUMINIZED-MIL-C-8240, COCCTITE-CERAMIC-INSULATION, CHROMATE-DYED-GLASS CLOTH, 3M-SAFETY-WALK-TYPE-B-M-0070, WALK-SYNTHETIC-CORK, MASKING-TAPE, SHERLOCK-LEAK-DETECTOR-TYPE-OG, SHERLOCK-LEAK DETECTOR-WITH-15-PERCENT-METHANOL, SODIUM-NITRITE-SOLUTION INHIBITOR CRYOGENIC ENGINEERING CONFERENCE PROCEEDINGS 1958 ADVANCES IN CRYOGENIC ENGINEERING V-4 P26-46 21P 1/59
990001900 NATIONAL FIRE PROTECTION ASSOC INSTALLATION OF BULK OXYGEN SYSTEMS AT CONSUMER SITES-1965 NFPA-NO-566 10P 1965
990001910 NATIONAL FIRE PROTECTION ASSOC INSTALLATION OF BULK OXYGEN SYSTEMS AT CONSUMER SITES PROPOSED AMENDMENTS PART II AMENDMENTS TO NFPA-NO-566 3P PASSED 5/71 NFPA-NO-50
990001920 APCI MAINTENANCE AND INSEPCTION REQUIREMENTS FOR CUSTOMER BULK GAS SUPPLY SYSTEM APCI-DIST-OPER-MAN-V-1-SEC-4.1.3 2P 6/71
990001930 APCI MAINTENANCE AND INSPECTION REQUIREMENTS FOR BULK LIQUID CUSTOMER INSTALLATIONS APCI-DIST-OPER-MAN-V-1-SEC-4.2.3 1P 5/69
990001940 APCI FLEET SAFETY- LOADING AND UNLOADING OPERATIONS APCI-SAFETY-STD-635.19 6P 2/68
990001950 COMPRESSED GAS ASSOC INSULATED TANK-TRUCK SPECIFICATION CGA-341 FOR COLD LIQUEFIED-GASES CGA-PAMPHLET-341-TENTATIVE-STANDARDS 13P 1970
990001960 COMPRESSED GAS ASSOC SAFETY RELIEF DEVICE STANDARDS PART-1- CYLINDERS FOR COMPRESSED GASES CGA-PAMPHLET-S-1.1 20P 1969
990001970 APCI FLEET SAFETY- FIRE EXTINGUISHMENT APCI-SAFETY-STD-635.30 5P 2/68
990001980 COMPRESSED GAS ASSOC EQUIPMENT CLEANED FOR OXYGEN SERVICE CGA-PAMPHLET-G-4.1 21P 3/59
990001990 KEHAT,E. APCI HAZARD LEVEL OF HYDROCARBON FILMS IN SYSTEMS CONTAINING LIQUID AND GASEOUS OXYGEN ADVANCES IN CRYOGENIC ENGINEERING V-1 P163-169 7P 1962
990002000 BALL,W.L. APCI HAZARD LEVEL OF HYDROCARBON FILMS IN OXYGEN SYSTEMS AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-4 P16-20 5P 1962
990002010 WALDE,R.A. APCI RELATIONSHIP OF THE CHEMICAL STRUCTURE OF CUTTING OILS TO THEIR OXYGEN-COMPATIBILITY AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-7 P21-3 3P 1965

990002020 APCI SAFETY CONTROL PROCEDURE- TAG OUT APCI-POM-SEC-1.03 2P PLUS EXHIBIT-A 1P 2/15/67
990002030 APCI SAFETY CONTROL PROCEDURE- SAFETY WORK-PERMIT APCI-POM-SEC-1.04 3P PLUS EXHIBIT-A 1P 2/16/67
990002040 APCI CODED VESSEL REPAIRS APCI-POM-SEC-6.09 4P 11/29/68 FOR ATTCHMTS SEE 205 206 207
990002050 MARYLAND CASUALTY CO APCI FIELD INSPECTION CONTRACT WITH MARYLAND CASUALTY CO APCI-POM-SEC-6.09-ATT CHMT-1 2P 8/27/69
990002060 APCI HYDROSTATIC TESTING-GENERAL APCI-QUAL-CONT-LAYOUT-117A 2P 7/1/71
990002070 APCI PNEUMATIC TESTING-GENERAL APCI-QUAL-CONT-LAYOUT-105A 3P 7/1/71
990002080 SMITH,H.W. APCI SAFETY CONTROL PROCEDURES- TAG OUT PROCEDURE APCI-SAFETY-STD-626.3.3 2P 5/62
990002090 SMITH,H.W. APCI SAFETY CONTROL PROCEDURES- AIR-SEPARATION-PLANT SAFETY WORK PERMITS APCI-SAFETY-STD -626.3.5 3P 6/19/61
990002100 AMERICAN SOCIETY OF MECHANICAL ENGINEERS RULES FOR CONSTRUCTION OF PRESSURE VESSELS DIVISION-1 ASM E BOILER AND PRESSURE VESSEL CODE SECTION VIII 361P 1971
990002110 AMERICAN SOCIETY OF MECHANICAL ENGINEERS QUALIFICATION STANDARD FOR WELDING AND BRAZING PROCEDURES, WELDERS, BRAZERS, AND WELDING AND BRAZING OPERATORS ASME BOILER AND PRESSURE VESSEL CODE SECTION I X 88P 1971
990002120 NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS NATIONAL BOARD INSPECTION CODE- A MANUAL FOR BOILER AND PRESSURE VESSEL INSPECTORS 150P 1968
990002130 ERDOGAN,F. ROBERTS,R. LEHIGH UNIV COMPARATIVE STUDY OF CRACK-PROPAGATION IN PLATES UNDER EXTENSION A ND BENDING INTERNATIONAL CONFERENCE ON FRACTURE PROCEEDINGS V-1 PP341-62 22P 1965
990002140 ROBERTS,R. ERDOGAN,F. LEHIGH UNIV EFFECT OF MEAN STRESS ON FATIGUE CRACK-PROPAGARION IN PLATES UNDE R EXTENSION AND BENDING ASME WINTER ANNUAL MEETING PITTSBURGH 11/12-17/66 TRANS ASME SER-D-J B ASIC ENG V-89 PP885-62 8P 12/67
990002150 LOUSHIN,L.L. LAMBERTIN,W.J. PALMER,A.J. ESSO APPLICATION OF FRACTURE-MECHANICS TO SAFE-LIFE DESIGN IN CRYOGENIC PRESSURE-VESSELS ESSO-REPORT-NO-EE.26ER.70 17P 8/24/70
990002160 TAFURI,J.C. APCI ROBERTS,R. LEHIGH UNIV FATIGUE CRACK GROWTH-RATES AND FRACTURE TOUGHNESS STUDY OF W ELDED ALUMINUM ALLOY-5083 ASME WINTER ANNUAL-MEETING NEW/YORK 8P 11/29/70-12/3/70
990002170 LATSHAW,D.R. APCI OXYGEN SAFETY REVIEW CHECK-LIST APCI-MEMO-71 05/4/71 3P
990002180 KITSON,F.K. APCI CHECK-LIST-AIR-SEPARATION-PLANT OPERATION APCI-SAFETY-STD-610.1/5 17P 2/16/61
990002190 HIMMELBERGER,F. APCI HANDLING OF LOW-TEMPERATURE-FLUIDS AND HIGH-PRESSURE OXYGEN NATIONAL SAFETY CON GRESS CHICAGO 7P PLUS 9P FIGURES PRESENTED BY W L BALL 10/19/59
990002200 BALL,W.L. APCI LOX-SPILL NCG CONSHOHOCKEN APCI-MEMO-68 05/23/68 2P
990002210 LAPIN,A. APCI DISCUSSION WITH MR E LUCAS-IPD INSPECTION, REGARDING APCI CLEANLINESS REQUIREMENTS APCI -MEMO-71 07/22/71 2P
990002220 LAPIN,A. APCI TELEPHONE CONVERSATION WITH MR WILLIAM MCCORMICK REGARDING REQUIREMENTS FOR VENDOR-CLASS -AA AND CLASS-AAA CLEANING APCI-MEMO-71 07/22/71 1P
990002230 APCI QUALITY CONTROL PROGRAM APCI-DIST-OPER-MAN-6.3 6P 7/65 1/69 4/68 PLUS EXHIBIT-A AND B 7/19 /65
990002240 SCOTT,D.J. APCI ANALYSES REQUIRED ON QUALITY-CONTROL-SAMPLES APCI-MEMO-68 05/1/68 1P
990002250 ENT,W.L. APCI REVISIONS TO IGD QUALITY ASSURANCE PROGRAM COST-PROCEDURES DIST-OPER-MAN-VOL-4-SECT-6.3 APCI-MEMO-66 10/17/66 2P PLUS SCHEDULE FOR SUBMITTING ROUTINE PRODUCT SAMPLES 5P
990002260 APCI ANALYSES REQUIREMENTS SUMMARY APCI-DIST-OPER-MAN-V-1-SEC-6.32 7P 3/70
990002270 APCI COLD-BOX LEAKS APCI-POM-SEC-1.14 5P 10/30/68
990002280 APCI CODED VESSEL REPAIRS APCI-POM-SEC-6.09 4P 15P OF ATTCHMTS 11/29/68
990002290 APCI INSTRUMENTATION PREVENTIVE MAINTENANCE APCI-POM-SEC-6.05 5P 10/30/68
990002300 APCI SAFETY-VALVES AND RUPTURE-DISCS APCI-POM-SEC-6.02 19P INCLUDING EXHIBITS ABCDE 12/8/64
990002310 APCI OPERATIONS DEPARTMENT PREVENTIVE MAINTENANCE REPORT FEED-BACK-CARD FORM-3610A
990002320 MASTER,H.H. APCI PLANT PREVENTIVE MAINTENANCE-CONTROL 9P PLUS EXHIBIT-A-1, A-2, A-3, A-4, A-5 6/7 1
990002330 APCI SAFETY REPORTS AND FORMS APCI-POM-SEC-5.18 6P PLUS EXHIBITS ABCDEFGH 3/3/70
990002340 APCI OXYGEN PUMP FILTER ASSEMBLY APCI-DRAWING-58521C REV-B 12/18/57
990002350 COMPRESSED GAS ASSOC COMPRESSED GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS CGA-PAMPHLET-V-1 57 P 1965
990002360 AMERICAN STANDARDS ASSOC COMPRESSED GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS ASA-B57.1 57P 1965
990002370 CANADIAN STANDARDS ASSOC COMPRESSED GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS CSA-B96 57P 19 65
990002380 APCI FILLING PROCEDURE FOR TRANSPORTABLE CRYOGENIC CONTAINERS (250-GALLON CAPACITY OR LARGER) GENERAL APCI-POM-SEC-2.02 7P PLUS EXHIBITS ABCDEFG 8/29/69
990002390 APCI FILLING PROCEDURE FOR TRANSPORTABLE CRYOGENIC CONTAINERS (250-GALLON CAPACITY OR LARGER) APCI-D IST-OPER-MAN-9.1 6P PLUS EXHIBITS ABC 4/66

990002400 APCI SAFETY CONTROL PROCEDURES-PURGING METHODS APCI-SAFETY-STD-626.4.1 7P 1/70 2/70
990002410 BALL,W.L. APCI INDUSTRIAL SAFETY-INDUSTRIAL SAFETY POLICY APCI-SAFETY-STD-625.0.1 13P 10/3/61
990002420 NATIONAL FIRE PREVENTION ASSOC STANDARD FOR THE INSTALLATION AND OPERATION OF OXYGEN-FUEL GAS SYSTEMS FOR WELDING AND CUTTING NFPA-NO-51 8P 1969 AND CUTTING AND WELDING PROCESSES NFPA-NO-51B 32P 1962
990002430 APCI OXYGEN CONTROL-PANEL APCI-DES-ENG-STD-534.1 (TO BE PUBLISHED)
990002440 SMITH,H. APCI FIRE PROTECTION EQUIPMENT- OUTSIDE FIRE-HYDRANT APCI-SAFETY-STD-630.2.2 1P 7/26/61
990002450 APCI FIRE PROTECTION EQUIPMENT- OUTSIDE HYDRANT-HOUSE AND EQUIPMENT APCI-SAFETY-STD-630.2.3 3P REV-6/15/70
990002460 APCI FIRE PROTECTION EQUIPMENT- INSIDE- OUTSIDE APCI-SAFETY-STD-630.3.2 3P 5/68
990002470 APCI LOX AND LIN VAPOR DISPOSAL-TANK-500-GAL APCI-DRAWING-92483D REV-B 9/30/68
990002480 MASTER,H.H. APCI LATHROP AUTO-LOAD SYSTEM APCI-MEMO-71 03/22/71 2P PLUS 3P ATTACHMENTS
990002490 MASTER,H.H. APCI AUTO LOAD SYSTEMS APCI-MEMO-71 05/4/71 2P PLUS 3P ATTACHMENTS
990002500 SCHMOYER,W.W. BALL,W.L. APCI MISTY PROBLEM VAPOR-CLOUDS FROM DEFROST OPERATIONS ALLEGEDLY CAUSED HIGHWAY ACCIDENT APCI-SAFETY-GRAM-NO-17 1P 8/10/62
990002510 MASTER,H.H. APCI PRODUCT VAPOR HAZARDS- SAFETY INFORMATION RELATIVE TO LIQUID-VAPOR-CLOUDS APCI-PAPER 7P 1971
990002520 GAYLE,J.B. NASA-KENNEDY FIRE INCIDENT IN AN OXYGEN CLOUD FIRE JOURNAL PP76-8 AND 81 4P 1/71
990002530 APCI INDUSTRIAL SAFETY POLICY APCI-POM-SEC-5.16 7P 10/30/68
990002540 APCI ACCIDENT REPORTING APCI-CORP-ADMIN-PROC N-1.5 3P 4/1/68
990002550 APCI ACCIDENT REPORTING APCI-POM-SEC-5.21 4P PLUS APPENDIX-A EXHIBIT-A 5/8/68
990002560 APCI PIPING- OXYGEN COMPRESSOR SYSTEM APCI OPERATED APCI-DES-ENG-STD-570.7 32P 7/19/71
990002570 SCHMOYER,W.W. APCI SPECIALTY-GAS GAUGE-FAILURE APCI-MEMO-64 04/13/64 4P
990002580 BERRETTINI,B.J. APCI LOX-PUMP FIRES AND EXPLOSIONS APCI-MEMO-70 06/26/70 3P
990002590 DUFFALA,S.H. PIEMME,A.G. LINDE ACCIDENT AND FIRE IN OXYGEN GENERATING PLANT AT GREAT-LAKES-STEEL-CORP ECORSE-MICHIGAN 2P 6/21/61
990002600 BALL,W.L. APCI OXYGEN COMPRESSOR FIRE APCI-SAFETY-GRAM-NO-03 2P 7/7/61
990002610 BALL,W.L. APCI REPORT OF OXYGEN PUMP EXPLOSION AIRCO-BUTLER APCI-MEMO-63 10/21/63 1P PLUS 6P ATTACHMENTS
99000261A RENDOS,J.J. AIRCO DESCRIPTION OF AN AIR-SEPARATION PLANT EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-6 PP41-4 1964
990002620 COWLES,S.W. ARMOUR AGRICULTURAL CHEMICAL CO OXYGEN FIRES AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-8 PP19-20 2P 1966
990002630 RENDOS,J.J. AIRCO LIQUID OXYGEN PUMP FAILURES RE-99000301
990002640 MASTER,H.H. APCI OXYGEN PIPE-LINE FAILURE APCI-MEMO-67 12/29/67 1P
990002650 MASTER,H.H. APCI LOX TRANSFER PUMPS APCI-MEMO-68 12/30/68 2P PLUS 2P ATTACHMENTS
990002660 MASTER,H.H. APCI LOX TRANSFER PUMP SCREENS APCI-MEMO-69 01/24/69 2P PLUS 3P ATTACHMENTS
990002670 STOMPLER,R.D. APCI PAUL, CARTER, AND COSMODYNE LOX-PUMP SAFETY APCI-MEMO-71 1/01/26/71 2P
990002680 STOMPLER,R.D. APCI LOX-PUMP SAFETY APCI-MEMO-71 2/19/71 1P
990002690 BAUER,H. WEGENER,W. WINDGASSEN,K.F. FIRE TESTS ON CENTRIFUGAL PUMPS FOR LIQUID-OXYGEN CRYOGENICS V-10 PP241-248 8P 6/70
990002700 SCHMOYER,W.W. APCI SAFE HANDLING OF REGULATORS AND TORCHES APCI-PAPER 17P PLUS 2P ATTACHMENTS 7/65
990002710 COMPRESSED GAS ASSOC SAFE HANDLING OF COMPRESSED GASES CGA-PAMPHLET-P-1 10P 1965
990002720 AMERICAN WELDING SOCIETY SAFETY IN WELDING AND CUTTING USAS-Z49.1 49P 1967
990002730 MASTER,H.H. APCI OXYGEN FLOW-METER RING SEAL-FLUID APCI-MEMO-70 02/27/70 1P
990002740 KEHAT,E. APCI TESTS OF PRESSURE-GAGES SAFETY DEVICES APCI-PROJECT-NO-87-0-8820 APCI-MEMO-61 06/28/61 5P
990002750 KITSON,F.K. APCI SUMMARY OF ACTION TAKEN ON PRESSURE-GAUGES APCI-MEMO-61 08/2/61 4P
990002760 KITSON,F.K. APCI NASH VACUUM PUMPS APCI-MEMO-71 01/19/71 2P
990002770 BALL,W.L. APCI HOSE-CONNECTOR ACCIDENT- GRANITE/CITY APCI-MEMO-67 12/15/67 1P
990002780 HUBBS,M.K. APCI NEAR-MISS ACCIDENT- GRANITE/CITY FACILITY APCI-MEMO-67 12/15/67 1P
990002790 MASTER,H.H. APCI NEAR-MISS ACCIDENT- BURNS/HARBOR APCI-MEMO-71 02/8/71 2P
990002800 MANUFACTURING CHEMISTS ASSOC INC LIQUID-OXYGEN EXPLOSION MCA-CASE-HISTORY-NO-824 2P 8/62
990002810 HUBBS,M.H. APCI NEAR-MISS ACCIDENT- CREIGHTON APCI-MEMO-68 06/4/68 2P
990002820 APCI INSTRUMENTATION- MODIFICATION TO EXISTING PRESSURE-GAUGES SNUBBER APCI-DES-ENG-STD-531.10.2 2P 12/5/61
990002830 APCI SAFE HANDLING OF CRYOGENIC LIQUIDS AND ASSOCIATED EQUIPMENT APCI-POM-SEC-1.17 8P 4/23/69
990002840 HUBBS,M.H. APCI TEST GAUGE EQUIPMENT FAILURE SHAKOPEE APCI-MEMO-68 06/12/68 2P
990002850 MAHR,A.J. APCI LIST OF CLEANING-AGENTS, ASSOCIATED EQUIPMENT AND SUPPLIES APPROVED FOR USE IN APCI MANUFACTURING FACILITIES APCI-QUAL-CONT-LAYOUT-103F 11P REV 12/14/65

990002860	APCI BYRON-JACKSON OXYGEN PUMP WASHOUT PROCEDURE FOR ANALYTICAL PURPOSES APCI-POM-SEC-1.07 5P 7/7/70
990002870	APCI PRODUCT TEST PROCEDURES 1200-SERIES REGULATORS APCI-TEST-PROCEDURE 4P 1/30/70
990002880	APCI OPERATING AND SAFETY INSTRUCTION FOR REGULATORS AND COMPRESSED GASES APCI-BROCHURE 4P 4/70
990002890	APCI SET-UP AND OPERATING INSTRUCTIONS FOR AIR-PRODUCTS REDI-SET WELDING AND CUTTING OUTFITS APCI-BROCHURE 11P 9/25/69
990002900	KOKINDA,J.J. APCI 1200-SERIES REGULATOR- MATERIAL OF CONSTRUCTION 231-G-120054 (OXYGEN) DRAWING 000-0-407004E-REV-F 6/7/71 APCI-MEMO-71 6/7/71 4P
990002910	LAPIN,A. APCI TESTING OF SCREENS TO BE USED IN OXYGEN COMPRESSOR SUCTION APCI-MEMO-71 07/26/71 2P
990002920	BALL,W.L. KITSON,F.K. APCI INSULATION MATERIALS FOR CRYOGENIC SYSTEMS MILFOAM URETHANE INSULATION NATIONAL-GYPSUM-BLUE LOX-SYSTEMS FOAM-GLASS LIQUID-HYDROGEN-PIPING-SYSTEMS LNG-SYSTEMS INERT-CRYOGENES BELOW THE DEW-POINT OF AIR-SYSTEMS INERT-CRYOGENS ABOVE THE DEW-POINT OF AIR-SYSTEMS UNARCO APCI-MEMO-63 11/1/63 3P
990002930	SCHMAUCH,G.E. APCI FLAMMABILITY TESTS ON INSULATION MATERIALS VASCOCEL MILFOAM NATIONAL-GYPSUM (GREEN) FOAM-GLAS (CORNING) APCI-IWO-NO-LA-0333 APCI-MEMO-68 10/24/68 2P
990002940	LANG,A. LINDE AIR-FRACTIONATION PLANT EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-4 PP71-80 1962
990002950	REYNOLDS,P.W. IMPERIAL CHEMICAL INDUSTRIES SAFETY IN AIR AND AMMONIA PLANTS AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-2 PP31-36 1960
990002960	ROTZLER,R.W. ET.AL OXYGEN PLANT REBOILER EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-2 PP31-36 1960
990002970	WRIGHT,G.T. DOMINION FOUNDRIES AND STEEL LTD OXYGEN PLANT VAPORIZER EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-3 PP9-12 1961
990002980	MATHEWS,L.G. LINDE OXYGEN PLANT EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-3 PP12-16 1961
990002990	PINNEY,G.G. NATIONAL CYLINDER GAS CO OXYGEN TRAILER FIRE AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-4 PP49-50 1962
990003000	BALL,W.L. APCI DISCUSSION OF ENERGY RELEASE IN A LIQUID OXYGEN PUMP AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-5 PP41-42 1963
990003010	RENDOS,J.J. AIRCO LIQUID OXYGEN PUMP FAILURES AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-9 P5 1967
990003020	MOORE,A.A. APL REPORT ON SERVICE VISIT TO H.M.S.-EAGLE APL-X0425 5P PLUS APPENDIX A AND B 8/18/71 PLUS MINUTES OF MEETING HELD ON BOARD HMS ARK-ROYAL 8/11/71 TO DISCUSS LIQUID-OXYGEN SAFETY REGULATIONS 3P 9/13/71 PLUS NOTES ON VISIT TO HMS ARK-ROYAL ON 11/8/71 TO DISCUSS SAFETY OF SHIPBOARD LOX-PLANTS 2P 9/13/71
990003030	KEHAT,E. APCI HAZARD LEVEL OF HYDROCARBON FILMS IN SYSTEMS CONTAINING LIQUID AND GASEOUS OXYGEN USAF-CONTRACT-AF33(616)6730 14P CRYOGENIC ENGINEERING CONFERENCE ANN/ARBOR 8/15-17/61
990003040	FREDERICK,L.G. LATSHAW,D.R. APCI OXYGEN INDEX RATING VITON-O-RING MATERIAL- VITON-E-60 (GREEN) VITON-A (BLACK) GARLOCK-900 JOHNS-MANVILLE .ASBESTOS-61 SHEET APCI-ANAL-REP-71-344 AND APCI-ANAL-REP-71-345 2P 8/13/71
990003050	NISSLER,K.H. DEMAG KA-27-IV/KA-4-IV OXYGEN COMPRESSOR VITON-A (BLACK) VITON-E60 (GREEN) DEMAG-LETTER TO APCI 1P 8/11/71
990003060	FREDERICK,L.G. LATSHAW,D.R. APCI OXYGEN INDEX RATING SILICONE-O-RING (1/8-INCH DIA) APCI-IWO-NO-XD-0128 APCI-ANAL-REP-71-399 1P 8/17/71
990003070	BALL,W.L. APCI MINUTES OF CGA AIR-SEPARATION EQUIPMENT COMMITTEE HELD AT FT/LAUDERDALE FLORIDA 5/11-12/71 LIQUID-OXYGEN PUMPS ALUMINUM IN OXYGEN SERVICE LIQUID-CARBONIC-LIQUID-OXYGEN TRAILER- ACCIDENT VICTORY-MEMORIAL-HOSPITAL 5/70 APCI-MEMO-71 06/3/71 17P
990003080	SCHNYDER,R. APCI MASTER DRAWING 1200-SERIES REGULATIONS APCI-DRAWING-000-0-407004E 1P 3/4/68
990003090	FREDERICK,L.G. LATSHAW,D.R. APCI COMPATIBILITY OF MATERIAL WITH OXYGEN JOHNS-MANVILLE ASBESTOS SHEET PACKING STYLE-NO-61 GARLOCK-900 APCI-IWO-NO-LB-0795 APCI-ANAL-REP-71-264 2P 5/28/71
990003100	ROBINSON,G.W. APCI LOX COMPATIBLE GASKET MATERIALS GARLOCK-900 DURABLA JOHNS-MANVILLE ASBESTOS SHEET PACKING STYLE-61 APCI-MEMO-71 06/2/71 1P PLUS 2P ATTACHMENTS
990003110	FREDERICK,L.G. LATSHAW,D.R. APCI FLUORESCENCE OF VARIOUS TYPES OF OILS- MOBIL-DTE-105 TEXACO-CAPPELLA-A CELLULUBE-550 FLUOROLUBE SEARS-THREAD-CUTTING-OIL APCI-ANAL-REP 1P 7/15/71
990003120	FREDERICK,L.G. LATSHAW,D.R. APCI OXYGEN COMPATABILITY WITH TWO-PART EPOXY-COMPOUND (7343-RESIN- 7139-CATALYST) FROM CREST PRODUCTS CO APCI-IWO-NO-XD-0134 APCI-ANAL-REP-71-446 1P 10/25/71
990003130	FREDERICK,L.G. LATSHAW,D.R. APCI OXY-TITE THREAD COMPOUND APCI IWO-NO-XD-0134 APCI-ANAL-REP-71-336 1P 10/22/71
990003140	KITSON,F.K. APCI RUPTURE DISCS MANUFACTURED LOX TANKERS BY AMETEK APCI-MEMO-71 06/22/71 1P
990003150	COMPRESSED GAS ASSOC SAFETY RELIEF DEVICE STANDARDS PT-3 COMPRESSED-GAS STORAGE-CONTAINERS CGA-PA

MPHLET-S-1.3 11P 1966
990003160 SMITH,H.W. APCI PERSONNEL-PROTECTIVE-EQUIPMENT- EYE PROTECTION APCI-SAFETY-STD-627.4.2 5P 10/62
990003170 APCI PRESSURE-GAUGE FAILURE SAFETY GLASSES SAVE ANOTHER PAIR OF EYES APCI-SAFETY-GRAM-NO-01 1P 6/1/6
1
990003180 SMITH,H.W. APCI SAFETY EQUIPMENT NEVER PREVENTS AN ACCIDENT- IT ONLY PREVENTS AN INJURY APCI-SAFETY-
GRAM-NO-29 1P 8/1/63
990003190 SCHMOYER,W.W. APCI AND THEN THERE WAS DARKNESS APCI-SAFETY-GRAM-NO-58 1P 3/15/67
990003200 APCI PERSONNEL-PROTECTIVE-EQUIPMENT- WEARING APPAREL HARD HATS APCI-SAFETY-STD-627.4.1 1P 6/15/70
990003210 APCI WEAR SAFETY SHOES APCI-SAFETY-GRAM-NO-11 2P 5/14/62
990003220 SMITH,H.W. APCI PERSONNEL-PROTECTIVE-EQUIPMENT- RESPIRATORY PROTECTIVE EQUIPMENT APCI-SAFETY-STD-627
.3 14P 1/64
990003230 APCI PERSONNEL-PROTECTIVE-EQUIPMENT- OCCUPATIONAL NOISE PROTECTIV
990003240 MASTER,H.H. APCI OPERATIONS HEARING PROTECTION PROGRAM APCI-MEMO-71 04/7/71 2P PLUS 1P ATTACHMENT
990003230 EQUIPMENT APCI-SAFETY-STD-627.4.8 1P 9/69
990003250 APCI INDUSTRIAL-SAFETY- OCCUPATIONAL NOISE APCI-SAFETY-STD-625.0.1.2 3P 4/9/71
990003260 KITSON,F.K. APCI STAFFING AND CHECK-IN SYSTEMS FOR OPERATING-PLANTS APCI-MEMO-68 06/25/68 2P
990003270 STOMPLER,R.D. APCI LOX-PUMP SAFETY-BARRIERS APCI-MEMO-71 02/19/71 2P
990003280 APCI PERSONNEL-PROTECTIVE SHIELDS FOR OXYGEN SYSTEMS APCI-TB-42 3P 9/30/71 APPLICABLE TO APCI-DES-
ENG-STD-546.1
990003290 BALL,W.L. APCI ARE SAFETY-GLASSES WORTH THE COST AND EFFORT APCI-SAFETY-GRAM-NO-30 1P 8/9/63
990003300 APCI OPERATIONS SAFETY MANUAL APCI-SAFETY MANUAL-20P64 88P 1964 (OUT OF PRINT)
990003310 APCI MAINTENANCE OF PORTABLE FIRE-EXTINGUISHERS APCI-POM-SEC-1.13 5P 3/30/67
990003320 HUBBS,M.H. APCI FIRE PROTECTION CGA AIR-SEPARATION PLANT SAFETY SYMPOSIUM PP175-184 10P 10/63
990003330 APCI PERSONNEL-PROTECTIVE-EQUIPMENT ALUMINIZED HEAT PROTECTIVE CLOTHING APCI-SAFETY-STD-627.4.7 2P 5
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990003340 APCI PERSONNEL-PROTECTIVE-EQUIPMENT TONNAGE AIR-SEPARATION PLANT APCI-SAFETY-STD-627.5.1 4P 6/15/70
990003350 OEHMKE,G.R. APCI GENERAL SPECIFICATION FOR CLEANING FOR OXYGEN SERVICE APCI-550-SD-27A 5P 12/10/59
990003360 OEHMKE,G.R. APCI GENERAL SPECIFICATION FOR CENTRIFUGAL COMPRESSORS APCI-550-SD-16A 37P 4/15/65
990003370 STOLZ,J.L. APCI GENERAL SPECIFICATION FOR RECIPROCATING COMPRESSORS APCI-550-SD-01A 37P 3/9/64
990003380 APCI CONSTRUCTION SPECIFICATIONS GENERAL CONSTRUCTION AND EQUIPMENT ERECTION OXYGEN COMPRESSION SYSTEM
EL/SEGUNDO/CALIF APCI-CONSTR-SPEC-200.0 TO 200.20 20P 8/7/70
990003390 ASTM STANDARD PICTORIAL SURFACE PREPARATION STANDARDS FOR PAINTING STEEL SURFACES ASTM-D2200-67 2P
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990003400 SCHMOYER,W.W. APCI NASA OXYGEN STUDY PROJECT 00-1-2495.07 APCI-MEMO-71 12/10/71 1P
990003410 KRILL,W.R. APCI STANDARD SPECIFICATION FOR A FIELD-FABRICATED CRYOGENIC LIQUID STORAGE-TANK (FLAT-BOTTO
M) APCI-99820A 18P 9/15/71
990003420 KRILL,W.R. APCI JOB SPECIFICATION 310000 GALLON CAPACITY LOX/LIN STORAGE TANK APCI-JOB SPECIFICATI
ON FOR JOB-NO-00-2-2775 APCI-NO-71-2775-16.10-1A 2P 9/16/71
990003430 AMERICAN PETROLEUM INST RECOMMENDED RULES FOR DESIGN AND CONSTRUCTION OF LARGE, WELDED, LOW-PRESSURE ST
ORAGE TANKS API STANDARD-620 2/70
990003440 INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS UNIFORM BUILDING CODE VOL-1 1970
990003450 COMPRESSED GAS ASSOC ASSEMBLY OF INDUSTRIAL PRACTICES USED FOR GASEOUS OXYGEN TRANSMISSION AND DISTRIB
UTION CGA-DOCKET 70-11 CGA-THIRD DRAFT 23P 3/22/72
990003460 APCI SAFETY RELIEF VALVES LOCATION AND PIPING-DESIGN CONSIDERATIONS APCI PIPING GROUP MEMO-19 10P
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990003470 AMERICAN SOCIETY OF MECHANICAL ENGINEERS PETROLEUM REFINERY PIPING ANSI-B31.3 104P 1966
990003480 AMERICAN SOCIETY OF MECHANICAL ENGINEERS REFRIGERATION PIPING ANSI-B31.5 60P 1966
990003490 THIELSCH,H. GRINNELL CO DEFECTS AND FAILURES IN PRESSURE-VESSELS AND PIPING REINHOLD PUBLISHING CORP
427P 1965
990003500 AMERICAN SOCIETY OF MECHANICAL ENGINEERS GAS TRANSMISSION AND DISTRIBUTION PIPING SYSTEMS ANSI-B3
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-STANDARDS ESTABLISHMENT OF MINIMUM STANDARDS FEDERAL REGISTER VOL-35 NO-161 8/19/70
990003520 OFFICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE- MINIMUM FEDERAL SAFETY
-STANDARDS FILING OF INSPECTION AND MAINTENANCE PLANS FEDERAL REGISTER VOL-35 NO-205 10/31/70
990003530 OFFICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE- MINIMUM FEDERAL SAFETY
-STANDARDS ODORIZATION OF GAS FEDERAL REGISTER VOL-35 NO-220 11/11/70
990003540 OFFICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE- MINIMUM FEDERAL SAFETY
-STANDARDS MISC AMENDMENTS FEDERAL REGISTER V-35 N-223 11/17/70
990003550 OFFICE OF PIPELINE SAFETY MINIMUM FEDERAL SAFETY-STANDARDS FOR GAS PIPELINES CORROSION-PITTING- NOTICE

OF PUBLIC HEARING FEDERAL REGISTER VOL-36 NO-126 6/30/71

990003560 OFFICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE- MINIMUM FEDERAL SAFETY -STANDARDS REQUIREMENTS FOR CORROSION CONTROL FEDERAL REGISTER VOL-36 NO-126 6/30/71

990003570 OFFICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE- MINIMUM FEDERAL SAFETY -STANDARDS EXTENSION OF TIME FOR CONFIRMATION OR REVISION OF MAXIMUM ALLOWABLE OPERATING PRESSURE FEDERAL REGISTER VOL-36 NO-176 9/10/71

990003580 MCSWAIN,C.B. APCI ANALYSIS OF WATER-HAMMER IN CRYOGENIC TRANSFER-LINES BIBLIOGRAPHY APCI-REPORT P86 2/28/64

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990003610 PEGRAM,J.W. APL ACCEPTANCE TESTS FOR CLASS-A CLEANING APL-ENGR-SPEC-A.02 3P 5/12/69

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990003650 APL CONSTRUCTION SPECIFICATION FOR PIPING ERECTION, TESTING AND CLEANING APL-ENGR-SPEC-M.02 9P PLUS APPENDIX I II III 4/19/71

990003660 PEGRAM,J.W. APL SPECIFICATION FOR OXYGEN SERVICE VESSEL FABRICATION APL-ENGR-SPEC-C.03 7P 7/26/71

990003670 PEGRAM,J.W. APL SPECIFICATION FOR OXYGEN SERVICE PRESSURE-VESSEL FABRICATION APL-ENGR-SPEC-C.04 8P 7/26/71

990003680 PEGRAM,J.W. APL BRAZED CORE EXTENDED SURFACE HEAT-EXCHANGERS APL-ENGR-SPEC-E.02 9P 6/28/70

990003690 ELMORE,G. APL SHELL AND TUBE-TYPE-COOLER, OTHER THAN FOR OXYGEN SERVICE (APL-PLANTS) APL-ENGR-SPEC-E.04 12P 6/1/71

990003700 ELMORE,G. APL SHELL AND TUBE-TYPE-COOLERS FOR OXYGEN SERVICE APL-ENGR-SPEC-E.05 13P 6/1/71

990003710 OLIVER,R. APL CENTRIFUGAL CRYOGENIC PUMPS APL-ENGR-SPEC-G.03 14P 4/1/71

990003720 PEGRAM,J.W. APL PRESSURE-GAUGE- OXYGEN SERVICE APL-ENGR-SPEC-J.07 3P 6/18/69

990003730 PEGRAM,J.W. APL PRESSURE REGULATING-VALVES FOR OXYGEN SERVICE APL-ENGR-SPEC-J.15 3P 6/18/69

990003740 PEGRAM,J.W. APL RELIEF VALVES, WARM GAS SERVICE -20F TO 100F APL-ENGR-SPEC-J.18 4P 6/18/69

990003750 PEGRAM,J.W. APL TRANSFER HOSE FOR CRYOGENIC LIQUIDS APL-ENGR-SPEC-L.11 3P 7/7/69

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990003770 PEGRAM,J.W. APL UNSINTERED P.T.F.E. TAPE APL-ENGR-SPEC-L.14 2P 7/8/69

990003780 PEGRAM,J.W. APL CRYOGENIC LIQUID HOSE-COUPLINGS FOR USE IN THE U.K APL-ENGR-STD-LS.08 6P 10/21/69

990003790 PEGRAM,J.W. APL EXPANDED PERLITE APL-ENGR-SPEC-N.01 3P 1/2/70

990003800 PEGRAM,J.W. APL MINERAL WOOL APL-ENGR-SPEC-N.02 3P 1/2/70

990003810 PEGRAM,J.W. APL INSULATION- PREFORMED CELLULAR GLASS SECTION FOR PIPELINES APL-ENGR-SPEC-N.05 5P 10/1/70

990003820 APL FIRE IN OXYGEN-LINE APL-SAFETY-BULL-028 1P 1/68

990003830 EVERSON,I. APL ACCIDENT AT AN OXYGEN CHARGING MANIFOLD APL-SAFETY-BULL-046 2P

990003840 EVERSON,I. APL ACCIDENT ARISING FROM VENTING-OXYGEN MANIFOLDS CONNECTED TO A COMMON VENT PIPE APL-SAFETY-BULL-075 3P 12/11/69

990003850 EVERSON,I. APL MORE ACCIDENTS ON OXYGEN EQUIPMENT APL-SAFETY-BULL-102 1P 2/8/71

990003860 EVERSON,I. LANBA,J.S. APL BURCKHARDT OXYGEN COMPRESSOR FIRE AT SSPC ROGNAC PLANT 3/2/71 APL-SAFETY-BULL-107 3P 4/14/71

990003870 GILLOTT,E. EVERSON,I. APL FAILURE OF BRAZED JOINTS IN HIGH-PRESSURE GASEOUS OXYGEN-LINE AT A CYLINDER FILLING DEPOT APL-SAFETY-BULL-114 3P 7/13/71

990003880 EVERSON,I. COOK,P. APL PRELIMINARY REPORT ON ACCIDENT AT ZELZATE PLANT 2/26/69 WHEN AN EXPLOSION AND FIRE OCCURRED IN BURCKHARDT CENTRIFUGAL LOX-PUMP-TYPE-GB114-NO-29224 APL-SAFETY-DEPT-REP-16 6P 2/28/69

990003890 CROXFORD,B.J. EVERSON,I. NAYLOR,R. APL REPORT ON EXPLOSION OF LOX-PUMP ON TANKER-400-11 1/7/70 AT JOHN/SUMMERS STEEL WORKS/SHOTTON PUMP-TYPE-GB114-SERIAL-NO-79 APL-SAFETY-DEPT-REP-26 6P 1/15/70

990003900 EVERSON,I. APL ACCIDENT AT T TURNER LTD PARK/LANE ROYTON OLDHAM LANCASTER 11 40 AM 5/2/70 APL-SAFETY-DEPT-REP-30 (PRELIMINARY) 2P 5/5/70

990003910 EVERSON,I. APL INVESTIGATION OF VALVE FIRES AT TEXAS INSTRUMENTS LTD-BEDFORD APL-SAFETY-DEPT-REP-31 5P REV-1 2/11/71

990003920 EVERSON,I. APL EXPLOSION AND FIRE DUE TO THE CRYOSTAR-GB114 LOX-PUMP ON AN SSPC LOX-TANKER APL-SAFETY-DEPT-REP-32 9P 7/10/70

990003930 EVERSON,I. APL INVESTIGATION OF CRYOSTAR LOX-PUMP EXPLOSION AT STOKE PLANT 8/7/70 APL-SAFETY-DEPT-REP-34 14P 8/24/70

990003940 COULSON,K.J. CROXFORD,B.J. EVERSON,I. APL REPORT ON EXPLOSION OF CRYOSTAR-GB.114-PUMP-NO-C.75 ON TANKER-400-11 2/17/71 AT THE CARRINGTON PLANT APL-SAFETY-DEPT-REP-35 7P PLUS APPENDIX I THROUGH VI 19P 3/5/71

990003950 BALL,W.L. BERRITTINI,B. APCI EVERSON,I. GRIFFITHS,D.K. APL RECOMMENDATIONS ARISING FROM EXPLOSION OF CRYOSTAR-GB.114-PUMP-NO-C.75 AT CARRINGTON 2/17/71 AS REPORTED IN SAFETY DEPT-REP-35 APL-SAFETY-DEPT-REP-36 6P 3/10/71

990003960 BOYNTON,M.C.W. BROWN,G.I. SHEPHERD,N. EVERSON,I. APL EXPLOSION ON OXY-FUEL-BURNER EQUIPMENT AT ALCAN-BOOTH ALUMINIUM WORKS ROGERSTONE/NEWPORT 5/18/71 APL-SAFETY-DEPT-REP-37 7P 6/2/71

990003970 APL CONSTRUCTION SPECIFICATION FOR PIPING ERECTION, TESTING AND CLEANING APL-ENGR-SPEC-M.02 8P APPENDIX I II III 3P 4/19/71

990003980 GILLOTT,E. APL SOLVENT WASHING OF PIPING SYSTEMS APL-IGD-ENGR-MAN-56-06 4P 7/3/71

990003990 APL GENERAL PROCEDURE FOR DECONTAMINATION OF STATIC-TANK AND ROAD-VEHICLE-ASSEMBLIES FOR OXYGEN SERVICE APL-QCP-Q10 REV.0 2P

990004000 APL MANUFACTURING QUALITY PROCEDURE FOR DEGREASING OF PIPEWORK APL-QCP-Q11 REV.0 2P

990004010 APL MANUFACTURING QUALITY PROCEDURE FOR INTERNAL CLEANING OF ALUMINUM TANKERS AND STATIC-TANKS FOR OXYGEN SERVICE APL-QCP-Q12 REV.0 1P

990004020 APL MANUFACTURING QUALITY PROCEDURE FOR INTERNAL CLEANING OF 9% NICKEL AND HI-PROOF STAINLESS STATIC-TANKS FOR OXYGEN SERVICE APL-QCP-Q13 REV.0 1P

990004030 APL ALOCLENE-100 AND APPLIED CHEMICALS-5.57 1P 2/5/72

990004040 PEGRAM,J.W. APL OXYGEN PIPELINES APL-ENGR-STD-LS.30/1 8P 7/1/70

990004050 PEGRAM,J.W. APL DESIGN AND SAFETY SATNDARDS FOR CARBON-STEEL GASEOUS OXYGEN TRANSMISSION-LINES APL-ENGR-STD-LS.30/2 3P 1/12/70

990004060 APL PIPING SELECTION SHEET-CARBON STEEL-WARM OXYGEN SERVICE 150PSIG (CS0.1.5) APL-ENGR-STD-LS.31/1 7P 6/12/70

990004070 PEGRAM,J.W. APL PIPING SELECTION SHEET-CARBON STEEL-WARM OXYGEN SERVICE 275PSIG (CS02.7) APL-ENGR-STD-LS.31/2 6P 1/29/70

990004080 APL PIPING SELECTION SHEET-CARBON STEEL-WARM OXYGEN SERVICE 500PSIG (CS05.0) APL-ENGR-STD-LS.31.3 6P 6/12/70

990004090 APL PIPING SELECTION SHEET-CARBON STEEL-WARM OXYGEN SERVICE 720PSIG (CS07.2) APL-ENGR-STD-LS.31.4 6P 6/12/70

990004100 APL CENTRIFUGAL OXYGEN COMPRESSOR MANUAL HATTINGEN PLANT 15P APPENDIX I II III 8P

990004110 CHAMBERS,J. APL LOX INSTALLATION AT CUSTOMER SITES APL-IGD-ENGR-MAN-40-01 7P 7/19/71

990004120 GRAY,G. APL PROCEDURE FOR FILLING CRYOGENIC TANKER BY PUMP AT CARRINGTON APL-IGD-ENGR-MAN-50-01 3P 5/27/71

990004130 GRAY,G. APL PROCEDURE FOR FILLING CRYOGENIC TANKERS BY PUMP AT BRACKNELL APL-IGD-ENGR-MAN-50-02 3P 5/27/71

990004140 GRAY,G. APL PROCEDURE FOR FILLING CRYOGENIC TANKERS BY PUMP AT STOKE-ON-TRENT APL-IGD-ENGR-MAN-50-03 3P 5/27/71

990004150 CHAMBERS,J. APL PURGE PROCEDURE FOR CRYOGENIC LIQUID CONTAINER APL-IGD-ENGR-MAN-52-02 7P 6/3/71

990004160 CHAMBERS,J. APL PROCEDURE FOR CYLINDER FILLING AND QUALITY CONTROL (STANDARD PURITY GASES) APL-IGD-ENGR-MAN-55.01 3P 7/2/71

990004170 CHAMBERS,J. APL PROCEDURE FOR THE INSTALLATION OF A CRYOGENIC TANK APL-IGD-ENGR-MAN-60-01 6P 5/19/71

990004180 DAVIES,G. APL OVERHAUL PROCEDURE APL-C-155/9.5 33P 1971

990004190 APL EXPERIMENTS WITH LIQUID OXYGEN APL-SAFETY-BULL-025 1P REPRINTED 1/68

990004200 APL LACK OF OXYGEN KILLS TWO WORKMEN APL-SAFETY-BULL-037 1P REPRINTED 1/68

990004210 ZURAWSKI,J. APL REPORT OF THE INVESTIGATION INTO BURCKHARDT CENTRIFUGAL PUMP EXPLOSION AND TANKER FIRE AT SHEEPBRIDGE ALLOY CASTINGS LTD APL-MEMO-64 02/5/64 16P

990004220 EVERSON,I. APL NOTES FOR GUIDANCE OF CUSTOMERS HAVING AIR PRODUCTS LTD OXYGEN EQUIPMENT APL-SAFETY-DEPT-INFO-SHEET-19 9P

990004230 EVERSON,I. APL FIRE HAZARDS IN COMPRESSED-AIR AND OXYGEN RICH ENVIRONMENTS APL-SAFETY-DEPT-INFO-SHEET-33 6P

990004240 DENISON,D.M. RAF INSTITUTE OF AVIATION MEDICINE FARNBOROUGH HANTS ENGLAND ASSESSMENT OF THE FIRE RISKS OF THE OXYGEN ENVIRONMENT EXPERIMENTS FPRC/MEMO-217 24P 1/65

990004250 DENISON,D. RAF INSTITUTE OF AVIATION MEDICINE FARNBOROUGH HANTS ENGLAND FIRE RISKS TO MAN OF OXYGEN RICH GAS ENVIRONMENTS FPRC/MEMO-223 12P 7/65

990004260 DENISON,D.M. RAF INSTITUTE OF AVIATION MEDICINE FARNBOROUGH HANTS ENGLAND FURTHER STUDIES UPON THE HUMAN ASPECTS OF FIRE IN ARTIFICIAL GAS ENVIRONMENTS FPRC/1270 28P 9/67

990004270 EVERSON,I. APL HAZARD LEVEL OF HYDROCARBON FILMS IN OXYGEN SYSTEMS APL-SAFETY-DEPT-INFO-SHEET-41 2P 4/8/71

990004280 EVERSON,I. APL LIMITING VALUES OF OIL-CONTAMINATION OF STAINLESS-STEEL SURFACES EXPOSED TO GASEOUS OX

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          YGEN  APL-SAFETY-DEPT-INFO-SHEET-42  1P  4/8/71
990004290 APCI  LUBRICANTS- KRYTOX-143-AA-OIL DUPONT   APCI-IA1A-01  1P  2/21/72
990004300 APCI  LUBRICANTS- HALOCARBON-11-21E, HALOCARBON PRODUCTS CORP   APCI-IA1A-02  1P  2/21/72
990004310 APCI  LUBRICANTS- HALOCARBON-11-14E, HALOCARBON PRODUCTS CORP   APCI-IA1A-03  1P  2/21/72
990004320 APCI  LUBRICANTS- HALOCARBON-6-25-WAX, HALOCARBON PRODUCTS CORP   APCI-IA1A-04  1P  2/21/72
990004330 APCI  LUBRICANTS- KEL-F-90-GREASE, MINNESOTA  MINING   MANUFACTURING  CO   APCI-IA1A-05  1P  2/21/72
990004340 APCI  LUBRICANTS- HALOCARBON-25-5S-GREASE, HALOCARBON PRODUCTS CORP   APCI-IA1A-06  1P  2/21/72
990004350 APCI  LUBRICANTS- FLUOROLUBE, FS, HOOKER CHEMICAL   APCI-IA1A-07  1P  2/21/72
990004360 APCI  LUBRICANTS- KRYTOX-143-AB-OIL DUPONT   APCI-IA1A-08  1P  2/21/72
990004370 APCI  LUBRICANTS- KRYTOX-143-AC-OIL DUPONT   APCI-IA1A-09  1P  2/21/72
990004380 APCI  LUBRICANTS- KRYTOX-143-AZ-OIL DUPONT   APCI-IA1A-10  1P  2/21/72
990004390 APCI  LUBRICANTS- FLUOROLUBE, FS-5, HOOKER CHEMICAL   APCI-IA1A-11  1P  2/21/72
990004400 APCI  LUBRICANTS- MOLYLUBE-N BEL-RAY  CO  FARMINGDALE/NJ   APCI-IA1A-12  1P  2/21/72
990004410 APCI  LUBRICANTS- MOLY-LUBE-NO-99, MOLY  LUBE PRODUCTS  GLEN/COVE/NY   APCI-IA1A-13  1P  2/21/72
990004420 APCI  LUBRICANTS- FLUORO-GLIDE, CHEMPLAST INC   APCI-IA1A-14  1P  2/21/72
990004430 APCI  LUBRICANTS- KRYTOX-143-AD-OIL DUPONT   APCI-IA1A-15  1P  2/21/72
990004440 APCI  LUBRICANTS- VOLTALEF-3A KINGSLEY AND  KEITH  LTD/UK   APCI-IA1A-16  1P  2/21/72
990004450 APCI  LUBRICANTS- ESSO BEACON-325   APCI-IA1A-17  1P  2/21/72
990004460 APCI  LUBRICANTS- FORMBLIN-YO4 MONTECATINI-EDISON   APCI-IA1A-18  1P  2/21/72
990004470 APCI  SEALANTS AND THREADING COMPOUNDS- PERMATEX-1516   APCI-IA2A-01  1P  2/21/72
990004480 APCI  SEALANTS AND THREADING COMPOUNDS- TEFLON-TAPE PERMACEL   APCI-IA2A-02  2P  2/21/72
990004490 APCI  SEALANTS AND THREADING COMPOUNDS- T-FILM ECO  MFGR  CO   APCI-IA2A-03  1P  2/21/72
990004500 APCI  SEALANTS AND THREADING COMPOUNDS- PUTTI-ROPE NATIONAL  GREENHOUSE  CO   APCI-IA2A-04  1P  2/21/72
990004510 APCI  SEALANTS AND THREADING COMPOUNDS- MOLYLUBE-N BEL-RAY  CO  FARMINGDALE/NJ   APCI-IA2A-05  1P  2/21/72
990004520 APCI  SEALANTS AND THREADING COMPOUNDS- CROSSLITE-FLUOROCARBON-TAPE   APCI-IA2A-06  2P  2/21/72
990004530 APCI  SEALANTS AND THREADING COMPOUNDS- DAMCO TAPE   APCI-IA2A-07  2P  2/21/72
990004540 APCI  SEALANTS AND THREADING COMPOUNDS- SANDEN TAPE   APCI-IA2A-08  2P  2/21/72
990004550 APCI  SEALANTS AND THREADING COMPOUNDS- CRANE  PACKING  CO-TAPE   APCI-IA2A-09  2P  2/21/72
990004560 APCI  SEALANTS AND THREADING COMPOUNDS- OXOMAT   APCI-IA2A-10  1P  2/21/72
990004570 APCI  SEALANTS AND THREADING COMPOUNDS- THREE-M FLUOROCARBON-TAPE   APCI-IA2A-11  2P  2/21/72
990004580 APCI  SEALANTS AND THREADING COMPOUNDS- SODIUM-SILICATE AND CHINA-CLAY-PASTE   APCI-IA2A-12  1P  2/21/72
990004590 APCI  THERMAL AND ELECTRICAL  INSULATIONS- FOAMGLAS  (CELLULAR-GLASS)  INSULATION, PITTSBURGH-CORNING CORP
             APCI-IA3A-01  1P  2/21/72
990004600 APCI  THERMAL AND ELECTRICAL  INSULATIONS- TRANSITE, JOHNS-MANVILLE   APCI-IA3A-02  1P  2/21/72
990004610 APCI  THERMAL AND ELECTRICAL  INSULATIONS- GLASS-WOOL   APCI-IA3A-03  1P  2/21/72
990004620 APCI  THERMAL AND ELECTRICAL  INSULATIONS- MINERAL-WOOL   APCI-IA3A-04  1P  2/21/72
990004630 APCI  THERMAL AND ELECTRICAL  INSULATIONS- PERLITE   APCI-IA3A-05  1P  2/21/72
990004640 APCI  THERMAL AND ELECTRICAL  INSULATIONS- MILFOAM MILFOAM CORP   APCI-IA3A-06  1P  2/21/72
990004650 APCI  THERMAL AND ELECTRICAL  INSULATIONS- NATIONAL-GYPSUM-BLUE NATIONAL-GYPSUM CORP   APCI-IA3A-07  1P  2
          /21/72
990004660 APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- RTV-60, SILICONE-RUBBER COMPOUND WITH SS-4004-SILICONE-PRIMER G
          E THERMOLITE-12-CURING-CATALYST   APCI-IA4A-01  1P  2/21/72
990004670 APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- KEENE-BINDER   APCI-IA4A-02  1P  2/21/72
990004680 APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- KEL-F-81   APCI-IA4A-03  1P  2/21/72
990004690 APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- NYLON   APCI-IA4A-04  1P  2/21/72
990004700 APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- NEOPRENE   APCI-IA4A-05  1P  2/21/72
990004710 APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- VITON-A DUPONT   APCI-IA4A-06  1P  2/21/72
990004720 APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- NYLON-66 ICI  LTD/UK   APCI-IA4A-07  1P  2/21/72
990004730 APCI  GASKETS AND PACKINGS- GRAPHITE-IMPREGNATED-ASBESTOS-PACKING   APCI-IA5A-01  1P  2/21/72
990004740 APCI  GASKETS AND PACKINGS- TFE-GF-GREEN, MELRATH  GASKETS  CO   APCI-IA5A-02  1P  2/21/72
990004750 APCI  GASKETS AND PACKINGS- VALLEGREEN, VALLEY/FORGE  GASKET  CO   APCI-IA5A-03  1P  2/21/72
990004760 APCI  GASKETS AND PACKINGS- FLUOROGREEN-E-600, JOHN/DORE  CO   APCI-IA5A-04  1P  2/21/71
990004770 APCI  GASKETS AND PACKINGS- MELRATH-150  (SHEET-ASBESTOS  GASKET MATERIAL)   APCI-IA5A-05  1P  2/21/72
990004780 APCI  GASKETS AND PACKINGS- KM226-SHEET  ASBESTOS  GASKET MATERIAL NICOLET INDUSTRIES INC   APCI-IA5A-06
          1P  2/21/72
990004790 APCI  GASKETS AND PACKINGS- GARLOCK-900  (SHEET-ASBESTOS  GASKET MATERIAL) GARLOCK  MFG  CO   APCI-IA5A-07
            1P  2/21/72
990004800 APCI  GASKETS AND PACKINGS- VULCANIZED-RED-FIBRE-GASKETS   APCI-IA5A-08  1P  2/21/72
990004810 APCI  GASKETS AND PACKINGS- KM246  SHEET-ASBESTOS  GASKET MATERIAL NICOLET INDUSTRIES   APCI-IA5A-09  1P
          2/21/72
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990004820 APCI GASKETS AND PACKINGS- TEFLON, DUPONT APCI-IA5A-10 2P 2/21/72

990004830 APCI GASKETS AND PACKINGS- VITON-A DUPONT APCI-IA5A-11 1P 2/21/72

990004840 APCI GASKETS AND PACKINGS- SINDANYO CS-51-ASBESTOS AND CEMENT BOARDS. NATURAL-UNTREATED-FINISH TURNERS
ASBESTOS CEMENT CO LTD/UK APCI-IA5A-12 1P 2/21/72

990004857 APCI GASKETS AND PACKINGS- KLINGERIT-661 RICHARD KLINGER LTD/UK

990004850 APCI-IA5A-13 1P 2/21/72

990004860 APCI GASKETS AND PACKINGS- TYGAFLOR CEMENTABLE PTFE TAPES TYGADURE LTD/UK APCI-IA5A-14 1P 2/21/72

990004870 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- TARSET PITTSBURGH CHEMICAL CO APCI-IA6A-01 1P
2/21/72

990004880 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SEALFAS-MASTIC-31-97 BENJAMIN FOSTER CO APCI-IA
6A-02 1P 2/21/72

990004890 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- PLASITE-NO-7122H WISCONSIN PROTECTIVE COATING CO
APCI-IA6A-03 1P 2/21/72

990004900 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-PIPE ASTM-B42 APCI-IA6A-04 1P 2/21/72

990004910 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-TUBE ASTM-B75 APCI-IA6A-05 1P 2/21/72

990004920 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- RED-BRASS-PIPE ASTM-B43 APCI-IA6A-06 1P 2/21/72

990004930 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B211-2024-T4 APCI-IA6A-07 2P 2/21
/72

990004940 APCI METLAS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM, ASTM-B-210-3003 APCI-IA6A-08 2P 2/21/
72

990004950 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B209-5083-0 APCI-IA6A-09 2P 2/21/
72

990004960 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B210-6061-T6 APCI-IA6A-10 2P 2/21
/72

990004970 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B241-6061-T6 APCI-IA6A-11 2P 2/21
/72

990004980 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B247-6061-T6 APCI-IA6A-12 2P 2/21
/72

990004990 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM B361-WP6061-T6 APCI-IA6A-13 2P 2/21/72

990005000 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- CARBON STEEL (OXYGEN SERVICE) APCI-IA6A-14 3P
2/21/72

990005010 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A312-TP304 APCI-IA6A-15 2P
2/21/72

990005020 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A240-304 APCI-IA6A-16 2P 2
/21/72

990005030 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A403-WP304 AND A403-WP304L
APCI-IA6A-17 2P 2/21/72

990005040 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A320-B8304 APCI-IA6A-18 2P
2/21/72

990005050 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A194-8T321 APCI-IA6A-19 2P
2/21/72

990005060 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEELS-TYPE-416-CADMIUM-PLATED APCI-IA6
A-20 1P 2/21/72

990005070 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A182-F-304 AND ASTM-A182-F-316
APCI-IA6A-21 2P 2/21/72

990005080 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL-TYPE-304 UNIDENTIFIED AS TO ASTM-S
PEC APCI-IA6A-22 2P 2/21/72

990005090 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-SILICON ASTM-B98GRB APCI-IA6A-23 2P 2/21
/72

990005100 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- FREE-MACHING BRASS APCI-IA6A-24 2P 2/21/72

990005110 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BERYLLIUM COPPER APCI-IA6A-25 2P 2/21/72

990005120 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A269-304 APCI-IA6A-26 2P 2
/21/72

990005130 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BRONZE ASTM-B61 OR B62 APCI-IA6A-27 2P 2/21/72

990005140 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BRASS-SHEET OR PLATE ASTM-B36 APCI-IA6A-28 2P
2/21/72

990005150 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- MONEL ASTM-B164 APCI-IA6A-29 2P 2/21/72

990005160 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A351-GR-CF8 APCI-IA6A-30 2P
2/21/72

990005170 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS 9-PERCENT NICKEL STEEL ASTM-A353GB APC

I-IA6A-31 2P 2/21/72

990005180 APCI METLAS, ALLOYS, SOLDERS, AND SURGACE TREATMENTS- COPPER-TUBE ASTM-B88 APCI-IA6A-32 1P 2/21/72

990005190 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- CARBON STEEL- NON-OXYGEN SERVICE WITH POSSIBLE EXPOSURE TO OXYGEN APCI-IA6A-33 3P 2/21/72

990005200 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SHPEROIDAL-GRAPHITE IRON CONTINENTAL-STANDARD-GGG-38 APCI-IA6A-34 1P 2/21/72

990005210 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SILVER APCI-IA6A-35 1P 2/21/72

990005220 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- NOVONOX STAINLESS STEEL ALLOY TO DIN GERMAN NATIONAL STANDARDS COMPOSITION 5-PERCENT-CR 17-PERCENT-NI 4-PERCENT-CU NIOBIUM STABILIZER BALANCE FE APCI-IA6A-36 1P 2/21/72

990005230 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- MUNTZ-METAL 60-40-TYPE COMPOSITION CU-58 1-PERCENT ZN38.5-42-PERCENT PB0.35-.9-PERCENT APCI-IA6A-37 1P 2/21/72

990005240 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALPHA BRASS-TYPE TCL-100 OR DTD-5019 TUNGUM CO LTD/UK COMPOSITION- COPPER-86-PERCENT ALUM-1.20-PERCENT NICKEL-1.4-PERCENT SILICON-1.3-PERCENT IRON-.25-PERCENT LEAD-.05-PERCENT TIN-.1-PERCENT MANGANESE-.1-PERCENT. TOTAL OTHER IMPURITIES K-PERCENT-ZINC REMAINDER APCI-IA6A-38 1P 2/21/72

990005250 APCI CHEMICALS, SOLVENTS, AND MISC- 1,1 DICHLOROTHANE APCI-IA7A-01 1P 2/21/72

990005260 APCI CHEMICALS, SOLVENTS, AND MISC- 1,1,1 TRICHLOROETHANE APCI-IA7A-02 1P 2/21/72

990005270 APCI CHEMICALS, SOLVENTS, AND MISC- CHLOROFORM APCI-IA7A-03 1P 2/21/72

990005280 APCI CHEMICALS, SOLVENTS, AND MISC- CARBON-TETRACHLORIDE APCI-IA7A-04 1P 2/21/72

990005290 APCI CHEMICALS, SOLVENTS, AND MISC- TRICHLOROETHYLENE APCI-IA7A-05 1P 2/21/72

990005300 APCI CHEMICALS, SOLVENTS, AND MISC- METHYLENE-CHLORIDE APCI-IA7A-06 1P 2/21/72

990005310 APCI MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, CLEANING-PROCEDURES-APCI APCI-IB1C-01 14P 2/21/72

990005320 APCI MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, CLEANING-PROCEDURES-APL APCI-IB1C-02 1P 2/21/72

990005330 APCI MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, QUALITY-CONTROL, FIRE HAZARDS APCI-IB1D(1)-1 2P 9/9/71

990005340 APCI MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, QUALITY-CONTROL-APCI APCI-IB1D(2)-1 3P 9/9/71

990005350 APCI MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPARIBILITY, QUALITY-CONTROL-APL APCI-IB1D(2)-2 2P 2/21/72

990005360 APCI MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY APCI-IB2-1 2P 2/10/72

990005370 APCI MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY APCI-IB2A-1 2P 9/2/71

990005380 APCI MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY NOTCH-SENSITIVITY OF MATERIALS APCI-IB2C-1 1P 9/2/71

990005390 APCI MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY FABRICATION AND WELDING APCI-IB2D-1 2P 10/28/71

990005400 APCI MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY MATERIALS AND PARTS SUITABILITY CONTROLS APCI-IB2E(2)-1 1P 9/2/71

990005410 APCI OPERATIONAL-HAZARDS- OVERPRESSURE APCI-IIA-1 2P 2/18/72

990005420 APCI OPERATIONAL-HAZARDS- OVERPRESSURE INTEGRITY OF INSULATION SHOP FABRICATED OX STORAGE TANKS APCI-IIA4-1 1P 12/30/71

990005430 APCI OPERATIONAL-HAZARDS- OVERPRESSURE INTEGRITY OF INSULATION FIELD FABRICATED FLAT-BOTTOM LOX STORAGE TANKS APCI-IIA4-2 1P 12/30/71

990005440 APCI OPERATIONAL-HAZARDS- DISPOSAL OF VENTED GASES COMPANY PRACTICES APCI-IIB-1 5P 11/1/71

990005450 APCI OPERATIONAL-HAZARDS- DISPOSAL OF VENTED GASES CLEANLINESS OF DISPOSAL SYSTEM APCI-IIB1-1 2P 2/12/72

990005460 VOID

990005470 APCI OPERATIONAL-HAZARDS, DISPOSAL OF VENTED GASES CLEANLINESS OF OXYGEN PIPING APCI-IIB1-2 1P 2/19/72

990005480 APCI OPERATIONAL-HAZARDS- DISPOSAL OF VENTED GASES PROCEDURAL ARRANGEMENTS APCI-IIB4-1 1P 2/19/72

990005490 APCI OPERATIONAL-HAZARDS- COUPLING TO OTHER SYSTEMS APCI-IIC1-1 APCI-IIC2-1 1P 12/22/71

990005500 APCI OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE APCI-IID-1 2P 9/3/71

990005510 APCI OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE DRAINAGE AND ULTIMATE DISPOSAL ARRANGEMENTS APCI-IID1-1 2P 8/22/71

990005520 APCI OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE SEPARATION OF INCOMPATIBLE MATERIALS AND IGNITION SOURCES IN DISPOSAL SYSTEMS APCI-IID2-1 1P 8/22/71

990005530 APCI OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE ENVIRONMENTAL WARNINGS AND ESCAPE SYSTEMS APCI-IID3-1 1
P 8/22/71

990005540 APCI OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE DETECTION- QUANTITY AND RESPONSE TIME LIMITS APCI-IID4-1
1P 8/22/71

990005550 APCI OPERATIONAL-HAZARDS- CONTAMINANTS ACUUMULATION APCI-IIE-1 1P 7/21/71

990005560 APCI OPERATIONAL-HAZARDS- OXYGEN-TRANSFER PRODUCTION TO STORAGE, STORAGE TO SYSTEM, STORAGE TO TRANSPO
RT, TRANSPORT TO SYSTEM APCI-IIF1-1 1P 12/22/71

990005570 APCI OPERATIONAL-HAZARDS- OXYGEN-TRANSFER PRODUCTION, STORAGE TO SYSTEM, STORAGE TO TRANSPORT, TRANSPOR
T TO SYSTEM LOADING AND UNLOADING PROCEDURES FOR LIQUID OXYGEN TRANSFER APCI-IIF1-2 1P 8/22/71

990005580 APCI OPERATIONAL-HAZARDS- OXYGEN-TRANSFER SYSTEMS SYSTEMS- FIELD FABRICATED CRYOGENIC LIQUID STORAGE T
ANKS APCI-IIF1-3 1P 2/3/72

990005590 APCI OPERATIONAL-HAZARDS- OXYGEN-TRANSFER SYSTEMS SYSTEMS- APL OXYGEN-TRANSFER METHODS TYPICAL INSTALLA
TIONS, AND OPERATIONS DEPARTMENT OVERHAUL PROCEDURES FOR LIQUID PUMPS APCI-IIF1-4 1P 2/21/72

990005600 APCI OPERATIONAL-HAZARDS- OXYGEN-TRANSFER PIPELINE-TRANSPORTATION PIPELINE TRANSPORTATION- LIST OF STAND
ARDS APCI-IIF2-1 2P 2/18/72

990005610 APCI OPERATIONAL-HAZARDS- OXYGEN-TRANSFER PIPELINE-TRANSPORTATION PIPELINE TRANSPORTATION- APL OXYGEN PI
PELINE DESIGN CONCEPTS AND CRITERIA APCI-IIF2-2 1P 2/21/72

990005620 APCI OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD RAILROAD BARGE AND PIPELINE-TRANSPORTATION PRESSURE-REL
IEF APCI-IIF2A-1 1P 8/22/71

990005630 APCI OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD RAILROAD BARGE AND PIPELINE-TRANSPORTATION CONTAMINATIO
N-CONTROL APCI-IIF2B-1 1P 9/3/71

990005640 APCI OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD RAILROAD BARGE AND PIPELINE TRANSPORTATION ROAD, RAILRO
AD, BARGE AND PIPELINE TRANSPORTATION OXYGEN-DISPERSAL FROM VENTS AND LINES APCI-IIF2C-1 1P 8/22/71

990005650 APCI OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD RAILROAD BARGE AND PIPELINE-TRANSPORTATION ROAD, RAILRO
AD, BARGE AND PIPELINE TRANSPORTATION VEHICLE ACCIDENT PROCEDURES APCI-IIF2D-1 1P 8/22/71

990005660 APCI OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD RAILROAD BARGE AND PIPELINE-TRANSPORTATION ROAD, RAILRO
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990003960		BOYNTON,M.C.W. BROWN,G.I. SHEPHERD,N. EVERSON,I. APL EXPLOSION ON OXY-FUEL-BU
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990000010		KITSON,F.K. APCI DON_T TURN A CYLINDER INTO A ROCKET APCI-SAFETY-GRAM-NO-04C
990000020		KITSON,F.K. APCI FIRE IN OXYGEN-LINE APCI-SAFETY-GRAM-NO-05 1P 10/20/61
990000550		KITSON,F.K. APCI FIRE-PROTECTION EQUIPMENT- DELUGE-SYSTEM AND LOX LOADING FACIL
990001460		KITSON,F.K. APCI FLAMMABILITY TEST OF GASKETS IN OXYGEN ATMOSPHERES JOHN-DORE-
990002920	BALL,W.L.	KITSON,F.K. APCI INSULATION MATERIALS FOR CRYOGENIC SYSTEMS MILFOAM URETHANE IN
990000060		KITSON,F.K. APCI ISOLATION OF PIPING-SYSTEMS APCI-SAFETY-GRAM-NO-21 1P 10/29

990000030		KITSON,F.K. APCI LIQUID OXYGEN LOADING APCI-SAFETY-GRAM-NO-06 1P 11/17/61
990002760		KITSON,F.K. APCI NASH VACUUM PUMPS APCI-MEMO-71 01/19/71 2P
990000440		KITSON,F.K. APCI PLANT COMPONENTS- AIR-SEPARATION, OXYGEN, COMPRESSOR APCI-SAF
990003140		KITSON,F.K. APCI RUPTURE DISCS MANUFACTURED LOX TANKERS BY AMETEK APCI-MEMO-
990003260		KITSON,F.K. APCI STAFFING AND CHECK-IN SYSTEMS FOR OPERATING-PLANTS APCI-ME
990002750		KITSON,F.K. APCI SUMMARY OF ACTION TAKEN ON PRESSURE-GAUGES APCI-MEMO-61 08/2
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990002900		KOKINDA,J.J. APCI 1200-SERIES REGULATOR- MATERIAL OF CONSTRUCTION 231-G-120054
990003420		KRILL,W.R. APCI JOB SPECIFICATION 310000 GALLON CAPACITY LOX/LIN STORAGE TANK
990003410		KRILL,W.R. APCI STANDARD SPECIFICATION FOR A FIELD-FABRICATED CRYOGENIC LIQUID S
990002150	LOUSHIN,L.L.	LAMBERTIN,W.J. PALMER,A.J. ESSO APPLICATION OF FRACTURE-MECHANICS TO SAFE-LIFE
990003860	EVERSON,I.	LANBA,J.S. APL BURCKHARDT OXYGEN COMPRESSOR FIRE AT SSPC ROGNAC PLANT 3/2/71
990002940		LANG,A. LINDE AIR-FRACTIONATION PLANT EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY
990006000		LAPIN,A. FOSTER,R.H. APCI OXYGEN DIFFUSION IN THE ATMOSPHERE FROM LIQUID OXY
990005990		LAPIN,A. FOSTER,R.H. APCI OXYGEN DIFFUSION IN THE ATMOSPHERE FROM LIQUID OXY
990002210		LAPIN,A. APCI DISCUSSION WITH MR E LUCAS-IPD INSPECTION, REGARDING APCI CLEANLI
990002220		LAPIN,A. APCI TELEPHONE CONVERSATION WITH MR WILLIAM MCCORMICK REGARDING REQUI
990002910		LAPIN,A. APCI TESTING OF SCREENS TO BE USED IN OXYGEN COMPRESSOR SUCTION APCI
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990003110	FREDERICK,L.G.	LATSHAW,D.R. APCI FLUORESCENCE OF VARIOUS TYPES OF OILS- MOBIL-DTE-105 TEXACO-CA
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990001410		LATSHAW,D.R. APCI GASKET MATERIAL COMPATIBILITY OF MELRATH MATERIAL WITH OXYGEN
990002170		LATSHAW,D.R. APCI OXYGEN SAFETY REVIEW CHECK-LIST APCI-MEMO-71 05/4/71 3P
990003040	FREDERICK,L.G.	LATSHAW,D.R. APCI OXYGEN INDEX RATING VITON-O-RING MATERIAL- VITON-E-60 (GREE
990003120	FREDERICK,L.G.	LATSHAW,D.R. APCI OXYGEN COMPATABILITY WITH TWO-PART EPOXY-COMPOUND (7343-RESI
990003060	FREDERICK,L.G.	LATSHAW,D.R. APCI OXYGEN INDEX RATING SILICONE-O-RING (1/8-INCH DIA) APCI-
990003130	FREDERICK,L.G.	LATSHAW,D.R. APCI OXY-TITE THREAD COMPOUND APCI IWO-NO-XO-0134 APCI-ANAL-REP
990002980	MATHEWS,L.G.	LINDE OXYGEN PLANT EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA
990002150		LOUSHIN,L.L. LAMBERTIN,W.J. PALMER,A.J. ESSO APPLICATION OF FRACTURE-MECHANICS
990002850		MAHR,A.J. APCI LIST OF CLEANING-AGENTS, ASSOCIATED EQUIPMENT AND SUPPLIES APPRO
990000970		MASTER,H.H. APCI AIR-SEPARATION-PLANT CONTAMINATION- HISTORY, SAMPLING, AND ANA
990002490		MASTER,H.H. APCI AUTO LOAD SYSTEMS APCI-MEMO-71 05/4/71 2P PLUS 3P ATTACHM
990002480		MASTER,H.H. APCI LATHROP AUTO-LOAD SYSTEM APCI-MEMO-71 03/22/71 2P PLUS 3P
990000910		MASTER,H.H. APCI LOX TANKS APCI-MEMO-70 06/26/70 1P
990002650		MASTER,H.H. APCI LOX TRANSFER PUMPS APCI-MEMO-68 12/30/68 2P PLUS 2P ATTAC
990002660		MASTER,H.H. APCI LOX TRANSFER PUMP SCREENS APCI-MEMO-69 01/24/69 2P PLUS 3P
990002790		MASTER,H.H. APCI NEAR-MISS ACCIDENT- BURNS/HARBOR APCI-MEMO-71 02/8/71 2P
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990002730		MASTER,H.H. APCI OXYGEN FLOW-METER RING SEAL-FLUID APCI-MEMO-70 02/27/70 1P
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990002510		MASTER,H.H. APCI PRODUCT VAPOR HAZARDS- SAFETY INFORMATION RELATIVE TO LIQUID-V
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990003050		NISSLER,K.H. DEMAG KA-27-IV/KA-4-IV OXYGEN COMPRESSOR VITON-A (BLACK) VITON-E60
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990003800			PEGRAM,J.W. APL MINERAL WOOL APL-ENGR-SPEC-N.02 3P 1/2/70
990004040			PEGRAM,J.W. APL OXYGEN PIPELINES APL-ENGR-STD-LS.30/1 8P 7/1/70
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990003670			PEGRAM,J.W. APL SPECIFICATION FOR OXYGEN SERVICE PRESSURE-VESSEL FABRICATION
990003660			PEGRAM,J.W. APL SPECIFICATION FOR OXYGEN SERVICE VESSEL FABRICATION APL-ENGR-
990003750			PEGRAM,J.W. APL TRANSFER HOSE FOR CRYOGENIC LIQUIDS APL-ENGR-SPEC-L.11 3P
990003770			PEGRAM,J.W. APL UNSINTERED P.T.F.E. TAPE APL-ENGR-SPEC-L.14 2P 7/8/69
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990002590		DUFFALA,S.H.	PIEMME,A.G. LINDE ACCIDENT AND FIRE IN OXYGEN GENERATING PLANT AT GREAT-LAKES-
990002990			PINNEY,G.G. NATIONAL CYLINDER GAS CO OXYGEN TRAILER FIRE AICHE-CEP-TECH-MAN
99000261A			RENDOS,J.J. AIRCO DESCRIPTION OF AN AIR-SEPARATION PLANT EXPLOSION AICHE-CEP-
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990002160		TAFURI,J.C. APCI	ROBERTS,R. LEHIGH UNIV FATIGUE CRACK GROWTH-RATES AND FRACTURE TOUGHNESS STUDY
990002130		ERDOGAN,F.	ROBERTS,R. LEHIGH UNIV COMPARATIVE STUDY OF CRACK-PROPAGATION IN PLATES UNDER
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990000080			SCHMOYER,W.W. APCI DRAIN-LINE EXPLOSION APCI-SAFETY-GRAM-NO-24 2P 1/17/63
990000070			SCHMOYER,W.W. APCI GASEOUS OXYGEN APCI-SAFETY-GRAM-NO-23C 6P 1/10/63
990001380			SCHMOYER,W.W. APCI HALOCARBON-WAX-6-25 APCI-MEMO-69 02/6/69 1P
990000130			SCHMOYER,W.W. APCI HUMAN TORCHES APCI-SAFETY-GRAM-NO-50C 1P 1/3/66
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990000050			SCHMOYER,W.W. APCI OXYGEN CYLINDER FAILURE APCI-SAFETY-GRAM-NO-13 2P 6/1/62
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990000100			SCHMOYER,W.W. APCI SNIFF THOSE CYLINDERS BEFORE REFILLING APCI-SAFETY-GRAM-NO-
990002570			SCHMOYER,W.W. APCI SPECIALTY-GAS GAUGE-FAILURE APCI-MEMO-64 04/13/64 4P
990000110			SCHMOYER,W.W. APCI VACUUM PUMP FAILURES APCI-SAFETY-GRAM-NO-35 1P 10/4/63
990003080			SCHNYDER,R. APCI MASTER DRAWING 1200-SERIES REGULATIONS APCI-DRAWING-000-0-407
990002240			SCOTT,D.J. APCI ANALYSES REQUIRED ON QUALITY-CONTROL-SAMPLES APCI-MEMO-68 05/
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990000470			SMITH,H. APCI PLANT COMPONENTS- AIR-SEPARATION PLANT, CRYOGENIC-LIQUID, AND DISP
990000540			SMITH,H. APCI SOLVENT AND CLEANERS- DEVIATIONS CLEANING FOR OXYGEN SERVICE APC
990003160			SMITH,H.W. APCI PERSONNEL-PROTECTIVE-EQUIPMENT- EYE PROTECTION APCI-SAFETY-ST
990003220			SMITH,H.W. APCI PERSONNEL-PROTECTIVE-EQUIPMENT- RESPIRATORY PROTECTIVE EQUIPME
990002080			SMITH,H.W. APCI SAFETY CONTROL PROCEDURES- TAG OUT PROCEDURE APCI-SAFETY-STD-
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990003180			SMITH,H.W. APCI SAFETY EQUIPMENT NEVER PREVENTS AN ACCIDENT- IT ONLY PREVENTS
990003370			STOLZ,J.L. APCI GENERAL SPECIFICATION FOR RECIPROCATING COMPRESSORS APCI-550-S
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990003270			STOMPLER,R.D. APCI LOX-PUMP SAFETY-BARRIERS APCI-MEMO-71 02/19/71 2P
990002670			STOMPLER,R.D. APCI PAUL, CARTER, AND COSMODYNE LOX-PUMP SAFETY APCI-MEMO-71 1
990002160			TAFURI,J.C. APCI ROBERTS,R. LEHIGH UNIV FATIGUE CRACK GROWTH-RATES AND FRACT
990000380		CAMPBELL,R.W.	TAYLOR,B.W. APCI USE OF PERLITE IN AIR-SEPARATION COLD-BOXES APCI-TB-39 1P 6
990003490			THIELSCH,H. GRINNELL CO DEFECTS AND FAILURES IN PRESSURE-VESSELS AND PIPING REI
990001540		DEAN,L.E.	THOMPSON,W.R. AEROJET-GENERAL CORP IGNITION CHARACTERISTICS OF METALS AND ALLOYS
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990000760			WALDE,R.A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDIES CELLU
990000740			WALDE,R.A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDIES CELLU
990000730			WALDE,R.A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- HALOCARBON, MOLYLUBE-99, MOL
990000720			WALDE,R.A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- KEL-F-POLYMER, NYLON, CUTTIN
990000710			WALDE,R.A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- OXYGEN-PRESSURE-GAUGE TWF WO
990001130			WALDE,R.A. APCI GASEOUS OXYGEN COMPATIBILITY OF CROSSLITE FLUOROCARBON TAPE THRE
990001170			WALDE,R.A. APCI GASEOUS OXYGEN COMPATIBILITY TEST ON MOLY-LUBE-NO-99 APCI-MEMO
990001320			WALDE,R.A. APCI KEL-F HIGH-PRESSURE OXYGEN COMPATIBILITY- NYLON APCI-MEMO-63
990002010			WALDE,R.A. APCI RELATIONSHIP OF THE CHEMICAL STRUCTURE OF CUTTING OILS TO THEIR
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990002690		BAUER,H.	WEGENER,W. WINDGASSEN,K.F. FIRE TESTS ON CENTRIFUGAL PUMPS FOR LIQUID-OXYGEN C
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990000450			WILSON,H. APCI PLANT COMPONENTS- COLD-BOXES APCI-SAFETY-STD-607.1.5 7P 1/63
990002690	BAUER,H.	WEGENER,W.	WINDGASSEN,K.F. FIRE TESTS ON CENTRIFUGAL PUMPS FOR LIQUID-OXYGEN CRYOGENICS V
990002970			WRIGHT,G.T. DOMINION FOUNDRIES AND STEEL LTD OXYGEN PLANT VAPORIZER EXPLOSION
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990001390			YODER,L. APCI FLUORO-GLIDE FLAMMABILITY IN 100-PERCENT GASEOUS OXYGEN APCI-
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990003010          RENDOS,J.J. +AIRCO  LIQUID OXYGEN PUMP FAILURES   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AM
990003430                      +AMERICAN  PETROLEUM  INST  RECOMMENDED RULES FOR DESIGN AND CONSTRUCTION OF LARGE,
990002100                      +AMERICAN  SOCIETY OF  MECHANICAL  ENGINEERS  RULES FOR CONSTRUCTION OF PRESSURE  V
990002110                      +AMERICAN  SOCIETY OF  MECHANICAL  ENGINEERS  QUALIFICATION  STANDARD FOR WELDING A
990003500                      +AMERICAN  SOCIETY OF  MECHANICAL  ENGINEERS  GAS  TRANSMISSION AND  DISTRIBUTION P
990003470                      +AMERICAN  SOCIETY OF  MECHANICAL  ENGINEERS  PETROLEUM REFINERY PIPING   ANSI-B31.
990003480                      +AMERICAN  SOCIETY OF  MECHANICAL  ENGINEERS  REFRIGERATION PIPING   ANSI-B31.5  60
990002360                      +AMERICAN  STANDARDS  ASSOC  COMPRESSED  GAS CYLINDER VALVE OUTLET AND INLET CONNEC
990002720                      +AMERICAN  WELDING  SOCIETY  SAFETY IN WELDING AND CUTTING   USAS-Z49.1  49P  1967
990002900         KOKINDA,J.J. +APCI  1200-SERIES REGULATOR- MATERIAL OF CONSTRUCTION  231-G-120054 (OXYGEN)  DRAW
990002550                      +APCI  ACCIDENT REPORTING   APCI-POM-SEC-5.21  4P PLUS  APPENDIX-A EXHIBIT-A  5/8/6
990002540                      +APCI  ACCIDENT REPORTING   APCI-CORP-ADMIN-PROC  N-1.5  3P  4/1/68
990005930                      +APCI  ACCIDENT-INCIDENT INVESTIGATION AND REPORT APL-SAFETY-BULLETINS AND  APL-SAF
990005910                      +APCI  ACCIDENT/INCIDENT INVESTIGATION AND REPORT  ACCIDENTS INVOLVING  SPILLS AND
990005920                      +APCI  ACCIDENT/INCIDENT INVESTIGATIONS AND REPORTS  ACCIDENTS INVOLVING OXYGEN-EQU
990000970          MASTER,H.H. +APCI  AIR-SEPARATION-PLANT CONTAMINATION- HISTORY, SAMPLING, AND  ANALYSIS   APCI
990002240           SCOTT,D.J. +APCI  ANALYSES REQUIRED ON QUALITY-CONTROL-SAMPLES   APCI-MEMO-68  05/1/68  1P
990002260                      +APCI  ANALYSES REQUIREMENTS SUMMARY   APCI-DIST-OPER-MAN-V-1-SEC-6.32  7P  3/70
990003580         MCSWAIN,C.B. +APCI  ANALYSIS OF WATER-HAMMER IN CRYOGENIC  TRANSFER-LINES BIBLIOGRAPHY   APCI-RE
990003190        SCHMOYER,W.W. +APCI  AND THEN THERE WAS DARKNESS   APCI-SAFETY-GRAM-NO-58  1P  3/15/67
990000040          KITSON,F.K. +APCI  APPROVED ALLOY STEELS IN CRYOGENIC SERVICE   APCI-SAFETY-GRAM-NO-10-REV-1  1
990003290            BALL,W.L. +APCI  ARE SAFETY-GLASSES  WORTH THE  COST AND  EFFORT   APCI-SAFETY-GRAM-NO-30  1P
990001100          KITSON,F.K. +APCI  ASSEMBLY OF OXYGEN REGULATORS T-FILM   APCI-MEMO-61  11/30/61  1P
990002490          MASTER,H.H. +APCI  AUTO LOAD  SYSTEMS   APCI-MEMO-71  05/4/71  2P PLUS  3P ATTACHMENTS
990001340           BAUER,E.G. +APCI  BEHAVIOR OF TRANSITE UNDER COMPRESSIVE-LOADS AT  AMBIENT AND  LIQUID-NITROGE
990000870                      +APCI  BRAZED ALUMINUM HEAT-EXCHANGER CLEANING REQUIREMENTS   APCI-QUAL-CONT-LAYOUT
990005950              DALY,J. +APCI  BURNING OF METALS IN OXYGEN  ATMOSPHERES (80 TO  100-PERCENT)   APCI-TM-186
990001860             KEHAT,E. +APCI  BURNING OF STEEL PIPES IN A  FLOWING OXYGEN  STREAM   APCI-MEMO-61  04/17/61
990002860                      +APCI  BYRON-JACKSON OXYGEN PUMP WASHOUT PROCEDURE FOR  ANALYTICAL  PURPOSES   APCI
990001060        SCHMOYER,W.W. +APCI  CARBON-TETRACHLORIDE   APCI-SAFETY-GRAM-NO-68  1P   2/21/69
990000560        SCHMOYER,W.W. +APCI  CAUTION- SNIFF TESTING CYLINDERS HAS ITS HAZARDS   APCI-SAFETY-GRAM-NO-49  2
990000520            BALL,W.L. +APCI  CHECK-LIST- AIR-SEPARATION PLANT-SITE   APCI-SAFETY-STD-610.1.1  5P  11/28/6
990002180          KITSON,F.K. +APCI  CHECK-LIST-AIR-SEPARATION-PLANT OPERATION   APCI-SAFETY-STD-610.1/5  17P  2/
990005260                      +APCI  CHEMICALS, SOLVENTS, AND  MISC-  1,1,1 TRICHLOROETHANE   APCI-IA7A-02  1P  2
990005300                      +APCI  CHEMICALS, SOLVENTS, AND  MISC- METHYLENE-CHLORIDE   APCI-IA7A-06  1P  2/21/
990005270                      +APCI  CHEMICALS, SOLVENTS, AND  MISC- CHLOROFORM   APCI-IA7A-03  1P  2/21/72
990005290                      +APCI  CHEMICALS, SOLVENTS, AND  MISC- TRICHLOROETHYLENE   APCI-IA7A-05  1P  2/21/7
990005280                      +APCI  CHEMICALS, SOLVENTS, AND  MISC- CARBON-TETRACHLORIDE   APCI-IA7A-04  1P  2/2
990005250                      +APCI  CHEMICALS, SOLVENTS, AND  MISC-  1,1 DICHLOROTHANE   APCI-IA7A-01  1P  2/21/
990000250                      +APCI  CIVIL-STRUCTURAL- PERSONNEL PROTECTIVE SHIELDS AND OXYGEN-SYSTEMS   APCI-DES
990000800                      +APCI  CLASS-A CLEANLINESS REQUIREMENTS   APCI-QUAL-CONT-LAYOUT-105F  3P  7/1/71
990000810                      +APCI  CLASS-AA CLEANLINESS REQUIREMENTS   APCI-QUAL-CONT-LAYOUT-106F  3P  7/1/71
990000820                      +APCI  CLASS-AAA CLEANLINESS REQUIREMENTS   APCI-QUAL-CONT-LAYOUT-107F  3P  7/1/71
990000790                      +APCI  CLASS-B CLEANLINESS REQUIREMENTS   APCI-QUAL-CONT-LAYOUT-104F  1P  7/1/71
990001010                      +APCI  CLEANING   APCI-CONSTR-SPEC-230.15 ON  P8  1P  9/16/69
990000500                      +APCI  CLEANING AND INSPECTION- MATERIALS AND OXYGEN SERVICE   APCI-SAFETY-STD-608.
990000950                      +APCI  CLEANING AND INSPECTION FOR EQUIPMENT IN AIR PLANTS AND IN OXYGEN SERVICE
990000940          KITSON,F.K. +APCI  CLEANING FOR OXYGEN SERVICE   APCI-MEMO-63  08/5/63  2P PLUS  9P ATTACHMENTS
990000960          BASSLER,E.J. +APCI  CLEANING FOR OXYGEN SERVICE  17P  1/60
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990000900		HATLEY,A.L.	+APCI	CLEANING LOX STORAGE TANK-NO-6 SANTA/SUSANA APCI-MEMO-64 03/11/64 1P PLU
990001020			+APCI	CLEANING OF CARBON STEEL PIPE AND FITTINGS, CLEANING ALUMINUM-PIPE FITTINGS
990000780			+APCI	CLEANING REQUIREMENTS FOR BOURDON-TUBE TYPE GAUGES USED FOR OXYGEN SERVICE
990000770			+APCI	CLEANING REQUIREMENTS FOR AIR-PLANT EQUIPMENT APCI-QUAL-CONT-LAYOUT-101F
990002260			+APCI	CODED VESSEL REPAIRS APCI-POM-SEC-6.09 4P 15P OF ATTCHMTS 11/29/68
990002040			+APCI	CODED VESSEL REPAIRS APCI-POM-SEC-6.09 4P 11/29/68 FOR ATTCHMTS SEE 20
990001850		FOSTER,R.H.	+APCI	COLD TEST OF 1/2-INCH SAFETY VALVE WITH CARBON STEEL SPRING APCI-IWO-NO-1
990002270			+APCI	COLD-BOX LEAKS APCI-POM-SEC-1.14 5P 10/30/68
990001440		BALL,W.L.	+APCI	COMBUSTIBLE CONTAMINANT CONTENT IN GRAPHITE IMPREGNATED ASBESTOS-PACKING TEF
990000510		SCHMOYER,W.W.	+APCI	COMPATIBILITY OF MATERIALS- OXYGEN COMPATIBLE MATERIALS APCI-SAFETY-STD-60
990003090	EDERICK,L.G.	LATSHAW,D.R.	+APCI	COMPATIBILITY OF MATERIAL WITH OXYGEN JOHNS-MANVILLE ASBESTOS SHEET PACKI
990003380			+APCI	CONSTRUCTION SPECIFICATIONS GENERAL CONSTRUCTION AND EQUIPMENT ERECTION OX
990000570		GEIST,J.M.	+APCI	CONTROLLED KINETICS EXPERIMENTATION- TEFLON-HOSE APCI-MAR-87-0-8820 1P 5
990000580		GEIST,J.M.	+APCI	CONTROLLED KINETICS EXPERIMENTS- TEFLON-HOSES, SUPPORTED BY BRAIDED STAINLE
990000430		BALL,W.L.	+APCI	CRITERIA9 AIR-SEPARATION PLANT-LAYOUT APCI-SAFETY-STD-605.1.3 6P 1/6/61
990006010			+APCI	CRYOGENIC SAFETY APCI CRYOGENIC SAFETY CONFERENCE ALLENTOWN 145P 7/5
990001070		KEHAT,E.	+APCI	DETONATION TESTS OF OIL FROM ALIQUIPPA PUMP-SUCTION FILTER DEFROST AND OF ME
990001090		KEHAT,E.	+APCI	DEVELOPMENT OF STANDARD IGNITION TEST APCI-PROJECT-NO-87-0-8820/1 8P 11/
990001360		KEHAT,E.	+APCI	DEVELOPMENT OF STANDARD IGNITION TEST METHYLENE-CHLORIDE- DICHLOROETHANE- TR
990003000		BALL,W.L.	+APCI	DISCUSSION OF ENERGY RELEASE IN A LIQUID OXYGEN PUMP AICHE-CEP-TECH-MANUA
990002210		LAPIN,A.	+APCI	DISCUSSION WITH MR E LUCAS-IPD INSPECTION, REGARDING APCI CLEANLINESS REQUI
990000010		KITSON,F.K.	+APCI	DON_T TURN A CYLINDER INTO A ROCKET APCI-SAFETY-GRAM-NO-04C 1P 8/7/61
990000080		SCHMOYER,W.W.	+APCI	DRAIN-LINE EXPLOSION APCI-SAFETY-GRAM-NO-24 2P 1/17/63
990000980			+APCI	EXCHANGER, PLANT, AND PLANT EQUIPMENT SOLVENT WASHOUT-FREQUENCIES APCI-PO
990002380			+APCI	FILLING PROCEDURE FOR TRANSPORTABLE CRYOGENIC CONTAINERS (250-GALLON CAPAC
990002390			+APCI	FILLING PROCEDURE FOR TRANSPORTABLE CRYOGENIC CONTAINERS (250-GALLON CAPAC
990000020		KITSON,F.K.	+APCI	FIRE IN OXYGEN-LINE APCI-SAFETY-GRAM-NO-05 1P 10/20/61
990002460			+APCI	FIRE PROTECTION EQUIPMENT- INSIDE- OUTSIDE APCI-SAFETY-STD-630.3.2 3P 5
990002440		SMITH,H.	+APCI	FIRE PROTECTION EQUIPMENT- OUTSIDE FIRE-HYDRANT APCI-SAFETY-STD-630.2.2
990002450			+APCI	FIRE PROTECTION EQUIPMENT- OUTSIDE HYDRANT-HOUSE AND EQUIPMENT APCI-SAFET
990003320		HUBBS,M.H.	+APCI	FIRE PROTECTION CGA AIR-SEPARATION PLANT SAFETY SYMPOSIUM PP175-184
990000550		KITSON,F.K.	+APCI	FIRE-PROTECTION EQUIPMENT- DELUGE-SYSTEM AND LOX LOADING FACILITY APCI-SA
990000760		WALDE,R.A.	+APCI	FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDIES CELLULUBE-300 CEL
990000730		WALDE,R.A.	+APCI	FLAMMABILITY AND EXPLOSION HAZARDS- HALOCARBON, MOLYLUBE-99, MOLYKOTE-TYPES-
990000710		WALDE,R.A.	+APCI	FLAMMABILITY AND EXPLOSION HAZARDS- OXYGEN-PRESSURE-GAUGE TWF WOOL, SPINTEX-
990000750		WALDE,R.A.	+APCI	FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDY CELLULUBE-300, DTE
990000720		WALDE,R.A.	+APCI	FLAMMABILITY AND EXPLOSION HAZARDS- KEL-F-POLYMER, NYLON, CUTTING-OILS APC
990000740		WALDE,R.A.	+APCI	FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDIES CELLULUBE-300, DT
990001460		KITSON,F.K.	+APCI	FLAMMABILITY TEST OF GASKETS IN OXYGEN ATMOSPHERES JOHN-DORE-CO, MELRATH-G
990002930		SCHMAUCH,G.E.	+APCI	FLAMMABILITY TESTS ON INSULATION MATERIALS VASCOCEL MILFOAM NATIONAL-GYPSUM
990001970			+APCI	FLEET SAFETY- FIRE EXTINGUISHMENT APCI-SAFETY-STD-635.30 5P 2/68
990001940			+APCI	FLEET SAFETY- LOADING AND UNLOADING OPERATIONS APCI-SAFETY-STD-635.19 6P
990003110	EDERICK,L.G.	LATSHAW,D.R.	+APCI	FLUORESCENCE OF VARIOUS TYPES OF OILS- MOBIL-DTE-105 TEXACO-CAPPELLA-AA CELL
990001390		YODER,L.	+APCI	FLUORO-GLIDE FLAMMABILITY IN 100-PERCENT GASEOUS OXYGEN APCI-ANAL-REP-6
990000070		SCHMOYER,W.W.	+APCI	GASEOUS OXYGEN APCI-SAFETY-GRAM-NO-23C 6P 1/10/63
990001130		WALDE,R.A.	+APCI	GASEOUS OXYGEN COMPATIBILITY OF CROSSLITE FLUOROCARBON TAPE THREE-M-FLUOROCA
990001170		WALDE,R.A.	+APCI	GASEOUS OXYGEN COMPATIBILITY TEST ON MOLY-LUBE-NO-99 APCI-MEMO-63 06/11/6
990001410		LATSHAW,D.R.	+APCI	GASKET MATERIAL COMPATIBILITY OF MELRATH MATERIAL WITH OXYGEN COMBUSTION IN
990001420		LATSHAW,D.R.	+APCI	GASKET MATERIALS COMPATBILITY OF GASKET MATERIALS WITH OXYGEN COMBUSTION I
990004790			+APCI	GASKETS AND PACKINGS- GARLOCK-900 (SHEET-ASBESTOS GASKET MATERIAL) GARLOCK
990004770			+APCI	GASKETS AND PACKINGS- GRAPHITE-IMPREGNATED-ASBESTOS-PACKING APCI-IA5A-01
990004780			+APCI	GASKETS AND PACKINGS- KM226-SHEET ASBESTOS GASKET MATERIAL NICOLET INDUSTR
990004760			+APCI	GASKETS AND PACKINGS- FLUOROGREEN-E-600, JOHN/DORE CO APCI-IA5A-04 1P 2
990004740			+APCI	GASKETS AND PACKINGS- TFE-GF-GREEN, MELRATH GASKETS CO APCI-IA5A-02 1P

990004800		+APCI	GASKETS AND PACKINGS- VULCANIZED-RED-FIBRE-GASKETS APCI-IA5A-08 1P 2/21/
990004770		+APCI	GASKETS AND PACKINGS- MELRATH-150 (SHEET-ASBESTOS GASKET MATERIAL) APCI-
990004750		+APCI	GASKETS AND PACKINGS- VALLEGREEN, VALLEY/FORGE GASKET CO APCI-IA5A-03 1
990004830		+APCI	GASKETS AND PACKINGS- VITON-A DUPONT APCI-IA5A-11 1P 2/21/72
990004810		+APCI	GASKETS AND PACKINGS- KM246 SHEET-ASBESTOS GASKET MATERIAL NICOLET INDUSTR
990004860		+APCI	GASKETS AND PACKINGS- TYGAFLOR CEMENTABLE PTFE TAPES TYGADURE LTD/UK A
990004857		+APCI	GASKETS AND PACKINGS- KLINGERIT-661 RICHARD KLINGER LTD/UK
990004820		+APCI	GASKETS AND PACKINGS- TEFLON, DUPONT APCI-IA5A-10 2P 2/21/72
990004840		+APCI	GASKETS AND PACKINGS- SINDANYO CS-51-ASBESTOS AND CEMENT BOARDS. NATURAL-U
990003350	OEHMKE,G.R.	+APCI	GENERAL SPECIFICATION FOR CLEANING FOR OXYGEN SERVICE APCI-550-SD-27A 5P
990003360	OEHMKE,G.R.	+APCI	GENERAL SPECIFICATION FOR CENTRIFUGAL COMPRESSORS APCI-550-SD-16A 37P 4/
990003370	STOLZ,J.L.	+APCI	GENERAL SPECIFICATION FOR RECIPROCATING COMPRESSORS APCI-550-SD-01A 37P
990001380	SCHMOYER,W.W.	+APCI	HALOCARBON-WAX-6-25 APCI-MEMO-69 02/6/69 1P
990002190	HIMMELBERGER,F.	+APCI	HANDLING OF LOW-TEMPERATURE-FLUIDS AND HIGH-PRESSURE OXYGEN NATIONAL SAFE
990002000	BALL,W.L.	+APCI	HAZARD LEVEL OF HYDROCARBON FILMS IN OXYGEN SYSTEMS AICHE-CEP-TECH-MANUA
990001990	KEHAT,E.	+APCI	HAZARD LEVEL OF HYDROCARBON FILMS IN SYSTEMS CONTAINING LIQUID AND GASEOU
990003030	KEHAT,E.	+APCI	HAZARD LEVEL OF HYDROCARBON FILMS IN SYSTEMS CONTAINING LIQUID AND GASEOU
990001370	BROPHY,M.	+APCI	HIGH-PRESSURE OXYGEN COMPATABILITY TESTS WITH SILICONE-RUBBER GASKET COMPOUN
990002770	BALL,W.L.	+APCI	HOSE-CONNECTOR ACCIDENT- GRANITE/CITY APCI-MEMO-67 12/15/67 1P
990000130	SCHMOYER,W.W.	+APCI	HUMAN TORCHES APCI-SAFETY-GRAM-NO-50C 1P 1/3/66
990002060		+APCI	HYDROSTATIC TESTING-GENERAL APCI-QUAL-CONT-LAYOUT-117A 2P 7/1/71
990001000	KEHAT,E.	+APCI	IGNITION TESTS OF T-FILM AND PENTON APCI-MEMO-61 11/28/61 2P
990001880	BAILEY,B.	+APCI	IGNITION-LIMITS OF SOME STAINLESS STEELS IN AN OXYGEN-ATMOSPHERE APCI-PRO
990001870	BAILEY,B.	+APCI	IGNITION-LIMITS OF CARBON STEEL IN OXYGEN-NITROGEN-ATMOSPHERES APCI-IWO-NO
990002530		+APCI	INDUSTRIAL SAFETY POLICY APCI-PUM-SEC-5.16 7P 10/30/68
990002410	BALL,W.L.	+APCI	INDUSTRIAL SAFETY-INDUSTRIAL SAFETY POLICY APCI-SAFETY-STD-625.0.1 13P
990003250		+APCI	INDUSTRIAL-SAFETY- OCCUPATIONAL NOISE APCI-SAFETY-STD-625.0.1.2 3P 4/9/7
990002290		+APCI	INSTRUMENTATION PREVENTIVE MAINTENANCE APCI-PUM-SEC-6.05 5P 10/30/68
990000230		+APCI	INSTRUMENTATION- ESTABLISHING PRESSURE-SETTINGS OF SAFETY DEVICES APCI-DES
990002820		+APCI	INSTRUMENTATION- MODIFICATION TO EXISTING PRESSURE-GAUGES SNUBBER APCI-DES
990000220		+APCI	INSTRUMENTATION- PRESSURE INDICATORS APCI-DES-ENG-STD-531.2 5P 10/63
990000240		+APCI	INSTRUMENTATION- SPECIAL REQUIREMENTS SAFETY AND RELIEF VALVES APCI-DES-EN
990000410		+APCI	INSULATION AND PAINTING- COLD-BOXES, THERMAL TANKS, GLASS WOOL APCI-DES-EN
990000400		+APCI	INSULATION AND PAINTING- COLD-INSULATION AND MINERAL FIBER GRANULATED APCI
990000390		+APCI	INSULATION AND PAINTING- COLD-BOXES THERMAL TANKS PERLITE APCI-DES-ENG-STD
990002920	BALL,W.L. KITSON,F.K.	+APCI	INSULATION MATERIALS FOR CRYOGENIC SYSTEMS MILFOAM URETHANE INSULATION NATI
990001400	HEATLEY,C.J. DINAN,E.R.	+APCI	INVESTIGATION OF THE FIRE-RESISTANT QUALITIES OF CELLULUBE-220, CELLULUBE-15
990000060	KITSON,F.K.	+APCI	ISOLATION OF PIPING-SYSTEMS APCI-SAFETY-GRAM-NO-21 1P 10/29/62
990003420	KRILL,W.R.	+APCI	JOB SPECIFICATION 310000 GALLON CAPACITY LOX/LIN STORAGE TANK APCI-JOB
990001320	WALDE,R.A.	+APCI	KEL-F HIGH-PRESSURE OXYGEN COMPATIBILITY- NYLON APCI-MEMO-63 05/17/63 1P
990002480	MASTER,H.H.	+APCI	LATHROP AUTO-LOAD SYSTEM APCI-MEMO-71 03/22/71 2P PLUS 3P ATTACHMENTS
990005940		+APCI	LIQUID AND GASEOUS OXYGEN SAFETY REVIEW DATA- ACCIDENT/INCIDENT INVESTIGAT
990000170	SCHMOYER,W.W.	+APCI	LIQUID OXYGEN APCI-SAFETY-GRAM-NO-54C 6P 1/31/67 P6 REVISED 1/31/68
990000030	KITSON,F.K.	+APCI	LIQUID OXYGEN LOADING APCI-SAFETY-GRAM-NO-06 1P 11/17/61
990002850	MAHR,A.J.	+APCI	LIST OF CLEANING-AGENTS, ASSOCIATED EQUIPMENT AND SUPPLIES APPROVED FOR USE
990002470		+APCI	LOX AND LIN VAPOR DISPOSAL-TANK-500-GAL APCI-DRAWING-92483D REV-B 9/30/6
990003100	ROBINSON,G.W.	+APCI	LOX COMPATIBLE GASKET MATERIALS GARLOCK-900 DURABLA JOHNS-MANVILLE ASBESTOS
990000910	MASTER,H.H.	+APCI	LOX TANKS APCI-MEMO-70 06/26/70 1P
990002660	MASTER,H.H.	+APCI	LOX TRANSFER PUMP SCREENS APCI-MEMO-69 01/24/69 2P PLUS 3P ATTACHMENTS
990002650	MASTER,H.H.	+APCI	LOX TRANSFER PUMPS APCI-MEMO-68 12/30/68 2P PLUS 2P ATTACHMENTS
990002530	BERRETTINI,B.J.	+APCI	LOX-PUMP FIRES AND EXPLOSIONS APCI-MEMO-70 06/26/70 3P
990002680	STOMPLER,R.D.	+APCI	LOX-PUMP SAFETY APCI-MEMO-71 2/19/71 1P
990003270	STOMPLER,R.D.	+APCI	LOX-PUMP SAFETY-BARRIERS APCI-MEMO-71 02/19/71 2P
990002200	BALL,W.L.	+APCI	LOX-SPILL NCG CONSHOHOCKEN APCI-MEMO-68 05/23/68 2P

990000090	SCHMOYER,W.W.	+APCI	LUBRICANTS AND THREAD COMPOUNDS FOR OXYGEN-SYSTEMS APCI-SAFETY-GRAM-NO-27
990004450		+APCI	LUBRICANTS- ESSO BEACON-325 APCI-IA1A-17 1P 2/21/72
990004420		+APCI	LUBRICANTS- FLUORO-GLIDE, CHEMPLAST INC APCI-IA1A-14 1P 2/21/72
990004390		+APCI	LUBRICANTS- FLUOROLUBE, FS-5, HOOKER CHEMICAL APCI-IA1A-11 1P 2/21/72
990004350		+APCI	LUBRICANTS- FLUOROLUBE, FS, HOOKER CHEMICAL APCI-IA1A-07 1P 2/21/72
990004460		+APCI	LUBRICANTS- FORMBLIN-Y04 MONTECATINI-EDISON APCI-IA1A-18 1P 2/21/72
990004320		+APCI	LUBRICANTS- HALOCARBON-6-25-WAX, HALOCARBON PRODUCTS CORP APCI-IA1A-04 1P
990004300		+APCI	LUBRICANTS- HALOCARBON-11-21E, HALOCARBON PRODUCTS CORP APCI-IA1A-02 1P
990004340		+APCI	LUBRICANTS- HALOCARBON-25-5S-GREASE, HALOCARBON PRODUCTS CORP APCI-IA1A-06
990004310		+APCI	LUBRICANTS- HALOCARBON-11-14E, HALOCARBON PRODUCTS CORP APCI-IA1A-03 1P
990004330		+APCI	LUBRICANTS- KEL-F-90-GREASE, MINNESOTA MINING MANUFACTURING CO APCI-IA
990004380		+APCI	LUBRICANTS- KRYTOX-143-AZ-OIL DUPONT APCI-IA1A-10 1P 2/21/72
990004370		+APCI	LUBRICANTS- KRYTOX-143-AC-OIL DUPONT APCI-IA1A-09 1P 2/21/72
990004290		+APCI	LUBRICANTS- KRYTOX-143-AA-OIL DUPONT APCI-IA1A-01 1P 2/21/72
990004360		+APCI	LUBRICANTS- KRYTOX-143-AB-OIL DUPONT APCI-IA1A-08 1P 2/21/72
990004430		+APCI	LUBRICANTS- KRYTOX-143-AD-OIL DUPONT APCI-IA1A-15 1P 2/21/72
990004410		+APCI	LUBRICANTS- MOLY-LUBE-NO-99, MOLY LUBE PRODUCTS GLEN/COVE/NY APCI-IA1A-1
990004400		+APCI	LUBRICANTS- MOLYLUBE-N BEL-RAY CO FARMINGDALE/NJ APCI-IA1A-12 1P 2/21/
990004440		+APCI	LUBRICANTS- VOLTALEF-3A KINGSLEY AND KEITH LTD/UK APCI-IA1A-16 1P 2/21
990000270		+APCI	MACHINERY- FIELD TESTING AND CENTRIFUGAL OXYGEN COMPRESSORS APCI-DES-ENG-S
990000260		+APCI	MACHINERY- FIELD TESTING AND RECIPROCATING OXYGEN COMPRESSORS APCI-DES-ENG
990001930		+APCI	MAINTENANCE AND INSPECTION REQUIREMENTS FOR BULK LIQUID CUSTOMER INSTALLATI
990001920		+APCI	MAINTENANCE AND INSEPCTION REQUIREMENTS FOR CUSTOMER BULK GAS SUPPLY SYSTEM
990005770		+APCI	MAINTENANCE PROGRAM- SYSTEM CHECK AND INSPECTION WHERE WHY AND HOW LEAKS
990005780		+APCI	MAINTENANCE PROGRAM- SYSTEM CHECK AND INSPECTION WHERE WHY AND HOW SYSTEM
990005830		+APCI	MAINTENANCE PROGRAM PRESSURE TESTING APCI-IIIC-1 3P 9/12/71
990005790		+APCI	MAINTENANCE PROGRAM- SYSTEM CHECK AND INSPECTION WHERE WHY AND HOW INSULATI
990005760		+APCI	MAINTENANCE PROGRAM SYSTEM CHECK AND INSPECTION WHERE WHY AND HOW STRUCTURE
990005800		+APCI	MAINTENANCE PROGRAM- SYSTEM CHECK AND INSPECTION WHERE WHY AND HOW GENERAL
990005820		+APCI	MAINTENANCE PROGRAM SAFE CLEANING PROCEDURES FOR FILTERS, TRAPS, AND INSTRU
990005810		+APCI	MAINTENANCE PROGRAM- SYSTEM CHECK AND INSPECTION WHERE WHY AND HOW PREVEN
990003310		+APCI	MAINTENANCE OF PORTABLE FIRE-EXTINGUISHERS APCI-PUM-SEC-1.13 5P 3/30/67
990003080	SCHNYDER,R.	+APCI	MASTER DRAWING 1200-SERIES REGULATIONS APCI-DRAWING-000-0-407004E 1P 3/4
990005330		+APCI	MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, QUALITY-CON
990005320		+APCI	MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, CLEANING-PR
990005350		+APCI	MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPARIBILITY, QUALITY-CON
990005390		+APCI	MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBIL
990005340		+APCI	MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, QUALITY-CON
990005370		+APCI	MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBIL
990005310		+APCI	MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, CLEANING-PR
990005380		+APCI	MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBIL
990005400		+APCI	MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBIL
990005360		+APCI	MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBIL
990005110		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BERYLLIUM COPPER APCI-IA6
990005230		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- MUNTZ-METAL 60-40-TYPE CO
990005170		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS 9-PERCENT NICKEL
990005240		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALPHA BRASS-TYPE TCL-100 OR
990005120		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A269-3
990005200		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SHPEROIDAL-GRAPHITE IRON CO
990005150		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- MONEL ASTM-B164 APCI-IA6A
990005210		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SILVER APCI-IA6A-35 1P
990005130		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BRONZE ASTM-B61 OR B62 A
990005160		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A351-C
990005220		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- NOVONOX STAINLESS STEEL AL

990005140		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BRASS-SHEET OR PLATE ASTM-
990005190		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- CARBON STEEL- NON-OXYGEN SE
990005060		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEELS-TYPE-416-C
990005080		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL-TYPE-304 UN
990004890		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- PLASITE-NO-7122H WISCONSIN
990004930		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B211-2024-T4
990005030		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A403-W
990005050		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A194-8
990004900		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-PIPE ASTM-B42 APCI
990004870		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- TARSET PITTSBURGH CHEMICAL
990004950		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B209-5083-0
990005090		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-SILICON ASTM-B98GRB
990004980		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B247-6061-T6
990004990		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM B361-WP6061-T6 A
990004970		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B241-6061-T6
990005000		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- CARBON STEEL (OXYGEN SERVI
990005070		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A182-F
990004880		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SEALFAS-MASTIC-31-97 BENJAM
990004960		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B210-6061-T6
990005100		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- FREE-MACHING BRASS APCI-I
990005020		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A240-3
990004920		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- RED-BRASS-PIPE ASTM-B43 A
990004910		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-TUBE ASTM-B75 APCI
990005010		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A312-T
990005040		+APCI	METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A320-B
990005180		+APCI	METLAS, ALLOYS, SOLDERS, AND SURGACE TREATMENTS- COPPER-TUBE ASTM-B88 APC
990004940		+APCI	METLAS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM, ASTM-B-210-3003
990003070	BALL,W.L.	+APCI	MINUTES OF CGA AIR-SEPARATION EQUIPMENT COMMITTEE HELD AT FT/LAUDERDALE F
990002500	SCHMOYER,W.W. BALL,W.L.	+APCI	MISTY PROBLEM VAPOR-CLOUDS FROM DEFROST OPERATIONS ALLEGEDLY CAUSED HIGHWAY
990001230	BROPHY,M.	+APCI	MOLLY-99 COMPATIBILITY TESTS WITH HIGH-PRESSURE OXYGEN APCI-R+D-NOTEBOOK-1
990003400	SCHMOYER,W.W.	+APCI	NASA OXYGEN STUDY PROJECT 00-1-2495.07 APCI-MEMO-71 12/10/71 1P
990002760	KITSON,F.K.	+APCI	NASH VACUUM PUMPS APCI-MEMO-71 01/19/71 2P
990002780	HUBBS,M.K.	+APCI	NEAR-MISS ACCIDENT- GRANITE/CITY FACILITY APCI-MEMO-67 12/15/67 1P
990002790	MASTER,H.H.	+APCI	NEAR-MISS ACCIDENT- BURNS/HARBOR APCI-MEMO-71 02/8/71 2P
990002810	HUBBS,M.H.	+APCI	NEAR-MISS ACCIDENT- CREIGHTON APCI-MEMO-68 06/4/68 2P
990001080	HIMMELBERGER,F.	+APCI	NOTES ON LIQUID OXYGEN CONTAMINANTS MISSILE-PROGRAM 10P 1/6/58
990001330	YODER,L.	+APCI	NYLON-SEAT USED IN K-G REGULATOR- IGNITION-TEMPERATURE IN 100-PERCENT OXYGE
990002880		+APCI	OPERATING AND SAFETY INSTRUCTION FOR REGULATORS AND COMPRESSED GASES APCI
990005480		+APCI	OPERATIONAL-HAZARDS- DISPOSAL OF VENTED GASES PROCEDURAL ARRANGEMENTS APC
990005440		+APCI	OPERATIONAL-HAZARDS- DISPOSAL OF VENTED GASES COMPANY PRACTICES APCI-IIB-
990005490		+APCI	OPERATIONAL-HAZARDS- COUPLING TO OTHER SYSTEMS APCI-IIC1-1 APCI-IIC2-1
990005410		+APCI	OPERATIONAL-HAZARDS- OVERPRESSURE APCI-IIA-1 2P 2/18/72
990005470		+APCI	OPERATIONAL-HAZARDS, DISPOSAL OF VENTED GASES CLEANLINESS OF OXYGEN PIPING
990005520		+APCI	OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE SEPARATION OF INCOMPATIBLE MATERIALS
990005430		+APCI	OPERATIONAL-HAZARDS- OVERPRESSURE INTEGRITY OF INSULATION FIELD FABRICATED
990005450		+APCI	OPERATIONAL-HAZARDS- DISPOSAL OF VENTED GASES CLEANLINESS OF DISPOSAL SYST
990005500		+APCI	OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE APCI-IID-1 2P 9/3/71
990005420		+APCI	OPERATIONAL-HAZARDS- OVERPRESSURE INTEGRITY OF INSULATION SHOP FABRICATED
990005510		+APCI	OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE DRAINAGE AND ULTIMATE DISPOSAL ARRA
990005530		+APCI	OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE ENVIRONMENTAL WARNINGS AND ESCAPE
990005670		+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER MALFUNCTION AND FAILURES APCI-IIF3-1
990005630		+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD RAILROAD BARGE AND PIPELINE-TRA
990005620		+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD RAILROAD BARGE AND PIPELINE-TRA
990005580		+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER SYSTEMS SYSTEMS- FIELD FABRICATED CRY

990005660			+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD RAILROAD BARGE AND PIPELINE-TRA
990005750			+APCI	OPERATIONAL-HAZARDS- FIRES AND EXPLOSIONS APCI-IIG-1 6P 11/1/71
990005570			+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER PRODUCTION, STORAGE TO SYSTEM, STORAGE
990005680			+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER MALFUNCTION AND FAILURES APCI INCIDENTS
990005740			+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER MALFUNCTIONS AND FAILURES INSULATION S
990005720			+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER MALFUNCTIONS AND FAILURES VALVES APC
990005650			+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER MALFUNCTION AND FAILURE INCIDENTS WHIC
990005600			+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER PIPELINE-TRANSPORTATION PIPELINE TRANS
990005540			+APCI	OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE DETECTION- QUANTITY AND RESPONSE TI
990005630			+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD RAILROAD BARGE AND PIPELINE-TRA
990005700			+APCI	OPERATIONAL-HAZARDS- OXYGEN TRANSFER EQUIPMENT MALFUNCTIONS AND FAILURES C
990005640			+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD RAILROAD BARGE AND PIPELINE TRA
990005610			+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER PIPELINE-TRANSPORTATION PIPELINE TRANS
990005730			+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER MALFUNCTIONS AND FAILURES GEISERING, EX
990005710			+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER EQUIPMENT MALFUNCTIONS AND FAILURES G
990005590			+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER SYSTEMS SYSTEMS- APL OXYGEN-TRANSFER M
990005550			+APCI	OPERATIONAL-HAZARDS- CONTAMINANTS ACUUMULATION APCI-IIE-1 1P 7/21/71
990005560			+APCI	OPERATIONAL-HAZARDS- OXYGEN-TRANSFER PRODUCTION TO STORAGE, STORAGE TO SYST
990002310			+APCI	OPERATIONS DEPARTMENT PREVENTIVE MAINTENANCE REPORT FEED-BACK-CARD FORM-361
990003240		MASTER,H.H.	+APCI	OPERATIONS HEARING PROTECTION PROGRAM APCI-MEMO-71 04/7/71 2P PLUS 1P
990003300			+APCI	OPERATIONS SAFETY MANUAL APCI-SAFETY MANUAL-20P64 88P 1964 (OUT OF PR
990001200		BROPHY,M.	+APCI	OXYGEN COMPATABILITY TESTS- MOLYLUBE-KOTE-AR AND MOLYLUBE-N APCI-R+D-NOTE
990001110		DINAN,E.	+APCI	OXYGEN COMPATIBILITY TESTS FOR VARIOUS MATERIALS- ABMA THREAD LUBRICANT AND
990002600		BALL,W.L.	+APCI	OXYGEN COMPRESSOR FIRE APCI-SAFETY-GRAM-NO-03 2P 7/7/61
990002430			+APCI	OXYGEN CONTROL-PANEL APCI-DES-ENG-STD-534.1 (TO BE PUBLISHED)
990000050		SCHMOYER,W.W.	+APCI	OXYGEN CYLINDER FAILURE APCI-SAFETY-GRAM-NO-13 2P 6/1/62
990002730		MASTER,H.H.	+APCI	OXYGEN FLOW-METER RING SEAL-FLUID APCI-MEMO-70 02/27/70 1P
990003120	EDERICK,L.G.	LATSHAW,D.R.	+APCI	OXYGEN COMPATABILITY WITH TWO-PART EPOXY-COMPOUND (7343-RESIN- 7139-CATAL
990006000	LAPIN,A.	FOSTER,R.H.	+APCI	OXYGEN DIFFUSION IN THE ATMOSPHERE FROM LIQUID OXYGEN POOLS CGA AIR-S
990005990	LAPIN,A.	FOSTER,R.H.	+APCI	OXYGEN DIFFUSION IN THE ATMOSPHERE FROM LIQUID OXYGEN POOLS ADVANCES I
990003060	EDERICK,L.G.	LATSHAW,D.R.	+APCI	OXYGEN INDEX RATING SILICONE-O-RING (1/8-INCH DIA) APCI-IWO-NO-XD-0128
990003040	EDERICK,L.G.	LATSHAW,D.R.	+APCI	OXYGEN INDEX RATING VITON-O-RING MATERIAL- VITON-E-60 (GREEN) VITON-A (B
990002640		MASTER,H.H.	+APCI	OXYGEN PIPE-LINE FAILURE APCI-MEMO-67 12/29/67 1P
990002340			+APCI	OXYGEN PUMP FILTER ASSEMBLY APCI-DRAWING-58521C REV-B 12/18/57
990000140		SCHMOYER,W.W.	+APCI	OXYGEN REGULATORS IN THE WELDING INDUSTRY APCI-SAFETY-GRAM-NO-60C 5P 11/
990002170		LATSHAW,D.R.	+APCI	OXYGEN SAFETY REVIEW CHECK-LIST APCI-MEMO-71 05/4/71 3P
990003130	EDERICK,L.G.	LATSHAW,D.R.	+APCI	OXY-TITE THREAD COMPOUND APCI IWO-NO-XD-0134 APCI-ANAL-REP-71-336 1P 1
990002670		STOMPLER,R.D.	+APCI	PAUL, CARTER, AND COSMODYNE LOX-PUMP SAFETY APCI-MEMO-71 1/01/26/71 2P
990001040			+APCI	PERSONAL PROTECTION-EQUIPMENT MAINTENANCE APCI-PDM-1.12 7P 4/21/67
990003280			+APCI	PERSONNEL-PROTECTIVE SHIELDS FOR OXYGEN SYSTEMS APCI-TB-42 3P 9/30/71
990003160		SMITH,H.W.	+APCI	PERSONNEL-PROTECTIVE-EQUIPMENT- EYE PROTECTION APCI-SAFETY-STD-627.4.2 5
990003200			+APCI	PERSONNEL-PROTECTIVE-EQUIPMENT- WEARING APPAREL HARD HATS APCI-SAFETY-ST
990003230			+APCI	PERSONNEL-PROTECTIVE-EQUIPMENT- OCCUPATIONAL NOISE PROTECTIV
990003330			+APCI	PERSONNEL-PROTECTIVE-EQUIPMENT ALUMINIZED HEAT PROTECTIVE CLOTHING APCI-S
990003220		SMITH,H.W.	+APCI	PERSONNEL-PROTECTIVE-EQUIPMENT- RESPIRATORY PROTECTIVE EQUIPMENT APCI-SA
990003340			+APCI	PERSONNEL-PROTECTIVE-EQUIPMENT TONNAGE AIR-SEPARATION PLANT APCI-SAFETY-S
990001480		BROPHY,M.	+APCI	PIPE BURNING TESTS APCI-R+D-NOTEBOOK-111 P26-9 4P 4/17/61
990001180		HIMMELBERGER,F.	+APCI	PIPING- APPROVED PIPE THREAD SEALANTS APCI-DES-ENG-STD-570.5.1 1P 11/11/
990000300			+APCI	PIPING- DRY OXYGEN SERVICE -20F TO 100F 150-PSIG-MAX CARBON-STEEL APC
990000310			+APCI	PIPING- DRY OXYGEN SERVICE -20F TO 100F 275-PSIG-MAX CARBON-STEEL APC
990000320			+APCI	PIPING- DRY OXYGEN SERVICE -20F TO 100F 500-PSIG-MAX-OWG CARBON-STEEL
990000330			+APCI	PIPING- DRY OXYGEN SERVICE -20F TO 100F 720-PSIG-MAX CARBON-STEEL APC
990000350			+APCI	PIPING- EXTENDED BONNET VALVE CODE APCI-DES-ENG-STD-579.4 3P 4/63
990001830			+APCI	PIPING- INTRODUCTION HAND VALVE-CODE APCI-DES-ENG-STD-579.3 12P 1/63

990000290		+APCI	PIPING- OXYGEN COMPRESSOR LOCATION APCI-DES-ENG-STD-570.6 2P 1/15/71
990002560		+APCI	PIPING- OXYGEN COMPRESSOR SYSTEM APCI OPERATED APCI-DES-ENG-STD-570.7
990000280		+APCI	PIPING- OXYGEN-PIPING APCI-DES-ENG-STD-578.60.1 14P 4/24/72
990001680		+APCI	PIPING- PRESSURE RATING TABLES- PLAIN-AND-THREADED-ENDS- CARBON STEEL-PIPE
990001740		+APCI	PIPING- PRESSURE RATING TABLES- PLAIN-AND-THREADED-ENDS- STAINLESS STEEL-P
990001610		+APCI	PIPING- PRESSURE RATING TABLES- PLAIN-ENDS COPPER-TUBE APCI-DES-ENG-STD-
990001510		+APCI	PIPING- PRESSURE RATING TABLES- PLAIN-AND-THREADED-ENDS- RED BRASS-PIPE
990001550		+APCI	PIPING- PRESSURE RATING TABLES- PLAIN-AND-THREADED-ENDS ALUMINUM-PIPE AP
990000340		+APCI	PIPING- STAINLESS-STEEL VALVES AND MATERIAL REQUIREMENTS APCI-DES-ENG-STD-
990000370		+APCI	PIPING- TRANSITION-JOINTS AND ALUMINUM TO STAINLESS-STEEL APCI-DES-ENG-STD
990000360		+APCI	PIPING- VALVE PROCUREMENT AND CLEANING PROCEDURE APCI-DES-ENG-STD-579.5
990001570		+APCI	PIPING-AA1.5- COLD-BOX-SERVICE 100F AND BELOW 150-PSIG-MAX-DWG ALUMINUM
990001580		+APCI	PIPING-AA3- COLD-BOX-SERVICE 100F AND BELOW 300-PSIG-MAX-DWG ALUMINUM AP
990001560		+APCI	PIPING-AA.3- COLD-BOX-SERVICE 150F AND BELOW 30PSIG-MAX-DWG ALUMINUM APC
990001710		+APCI	PIPING-CS14- GENERAL-SERVICE -20F TO 100F 1440-PSIG-MAX-DWG CARBON STEEL-
990001840		+APCI	PIPING-CS1.5- GENERAL-SERVICE -20F TO 100F 150-PSIG-MAX-DWG CARBON STEEL-
990001720		+APCI	PIPING-CS20- GENERAL-SERVICE -20F TO 100F 2000-PSIG-MAX-DWG CARBON STEEL-
990001690		+APCI	PIPING-CS2.7- GENERAL-SERVICE -20F TO 100F 275-PSIG-MAX-DWG CARBON STEEL
990001730		+APCI	PIPING-CS36- GENERAL-SERVICE -20F TO 100F 3600-PSIG-MAX-DWG CARBON STEEL
990001700		+APCI	PIPING-CS7.2- GENERAL-SERVICE -20F TO 100F 720-PSIG-MAX-DWG CARBON STEEL-
990001620		+APCI	PIPING-CT2- COLD-BOX-SERVICE 100F AND BELOW 200-PSIG-MAX-DWG COPPER-TUBE
990001630		+APCI	PIPING-CT4- COLD-BOX-SERVICE 100F AND BELOW 400-PSIG-MAX-DWG COPPER-TUBE
990001590		+APCI	PIPING-IAA4- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 400
990001600		+APCI	PIPING-IAA9- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 900
990001660		+APCI	PIPING-ICT10- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW -1
990001670		+APCI	PIPING-ICT23- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 23
990001640		+APCI	PIPING-ICT4- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 400
990001650		+APCI	PIPING-ICT9- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 900
990001770		+APCI	PIPING-SS12- COLD-BOX-SERVICE 100F AND BELOW 1235-PSIG-MAX-DWG STAINLESS S
990001780		+APCI	PIPING-SS17-COLD-BOX-SERVICE 100F AND BELOW 1715-PSIG-MAX-DWG STAINLESS ST
990001750		+APCI	PIPING-SS2.7- COLD-BOX-SERVICE 100F AND BELOW 275-PSIG-MAX-DWG STAINLESS S
990001790		+APCI	PIPING-SS30- COLD-BOX-SERVICE 100F AND BELOW 3000-PSIG-MAX-DWG STAINLESS S
990001800		+APCI	PIPING-SS36- COLD-BOX-SERVICE 100F AND BELOW 3600-PSIG-MAX-DWG STAINLESS S
990001760		+APCI	PIPING-SS6- COLD-BOX-SERVICE 100F AND BELOW 615-PSIG-MAX-DWG STAINLESS STE
990001810		+APCI	PIPING-SS7.2- COLD-BOX-SERVICE 100F AND BELOW 720-PSIG-MAX-DWG STAINLESS S
990001820		+APCI	PIPING-SSL1.5- LUBE-OIL-SERVICE -20F TO 150F 150-PSIG-MAX STAINLESS STEEL
990000460	KITSON,F.	+APCI	PLANT COMPONENTS- AIR-SEPARATION PLANT, PIPING, VALVES AND SAFETY-RELIEF DEV
990000470	SMITH,H.	+APCI	PLANT COMPONENTS- AIR-SEPARATION PLANT, CRYOGENIC-LIQUID, AND DISPOSAL APC
990000440	KITSON,F.K.	+APCI	PLANT COMPONENTS- AIR-SEPARATION, OXYGEN, COMPRESSOR APCI-SAFETY-STD-607.1
990000450	WILSON,H.	+APCI	PLANT COMPONENTS- COLD-BOXES APCI-SAFETY-STD-607.1.5 7P 1/63
990000490	SCHMOYER,W.W.	+APCI	PLANT COMPONENTS- STORAGE, VACUUM-SYSTEMS, AND COMPRESSED-GASES APCI-SAFET
990000480	BALL,W.L.	+APCI	PLANT COMPONENTS- STORAGE, CONVERTER-SYSTEM, AND CRYOGENIC-LIQUIDS APCI-SA
990002320	MASTER,H.H.	+APCI	PLANT PREVENTIVE MAINTENANCE-CONTROL 9P PLUS EXHIBIT-A-1, A-2, A-3, A-4
990000990		+APCI	PLANT SOLVENT WASHOUT-GENERAL APCI-POM-SEC-1.05 12P 2/20/67
990000420	BALL,W.L.	+APCI	PLANT-SITE CRITERIA- AIR-SEPARATION APCI-SAFETY-STD-605.1 9P 11/10/60
990001500	BROPHY,M.	+APCI	PLASITE PROTECTIVE COATING APCI-MEMO-60 06/9/60 2P
990004710		+APCI	PLASTICS, ELASTOMERS, AND ADHESIVES- VITON-A DUPONT APCI-IA4A-06 1P 2/21
990004690		+APCI	PLASTICS, ELASTOMERS, AND ADHESIVES- NYLON APCI-IA4A-04 1P 2/21/72
990004660		+APCI	PLASTICS, ELASTOMERS, AND ADHESIVES- RTV-60, SILICONE-RUBBER COMPOUND WITH S
990004700		+APCI	PLASTICS, ELASTOMERS, AND ADHESIVES- NEOPRENE APCI-IA4A-05 1P 2/21/72
990004680		+APCI	PLASTICS, ELASTOMERS, AND ADHESIVES- KEL-F-81 APCI-IA4A-03 1P 2/21/72
990004720		+APCI	PLASTICS, ELASTOMERS, AND ADHESIVES- NYLON-66 ICI LTD/UK APCI-IA4A-07 1P
990004670		+APCI	PLASTICS, ELASTOMERS, AND ADHESIVES- KEENE-BINDER APCI-IA4A-02 1P 2/21/7
990002070		+APCI	PNEUMATIC TESTING-GENERAL APCI-QUAL-CONT-LAYOUT-105A 3P 7/1/71

990000120	SCHMUYER,W.W.	+APCI	PRESSURE GAUGE FAILURES APCI-SAFETY-GRAM-NO-43 2P 5/8/64
990003170		+APCI	PRESSURE-GAUGE FAILURE SAFETY GLASSES SAVE ANOTHER PAIR OF EYES APCI-SAFE
990000160		+APCI	PRESSURE-VESSELS- GASEOUS OXYGEN STORAGE CYLINDER APCI-DES-ENG-STD-515.1.3
990000210		+APCI	PRESSURE-VESSELS- HEAD-DESIGN APCI-DES-ENG-STD-510.3 13P 8/62
990000190		+APCI	PRESSURE-VESSELS- MATERIALS OF CONSTRUCTION APCI-DES-ENG-STD-510.1.4 4P
990000200		+APCI	PRESSURE-VESSELS- SHELL-DESIGN APCI-DES-ENG-STD-510.2 4P 2/65
990000180		+APCI	PRESSURE-VESSELS- VESSEL-DESIGN-BASIS AND GENERAL STANDARDS APCI-DES-ENG-S
990000150		+APCI	PRESSURE-VESSELS- VAPORIZER AND CRYOGENIC LIQUID DISPOSAL APCI-DES-ENG-STD
990001310		+APCI	PROCEDURE TO ESTABLISH ACCEPTANCE OF FIBERIZED MINERAL WOOL INSULATION AP
990002870		+APCI	PRODUCT TEST PROCEDURES 1200-SERIES REGULATORS APCI-TEST-PROCEDURE 4P 1/
990002510	MASTER,H.H.	+APCI	PRODUCT VAPOR HAZARDS- SAFETY INFORMATION RELATIVE TO LIQUID-VAPOR-CLOUDS
990001470	BASSLER,E.	+APCI	PRODUCTION OF ROCK WOOL BETHLEHEM-STEEL-CO APCI-MEMO-59 11/12/59 2P
990001120	ENT,W.L.	+APCI	PUTTI-ROPE ANALYSIS FOR OIL CONTENT AND FLAMMABILITY TEMPERATURE APCI-ME
990002230		+APCI	QUALITY CONTROL PROGRAM APCI-DIST-OPER-MAN-6.3 6P 7/65 1/69 4/68 PLU
990001450	HIMMELBERGER,F.	+APCI	QUALITY CONTROL OF ROCK WOOL APCI-MEMO 2 HIMMELBERGER,F. APCI QUALITY
990001450 I-MEMO 2	HIMMELBERGER,F.	+APCI	QUALITY CONTROL OF ROCK WOOL APCI-MEMO-59 11/6/59 2P
990001190	SCHMOYER,W.W.	+APCI	REGULATOR THREAD SEALANT MOLYLUBE-N APCI-MEMO-63 10/4/63 1P
990002010	WALDE,R.A.	+APCI	RELATIONSHIP OF THE CHEMICAL STRUCTURE OF CUTTING OILS TO THEIR OXYGEN-COMPA
990002610	BALL,W.L.	+APCI	REPORT OF OXYGEN PUMP EXPLOSION AIRCO-BUTLER APCI-MEMO-63 10/21/63 1P PL
990000880		+APCI	REQUIREMENTS FOR IPD SPECIFIED PAINT SYSTEMS APCI-QUAL-CONT-LAYOUT-120F
990000830		+APCI	REQUIREMENTS FOR VENDOR CLASS-B CLEANING APCI-QUAL-CONT-LAYOUT-114F 2P 7
990000860		+APCI	REQUIREMENTS FOR VENDOR CLASS-AAA CLEANING APCI-QUAL-CONT-LAYOUT-117F 3P
990000850		+APCI	REQUIREMENTS FOR VENDOR CLASS-AA CLEANING APCI-QUAL-CONT-LAYOUT-116F 2P
990000840		+APCI	REQUIREMENTS FOR VENDOR CLASS-A CLEANING APCI-QUAL-CONT-LAYOUT-115F 2P 7
990002250	ENT,W.L.	+APCI	REVISIONS TO IGO QUALITY ASSURANCE PROGRAM COST-PROCEDURES DIST-OPER-MAN-V
990003140	KITSON,F.K.	+APCI	RUPTURE DISCS MANUFACTURED LOX TANKERS BY AMETEK APCI-MEMO-71 06/22/71
990002830		+APCI	SAFE HANDLING OF CRYOGENIC LIQUIDS AND ASSOCIATED EQUIPMENT APCI-POM-SEC-
990002700	SCHMOYER,W.W.	+APCI	SAFE HANDLING OF REGULATORS AND TORCHES APCI-PAPER 17P PLUS 2P ATTACHME
990003180	SMITH,H.W.	+APCI	SAFETY EQUIPMENT NEVER PREVENTS AN ACCIDENT- IT ONLY PREVENTS AN INJURY
990000530		+APCI	SAFETY CONTROL PROCEDURES- EMERGENCY PROCEDURES APCI-SAFETY-STD-626.3.8
990002400		+APCI	SAFETY CONTROL PROCEDURES-PURGING METHODS APCI-SAFETY-STD-626.4.1 7P 1/
990002090	SMITH,H.W.	+APCI	SAFETY CONTROL PROCEDURES- AIR-SEPARATION-PLANT SAFETY WORK PERMITS APC
990002080	SMITH,H.W.	+APCI	SAFETY CONTROL PROCEDURES- TAG OUT PROCEDURE APCI-SAFETY-STD-626.3.3 2P
990002030		+APCI	SAFETY CONTROL PROCEDURE- SAFETY WORK-PERMIT APCI-POM-SEC-1.04 3P PLUS
990002020		+APCI	SAFETY CONTROL PROCEDURE- TAG OUT APCI-POM-SEC-1.03 2P PLUS EXHIBIT-A
990003460		+APCI	SAFETY RELIEF VALVES LOCATION AND PIPING-DESIGN CONSIDERATIONS APCI PIPIN
990002330		+APCI	SAFETY REPORTS AND FORMS APCI-POM-SEC-5.18 6P PLUS EXHIBITS ABCDEFGH 3/
990001350	BROPHY,M.	+APCI	SAFETY TESTS UNDER WO-81-0095 HYLOMAR-UNIVERSAL-JOINTING COMPOUND SQ-32 AND
990001210	MOYSAN,S.R.	+APCI	SAFETY-VALVE-SEAT OXOMAT FLAMMABILITY IN 100-PERCENT GASEOUS OXYGEN APCI
990002300		+APCI	SAFETY-VALVES AND RUPTURE-DISCS APCI-POM-SEC-6.02 19P INCLUDING EXHIBITS
990000590	KEHAT,E.	+APCI	SAFETY, HAZARDS, AND EXPLOSION TESTING- UCON-TYPE LUBRICANTS, STEEL-PIPES
990000600	KEHAT,E.	+APCI	SAFETY, HAZARDS, AND EXPLOSION TESTING- STANDARD PRESSURE BOMBS AND SPARK-IG
990000690	FOSTER,R.H.	+APCI	SAFETY, HAZARDS, AND EXPLOSION TESTING- HOUDRY FOAM INSULATION, AND HAVEG GL
990000660	FOSTER,R.H.	+APCI	SAFETY, HAZARDS, AND EXPLOSION TESTING- IGNITION TEST-APPARATUS, FLORUBE-GRE
990000670	FOSTER,R.H.	+APCI	SAFETY, HAZARDS, AND EXPLOSION TESTING- POLYESTER RESIN IMPREGNATED FIBERGL
990000700	FOSTER,R.H.	+APCI	SAFETY, HAZARDS, AND EXPLOSION TESTING- TALCUM-POWDER AS A LUBRICANT, TARSET
990000640	KEHAT,E.	+APCI	SAFETY, HAZARDS, AND EXPLOSION TESTING- CS2 CARBON-DISULFIDE ALIQUIPPA PUMP-
990000620	KEHAT,E.	+APCI	SAFETY, HAZARDS, AND EXPLOSION TESTING- PINE AND MAPLE WOOD, ACTIVATED CARBO
990000630	KEHAT,E.	+APCI	SAFETY, HAZARDS, AND EXPLOSION TESTING- SILICON-OILS DOW-CORNING-RF-1-0065,
990000610	KEHAT,E.	+APCI	SAFETY, HAZARDS, AND EXPLOSION TESTING- SPARK-IGNITION, STANDARD BOMB TEST,
990000680	FOSTER,R.H.	+APCI	SAFETY, HAZARDS, AND EXPLOSION TESTING- EPON-H-60, POLYCEL-440R, AND STYROFO
990000650	KEHAT,E. FOSTER,R.H.	+APCI	SAFETY, HAZARDS, AND EXPLOSION TESTING- STANDARD IGNITION TEST METHOD, APL P
990004560		+APCI	SEALANTS AND THREADING COMPOUNDS- OXOMAT APCI-I42A-10 1P 2/21/72
990004510		+APCI	SEALANTS AND THREADING COMPOUNDS- MOLYLUBE-N BEL-RAY CO FARMINGDALE/NJ A

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990004530                          +APCI  SEALANTS AND THREADING COMPOUNDS- DAMCO TAPE   APCI-IA2A-07  2P  2/21/72
990004550                          +APCI  SEALANTS AND THREADING COMPOUNDS- CRANE  PACKING  CO-TAPE   APCI-IA2A-09  2P
990004490                          +APCI  SEALANTS AND THREADING COMPOUNDS- T-FILM ECO  MFGR  CO   APCI-IA2A-03  1P  2
990004540                          +APCI  SEALANTS AND THREADING COMPOUNDS- SANDEN TAPE   APCI-IA2A-08  2P  2/21/72
990004500                          +APCI  SEALANTS AND THREADING COMPOUNDS- PUTTI-ROPE NATIONAL  GREENHOUSE  CO   APCI
990004570                          +APCI  SEALANTS AND THREADING COMPOUNDS- THREE-M FLUOROCARBON-TAPE   APCI-IA2A-11
990004480                          +APCI  SEALANTS AND THREADING COMPOUNDS- TEFLON-TAPE PERMACEL   APCI-IA2A-02  2P  2
990004580                          +APCI  SEALANTS AND THREADING COMPOUNDS- SODIUM-SILICATE AND CHINA-CLAY-PASTE   APC
990004470                          +APCI  SEALANTS AND THREADING COMPOUNDS- PERMATEX-1516   APCI-IA2A-01  1P  2/21/72
990004520                          +APCI  SEALANTS AND THREADING COMPOUNDS- CROSSLITE-FLUOROCARBON-TAPE   APCI-IA2A-06
990001300                YODER,L.  +APCI  SEALING MATERIALS- FLAMMABILITY IN  100-PERCENT  GASEOUS OXYGEN  FOAMSEAL-30
990002890                          +APCI  SET-UP AND OPERATING INSTRUCTIONS FOR AIR-PRODUCTS REDI-SET WELDING AND CUTT
990000100           SCHMUYER,W.W.  +APCI  SNIFF THOSE CYLINDERS BEFORE REFILLING   APCI-SAFETY-GRAM-NO-31  2P  8/21/63
990000540                SMITH,H.  +APCI  SOLVENT AND CLEANERS- DEVIATIONS CLEANING FOR OXYGEN SERVICE   APCI-SAFETY-S
990002570           SCHMOYER,W.W.  +APCI  SPECIALTY-GAS GAUGE-FAILURE   APCI-MEMO-64  04/13/64  4P
990003260             KITSON,F.K.  +APCI  STAFFING AND  CHECK-IN  SYSTEMS FOR  OPERATING-PLANTS   APCI-MEMO-68  06/25/
990003410             KRILL,W.R.   +APCI  STANDARD SPECIFICATION FOR A FIELD-FABRICATED CRYOGENIC LIQUID STORAGE-TANK
990000890             MASTER,H.H.  +APCI  STORAGE TANK CLEANING   APCI-MEMO-63  01/24/63  1P
990002750             KITSON,F.K.  +APCI  SUMMARY OF ACTION TAKEN ON PRESSURE-GAUGES   APCI-MEMO-61  08/2/61  4P
990005880                          +APCI  SYSTEM-EMERGENCIES PROTECTION BUILDINGS AND  ADJACENT  SYSTEMS  PROTECTION
990005860                          +APCI  SYSTEM-EMERGENCIES WARNING DEVICES   APCI-IVB-1  5P  11/12/71
990005890                          +APCI  SYSTEM-EMERGENCIES HAZARDS  PROTECTION GENERAL PRECAUTIONS   APCI-IVE-1  2P
990005840                          +APCI  SYSTEM-EMERGENCIES   APCI-IV-1  1P  12/23/71
990005850                          +APCI  SYSTEM-EMERGENCIES SAFETY  TRAINING AND  AREA  PLACARDING   APCI-IVA-1  4P
990005870                          +APCI  SYSTEM-EMERGENCIES PROTECTION PERSONNEL   APCI-IVC1-1  6P  1/13/72
990005900                          +APCI  SYSTEM-EMERGENCIES HAZARDS  PROTECTION APL-BULLETINS AND REPORTS ON  VARIOUS
990001160                YODER,L.  +APCI  TAPE-SEAL THREAD LUBRICANT AND SEALER-  TAPE-SEAL FROM FRIESLAND-PLASTIC COM
990001490               BROPHY,M.  +APCI  TARSET PIPE-COATING THE PLASITE TESTS  MANUFACTURED BY PITTSBURGH  CHEMICAL
990001150            FREDERICK,L.  +APCI  TEFLON TAPE PERCENT ETHER EXTRACTABLE CONTAMINANTS AND FLUORESCENCE DAMCO-TE
990002220                LAPIN,A.  +APCI  TELEPHONE CONVERSATION WITH  MR  WILLIAM MCCORMICK REGARDING REQUIREMENTS FO
990002840             HUBBS,M.H.   +APCI  TEST GAUGE EQUIPMENT FAILURE SHAKOPEE   APCI-MEMO-68  06/12/68  2P
990002910                LAPIN,A.  +APCI  TESTING OF SCREENS TO BE USED IN OXYGEN COMPRESSOR  SUCTION   APCI-MEMO-71
990002740                KEHAT,E.  +APCI  TESTS OF PRESSURE-GAGES SAFETY DEVICES   APCI-PROJECT-NO-87-0-8820   APCI-ME
990004620                          +APCI  THERMAL AND ELECTRICAL  INSULATIONS- MINERAL-WOOL   APCI-IA3A-04  1P  2/21/7
990004630                          +APCI  THERMAL AND ELECTRICAL  INSULATIONS- PERLITE   APCI-IA3A-05  1P  2/21/72
990004600                          +APCI  THERMAL AND ELECTRICAL  INSULATIONS- TRANSITE, JOHNS-MANVILLE   APCI-IA3A-02
990004590                          +APCI  THERMAL AND ELECTRICAL  INSULATIONS- FOAMGLAS  (CELLULAR-GLASS)  INSULATION,
990004610                          +APCI  THERMAL AND ELECTRICAL  INSULATIONS- GLASS-WOOL   APCI-IA3A-03  1P  2/21/72
990004650                          +APCI  THERMAL AND ELECTRICAL  INSULATIONS- NATIONAL-GYPSUM-BLUE NATIONAL-GYPSUM CO
990004640                          +APCI  THERMAL AND ELECTRICAL  INSULATIONS- MILFOAM MILFOAM CORP   APCI-IA3A-06  1P
990001140                YODER,L.  +APCI  T-FILM THREAD COMPOUND, AUTOIGNITION TEST   APCI-ANAL-REP-61-683   APCI-IWO-
990000380 CAMPBELL,R.W.  TAYLOR,B.W.  +APCI  USE OF PERLITE IN AIR-SEPARATION COLD-BOXES   APCI-TB-39  1P  6/14/71
990000110           SCHMOYER,W.W.  +APCI  VACUUM PUMP FAILURES   APCI-SAFETY-GRAM-NO-35  1P  10/4/63
990001430             MOYSAN,S.R.  +APCI  VALVE WASHERS NEW AND USED QUALITATIVE AND QUANTITATIVE OIL  ANALYSIS   APCI
990000920             KITSON,F.K.  +APCI  WASHOUT  ANALYSIS OF SUN-OIL COMPANY_S LOX-TANK VAPORIZER   APCI-MEMO-64  04
990003210                          +APCI  WEAR SAFETY SHOES   APCI-SAFETY-GRAM-NO-11  2P  5/14/62
990003950  BALL,W.L.  BERRITTINI,B.  +APCI  EVERSON,I.  GRIFFITHS,D.K.  APL  RECOMMENDATIONS ARISING FROM EXPLOSION OF C
990002160             TAFURI,J.C.  +APCI  ROBERTS,R.  LEHIGH  UNIV  FATIGUE CRACK  GROWTH-RATES AND FRACTURE TOUGHNESS
990003600                          +APL   ACCEPTANCE TEST FOR CLASS-B CLEANLINESS   APL-ENGR-SPEC-A-01  2P  5/12/69
990003620             PEGRAM,J.W.  +APL   ACCEPTANCE TEST FOR CLASS-AA CLEANLINESS  (OXYGEN-CLEAN)   APL-ENGR-SPEC-A.03
990003610             PEGRAM,J.W.  +APL   ACCEPTANCE TESTS FOR CLASS-A CLEANING   APL-ENGR-SPEC-A.02  3P  5/12/69
990003840              EVERSON,I.  +APL   ACCIDENT ARISING FROM VENTING-OXYGEN MANIFOLDS CONNECTED TO A COMMON  VENT  P
990003830              EVERSON,I.  +APL   ACCIDENT AT AN  OXYGEN CHARGING MANIFOLD   APL-SAFETY-BULL-046  2P
990003900              EVERSON,I.  +APL   ACCIDENT AT T TURNER  LTD PARK/LANE  ROYTON  OLDHAM  LANCASTER  11940 AM  5/2
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990004030			+APL	ALOCLENE-100 AND APPLIED CHEMICALS-5.57 1P 2/5/72
990003680		PEGRAM,J.W.	+APL	BRAZED CORE EXTENDED SURFACE HEAT-EXCHANGERS APL-ENGR-SPEC-E.02 9P 6/28/7
990003860	EVERSON,I.	LANBA,J.S.	+APL	BURCKHARDT OXYGEN COMPRESSOR FIRE AT SSPC ROGNAC PLANT 3/2/71 APL-SAFETY-
990003710		OLIVER,R.	+APL	CENTRIFUGAL CRYOGENIC PUMPS APL-ENGR-SPEC-G.03 14P 4/1/71
990004100			+APL	CENTRIFUGAL OXYGEN COMPRESSOR MANUAL HATTINGEN PLANT 15P APPENDIX I II II
990003650			+APL	CONSTRUCTION SPECIFICATION FOR PIPING ERECTION, TESTING AND CLEANING APL-E
990003970			+APL	CONSTRUCTION SPECIFICATION FOR PIPING ERECTION, TESTING AND CLEANING APL-
990003780		PEGRAM,J.W.	+APL	CRYOGENIC LIQUID HOSE-COUPLINGS FOR USE IN THE U.K APL-ENGR-STD-LS.08 6P
990003830		PEGRAM,J.W.	+APL	DEGREASING ACCEPTANCE TESTS FOR OXYGEN SERVICE COMPRESSORS APL-ENGR-SPEC-K
990004050		PEGRAM,J.W.	+APL	DESIGN AND SAFETY SATNDARDS FOR CARBON-STEEL GASEOUS OXYGEN TRANSMISSION-L
990003790		PEGRAM,J.W.	+APL	EXPANDED PERLITE APL-ENGR-SPEC-N.01 3P 1/2/70
990004190			+APL	EXPERIMENTS WITH LIQUID OXYGEN APL-SAFETY-BULL-025 1P REPRINTED 1/68
990003920		EVERSON,I.	+APL	EXPLOSION AND FIRE DUE TO THE CRYOSTAR-GB114 LOX-PUMP ON AN SSPC LOX-TANKER
990003960	SHEPHERD,N.	EVERSON,I.	+APL	EXPLOSION ON OXY-FUEL-BURNER EQUIPMENT AT ALCAN-BOOTH ALUMINIUM WORKS ROGER
990003870	GILLOTT,E.	EVERSON,I.	+APL	FAILURE OF BRAZED JOINTS IN HIGH-PRESSURE GASEOUS OXYGEN-LINE AT A CYLINDER
990001050	COULSON,K.J.	EVERSON,I.	+APL	FIRE HAZARD WHEN VAPOUR CLEANING WITH TRICHLOROETHYLENE (T.C.E.) APL-SAFET
990003820			+APL	FIRE IN OXYGEN-LINE APL-SAFETY-BULL-028 1P 1/68
990004230		EVERSON,I.	+APL	FIRE HAZARDS IN COMPRESSED-AIR AND OXYGEN RICH ENVIRONMENTS APL-SAFETY-D
990003760		PEGRAM,J.W.	+APL	FLEXIBLE HOSES FOR CHARGING AND DISCHARGING MANIFOLDS OXYGEN SERVICE APL
990003990			+APL	GENERAL PROCEDURE FOR DECONTAMINATION OF STATIC-TANK AND ROAD-VEHICLE-ASSEMBL
990004270		EVERSON,I.	+APL	HAZARD LEVEL OF HYDROCARBON FILMS IN OXYGEN SYSTEMS APL-SAFETY-DEPT-INFO-
990003810		PEGRAM,J.W.	+APL	INSULATION- PREFORMED CELLULAR GLASS SECTION FOR PIPELINES APL-ENGR-SPEC-N
990003930		EVERSON,I.	+APL	INVESTIGATION OF CRYOSTAR LOX-PUMP EXPLOSION AT STOKE PLANT 8/7/70 APL-SA
990003910		EVERSON,I.	+APL	INVESTIGATION OF VALVE FIRES AT TEXAS INSTRUMENTS LTD-BEDFORD APL-SAFETY-
990004200			+APL	LACK OF OXYGEN KILLS TWO WORKMEN APL-SAFETY-BULL-037 1P REPRINTED 1/68
990004280		EVERSON,I.	+APL	LIMITING VALUES OF OIL-CONTAMINATION OF STAINLESS-STEEL SURFACES EXPOSED TO
990004110		CHAMBERS,J.	+APL	LOX INSTALLATION AT CUSTOMER SITES APL-IGD-ENGR-MAN-40-01 7P 7/19/71
990004000			+APL	MANUFACTURING QUALITY PROCEDURE FOR DEGREASING OF PIPEWORK APL-QCP-Q11 REV
990004010			+APL	MANUFACTURING QUALITY PROCEDURE FOR INTERNAL CLEANING OF ALUMINUM TANKERS AN
990004020			+APL	MANUFACTURING QUALITY PROCEDURE FOR INTERNAL CLEANING OF 9% NICKEL AND HI-PR
990003800		PEGRAM,J.W.	+APL	MINERAL WOOL APL-ENGR-SPEC-N.02 3P 1/2/70
990003850		EVERSON,I.	+APL	MORE ACCIDENTS ON OXYGEN EQUIPMENT APL-SAFETY-BULL-102 1P 2/8/71
990004220		EVERSON,I.	+APL	NOTES FOR GUIDANCE OF CUSTOMERS HAVING AIR PRODUCTS LTD OXYGEN EQUIPMEN
990004180		DAVIES,G.	+APL	OVERHAUL PROCEDURE APL-C-155/9.5 33P 1971
990004040		PEGRAM,J.W.	+APL	OXYGEN PIPELINES APL-ENGR-STD-LS.30/1 8P 7/1/70
990004070		PEGRAM,J.W.	+APL	PIPING SELECTION SHEET-CARBON STEEL-WARM OXYGEN SERVICE 275PSIG (CS02.7)
990004090			+APL	PIPING SELECTION SHEET-CARBON STEEL-WARM OXYGEN SERVICE 720PSIG (CS07.2)
990004060			+APL	PIPING SELECTION SHEET-CARBON STEEL-WARM OXYGEN SERVICE 150PSIG (CS0.1.5)
990004080			+APL	PIPING SELECTION SHEET-CARBON STEEL-WARM OXYGEN SERVICE 500PSIG (CS05.0)
990003880	EVERSON,I.	COOK,P.	+APL	PRELIMINARY REPORT ON ACCIDENT AT ZELZATE PLANT 2/26/69 WHEN AN EXPLOSION A
990003730		PEGRAM,J.W.	+APL	PRESSURE REGULATING-VALVES FOR OXYGEN SERVICE APL-ENGR-SPEC-J.15 3P 6/18/
990003720		PEGRAM,J.W.	+APL	PRESSURE-GAUGE- OXYGEN SERVICE APL-ENGR-SPEC-J.07 3P 6/18/69
990004160		CHAMBERS,J.	+APL	PROCEDURE FOR CYLINDER FILLING AND QUALITY CONTROL (STANDARD PURITY GASES
990004130		GRAY,G.	+APL	PROCEDURE FOR FILLING CRYOGENIC TANKERS BY PUMP AT BRACKNELL APL-IGD-ENGR-
990004120		GRAY,G.	+APL	PROCEDURE FOR FILLING CRYOGENIC TANKER BY PUMP AT CARRINGTON APL-IGD-ENGR-
990004140		GRAY,G.	+APL	PROCEDURE FOR FILLING CRYOGENIC TANKERS BY PUMP AT STOKE-ON-TRENT APL-IGD-
990004170		CHAMBERS,J.	+APL	PROCEDURE FOR THE INSTALLATION OF A CRYOGENIC TANK APL-IGD-ENGR-MAN-60-01
990004150		CHAMBERS,J.	+APL	PURGE PROCEDURE FOR CRYOGENIC LIQUID CONTAINER APL-IGD-ENGR-MAN-52-02 7P
990003950	EVERSON,I.	GRIFFITHS,D.K.	+APL	RECOMMENDATIONS ARISING FROM EXPLOSION OF CRYOSTAR-GB.114-PUMP-NO-C.75 AT CAR
990003740		PEGRAM,J.W.	+APL	RELIEF VALVES, WARM GAS SERVICE -20F TO 100F APL-ENGR-SPEC-J.18 4P 6/1
990004210		ZURAWSKI,J.	+APL	REPORT OF THE INVESTIGATION INTO BURCKHARDT CENTRIFUGAL PUMP EXPLOSION AND TA
990003940	CROXFORD,B.J.	EVERSON,I.	+APL	REPORT ON EXPLOSION OF CRYOSTAR-GB.114-PUMP-NO-C.75 ON TANKER-400-11 2/17/71
990003890	J. EVERSON,I.	NAYLOR,R.	+APL	REPORT ON EXPLOSION OF LOX-PUMP ON TANKER-400-11 1/7/70 AT JOHN/SUMMERS STE
990003020		MOORE,A.A.	+APL	REPORT ON SERVICE VISIT TO H.M.S.-EAGLE APL-X0425 5P PLUS APPENDIX A AND

990003700	ELMORE,G.	+APL SHELL AND TUBE-TYPE-COOLERS FOR OXYGEN SERVICE APL-ENGR-SPEC-E.05 13P 6/1
990003690	ELMORE,G.	+APL SHELL AND TUBE-TYPE-COOLER, OTHER THAN FOR OXYGEN SERVICE (APL-PLANTS) APL
990003980	GILLOTT,E.	+APL SOLVENT WASHING OF PIPING SYSTEMS APL-IGD-ENGR-MAN-56-06 4P 7/3/71
990003660	PEGRAM,J.W.	+APL SPECIFICATION FOR OXYGEN SERVICE VESSEL FABRICATION APL-ENGR-SPEC-C.03 7P
990003670	PEGRAM,J.W.	+APL SPECIFICATION FOR OXYGEN SERVICE PRESSURE-VESSEL FABRICATION APL-ENGR-SPEC
990003750	PEGRAM,J.W.	+APL TRANSFER HOSE FOR CRYOGENIC LIQUIDS APL-ENGR-SPEC-L.11 3P 7/7/69
990003770	PEGRAM,J.W.	+APL UNSINTERED P.T.F.E. TAPE APL-ENGR-SPEC-L.14 2P 7/8/69
990003640	PEGRAM,J.W.	+APL VALVES-OXYGEN SERVICE-MINIMUM DECONTAMINATION AND TEST REQUIREMENTS APL-ENG
990002620	COWLES,S.W.	+ARMOUR AGRICULTURAL CHEMICAL CO OXYGEN FIRES AICHE-CEP-TECH-MANUAL SAFETY IN
990003390		+ASTM STANDARD PICTORIAL SURFACE PREPARATION STANDARDS FOR PAINTING STEEL SURFAC
990001530	WHITE,E.L. WARD,J.J.	+BATTELLE MEMORIAL INSTITUTE IGNITION OF METALS IN OXYGEN DMIC-REPORT-224 33P
990001520	D. BOYD,W.K. MILLER,P.D.	+BATTELLE MEMORIAL INSTITUTE REACTIVITY OF METALS WITH LIQUID AND GASEOUS OXYG
990003590		+BRITISH CRYOGENICS COUNCIL SAFETY PANEL CRYOGENICS SAFETY MANUAL P122 1970
990002370		+CANADIAN STANDARDS ASSOC COMPRESSED GAS CYLINDER VALVE OUTLET AND INLET CONNEC
990003450		+COMPRESSED GAS ASSOC ASSEMBLY OF INDUSTRIAL PRACTICES USED FOR GASEOUS OXYGEN
990002350		+COMPRESSED GAS ASSOC COMPRESSED GAS CYLINDER VALVE OUTLET AND INLET CONNECTION
990001980		+COMPRESSED GAS ASSOC EQUIPMENT CLEANED FOR OXYGEN SERVICE CGA-PAMPHLET-G-4.1
990001950		+COMPRESSED GAS ASSOC INSULATED TANK-TRUCK SPECIFICATION CGA-341 FOR COLD LIQUE
990002710		+COMPRESSED GAS ASSOC SAFE HANDLING OF COMPRESSED GASES CGA-PAMPHLET-P-1 10P
990001960		+COMPRESSED GAS ASSOC SAFETY RELIEF DEVICE STANDARDS PART-1- CYLINDERS FOR COM
990003150		+COMPRESSED GAS ASSOC SAFETY RELIEF DEVICE STANDARDS PT-3 COMPRESSED-GAS STO
990003050	NISSLER,K.H.	+DEMAG KA-27-IV/KA-4-IV OXYGEN COMPRESSOR VITON-A (BLACK) VITON-E60 (GREEN) DE
990002970	WRIGHT,G.T.	+DOMINION FOUNDRIES AND STEEL LTD OXYGEN PLANT VAPORIZER EXPLOSION AICHE-CEP-
990002150	AMBERTIN,W.J. PALMER,A.J.	+ESSO APPLICATION OF FRACTURE-MECHANICS TO SAFE-LIFE DESIGN IN CRYOGENIC PRESSURE
990003490	THIELSCH,H.	+GRINNELL CO DEFECTS AND FAILURES IN PRESSURE-VESSELS AND PIPING REINHOLD PUBLIS
990001030	MATHEWS,W.D. OWEN,G.G.	+IMPERIAL CHEMICAL INDUSTRIES LTD SAFETY ASPECTS OF RECONSTRUCTED ICI TONNAGE OXY
990002950	REYNOLDS,P.W.	+IMPERIAL CHEMICAL INDUSTRIES SAFETY IN AIR AND AMMONIA PLANTS AICHE-CEP-TECH-
990003440		+INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS UNIFORM BUILDING CODE VOL-1
990002130	ERDOGAN,F. ROBERTS,R.	+LEHIGH UNIV COMPARATIVE STUDY OF CRACK-PROPAGATION IN PLATES UNDER EXTENSION A
990002140	ROBERTS,R. ERDOGAN,F.	+LEHIGH UNIV EFFECT OF MEAN STRESS ON FATIGUE CRACK-PROPAGARION IN PLATES UNDE
990002160	URI,J.C. APCI ROBERTS,R.	+LEHIGH UNIV FATIGUE CRACK GROWTH-RATES AND FRACTURE TOUGHNESS STUDY OF WELDED A
990002590	DUFFALA,S.H. PIEMME,A.G.	+LINDE ACCIDENT AND FIRE IN OXYGEN GENERATING PLANT AT GREAT-LAKES-STEEL-CORP EC
990002940	LANG,A.	+LINDE AIR-FRACTIONATION PLANT EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY IN AIR A
990002800		+MANUFACTURING CHEMISTS ASSOC INC LIQUID-OXYGEN EXPLOSION MCA-CASE-HISTORY-NO-8
990001890	PECKHAM,H.M. HAUSER,R.L.	+MARTIN CO COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN METHYL-CHLORIDE, METHYLE
990002050		+MARYLAND CASUALTY CO APCI FIELD INSPECTION CONTRACT WITH MARYLAND CASUALTY CO
990005980		+MERKBLATTER GERMAN PRESSURE VESSEL CODE-AD MERKBLATTER (ENGLISH TRANSLATION)
990001290		+NASA-HOUSTON NONMETALLIC MATERIALS DESIGN GUIDELINES AND TEST DATA-HANDBOOK MSC
990001280	KEY,C.F. RIEHL,W.A.	+NASA-HUNTSVILLE COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN MTP-P+VE-M-63-14
990001270	KEY,C.F. RIEHL,W.A.	+NASA-HUNTSVILLE COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN NASA-TMX-985 72P
990001250	KEY,C.F.	+NASA-HUNTSVILLE COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN III NASA-TMX-5353
990001260	KEY,C.F.	+NASA-HUNTSVILLE COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN IV NASA-TMX-53773
990001240	KEY,C.F.	+NASA-HUNTSVILLE COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN NASA-TMX-53052 3
990002520	GAYLE,J.B.	+NASA-KENNEDY FIRE INCIDENT IN AN OXYGEN CLOUD FIRE JOURNAL PP76-8 AND 81 4P
990005970	BRYAN,C.J.	+NASA-KENNEDY MATERIALS COMPATIBILITY FOR GASEOUS OXYGEN SYSTEMS MAB-3268-69 9
990002120		+NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS NATIONAL BOARD INSP
990002990	PINNEY,G.G.	+NATIONAL CYLINDER GAS CO OXYGEN TRAILER FIRE AICHE-CEP-TECH-MANUAL SAFETY I
990002420		+NATIONAL FIRE PREVENTION ASSOC STANDARD FOR THE INSTALLATION AND OPERATION OF
990001900		+NATIONAL FIRE PROTECTION ASSOC INSTALLATION OF BULK OXYGEN SYSTEMS AT CONSUM
990001910		+NATIONAL FIRE PROTECTION ASSOC INSTALLATION OF BULK OXYGEN SYSTEMS AT CONSUM
990003530		+OFFICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE
990003560		+OFFICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE
990003520		+OFFICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE
990003550		+OFFICE OF PIPELINE SAFETY MINIMUM FEDERAL SAFETY-STANDARDS FOR GAS PIPELINES CO

990003510		+OFFICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE
990003570		+OFFICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE
990003540		+OFFICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE
990000930		+PENNSALT CORP CLEANING OF LIQUIEFIED-GAS PROCESSING EQUIPMENT PENNSALT-TECHNICA
990004240	DENISON,D.M.	+RAF INSTITUTE OF AVIATION MEDICINE FARNBOROUGH HANTS ENGLAND ASSESSMENT OF T
990004260	DENISON,D.M.	+RAF INSTITUTE OF AVIATION MEDICINE FARNBOROUGH HANTS ENGLAND FURTHER STUDIES
990004250	DENISON,D.	+RAF INSTITUTE OF AVIATION MEDICINE FARNBOROUGH HANTS ENGLAND FIRE RISKS TO
990005960	NIHART,G.J. ET.AL	+UNION CARBIDE CORP COMPATIBILITY OF MATERIALS WITH 7500-PSI OXYGEN AD608260

990001110 TS FOR VARIOUS MATERIALS- ABMA THREAD LUBRICANT AND SEALANT, ANDEROL-L-536 RUST-PREVENTIVE LEHIGH CHEMICAL C
990003600 APL ACCEPTANCE TEST FOR CLASS-B CLEANLINESS APL-ENGR-SPEC-A-01 2P 5/12/69
990003620 PEGRAM,J.W. APL ACCEPTANCE TEST FOR CLASS-AA CLEANLINESS (OXYGEN-CLEAN) APL-ENGR-SPEC-A.03 4P
990003610 PEGRAM,J.W. APL ACCEPTANCE TESTS FOR CLASS-A CLEANING APL-ENGR-SPEC-A.02 3P 5/12/69
990003630 GRAM,J.W. APL DEGREASING ACCEPTANCE TESTS FOR OXYGEN SERVICE COMPRESSORS APL-ENGR-SPEC-K.02 3P 6/23/69
990000620 TING- PINE AND MAPLE WOOD, ACTIVATED CARBON APCI-MAR-87-0-8821 1P 10/61
990005550 ONAL-HAZARDS- CONTAMINANTS ACUUMULATION APCI-IIE-1 1P 7/21/71
990004670 PLASTICS, ELASTOMERS, AND ADHESIVES- KEENE-BINDER APCI-IA4A-02 1P 2/21/72
990004680 PLASTICS, ELASTOMERS, AND ADHESIVES- KEL-F-81 APCI-IA4A-03 1P 2/21/72
990004700 PLASTICS, ELASTOMERS, AND ADHESIVES- NEOPRENE APCI-IA4A-05 1P 2/21/72
990004690 PLASTICS, ELASTOMERS, AND ADHESIVES- NYLON APCI-IA4A-04 1P 2/21/72
990004720 PLASTICS, ELASTOMERS, AND ADHESIVES- NYLON-66 ICI LTD/UK APCI-IA4A-07 1P 2/21/72
990004660 PLASTICS, ELASTOMERS, AND ADHESIVES- RTV-60, SILICONE-RUBBER COMPOUND WITH SS-4004-SILICONE-PRIMER GE THERMOL
990004710 PLASTICS, ELASTOMERS, AND ADHESIVES- VITON-A DUPONT APCI-IA4A-06 1P 2/21/72
990005800 ERAL CONSIDERATIONS OF THE AGING SYSTEM APCI-IIIA5-1 1P 8/22/71
990002950 CAL INDUSTRIES SAFETY IN AIR AND AMMONIA PLANTS AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS
990000950 NSPECTION FOR EQUIPMENT IN AIR PLANTS AND IN OXYGEN SERVICE APCI-POM-SEC-1.08 7P PLUS 3P ATTACHMENTS 4/4/
990002610 T OF OXYGEN PUMP EXPLOSION AIRCO-BUTLER APCI-MEMO-63 10/21/63 1P PLUS 6P ATTACHMENTS
990002940 LANG,A. LINDE AIR-FRACTIONATION PLANT EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMO
990000770 CLEANING REQUIREMENTS FOR AIR-PLANT EQUIPMENT APCI-QUAL-CONT-LAYOUT-101F 2P PLUS 5P OF ATTCHMTS 7/1/71
990002890 OPERATING INSTRUCTIONS FOR AIR-PRODUCTS REDI-SET WELDING AND CUTTING OUTFITS APCI-BROCHURE 11P 9/25/69
990000420 APCI PLANT-SITE CRITERIA- AIR-SEPARATION APCI-SAFETY-STD-605.1 9P 11/10/60
990000380 APCI USE OF PERLITE IN AIR-SEPARATION COLD-BOXES APCI-TB-39 1P 6/14/71
990003070 W.L. APCI MINUTES OF CGA AIR-SEPARATION EQUIPMENT COMMITTEE HELD AT FT/LAUDERDALE FLORIDA 5/11-12/71 LIQ
990003340 OTECTIVE-EQUIPMENT TONNAGE AIR-SEPARATION PLANT APCI-SAFETY-STD-627.5.1 4P 6/15/70
99000261A AIRCO DESCRIPTION OF AN AIR-SEPARATION PLANT EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONI
990000430 BALL,W.L. APCI CRITERIA9 AIR-SEPARATION PLANT-LAYOUT APCI-SAFETY-STD-605.1.3 6P 1/6/61
990000520 LL,W.L. APCI CHECK-LIST- AIR-SEPARATION PLANT-SITE APCI-SAFETY-STD-610.1.1 5P 11/28/60
990000470 APCI PLANT COMPONENTS- AIR-SEPARATION PLANT, CRYOGENIC-LIQUID, AND DISPOSAL APCI-SAFETY-STD-607.1.20 3P
990000460 APCI PLANT COMPONENTS- AIR-SEPARATION PLANT, PIPING, VALVES AND SAFETY-RELIEF DEVICES APCI-SAFETY-STD-60
990000970 MASTER,H.H. APCI AIR-SEPARATION-PLANT CONTAMINATION- HISTORY, SAMPLING, AND ANALYSIS APCI PLANT
990002090 AFETY CONTROL PROCEDURES- AIR-SEPARATION-PLANT SAFETY WORK PERMITS APCI-SAFETY-STD-626.3.5 3P 6/19/61
990000440 APCI PLANT COMPONENTS- AIR-SEPARATION, OXYGEN, COMPRESSOR APCI-SAFETY-STD-607.1.2.3 6P 12/62
990003960 -FUEL-BURNER EQUIPMENT AT ALCAN-BOOTH ALUMINIUM WORKS ROGERSTONE/NEWPORT 5/18/71 APL-SAFETY-DEPT-REP-37
990001070 TONATION TESTS OF OIL FROM ALIQUIPPA PUMP-SUCTION FILTER DEFROST AND OF METHYLENE-CHLORIDE APCI-MEMO-61 12/
990000640 TING- CS2 CARBON-DISULFIDE ALIQUIPPA PUMP-SUCTION-FILTER-DEFROST CYL-SEAL SEALING COMPOUND APCI-MAR-87-0-882
990003570 ON OR REVISION OF MAXIMUM ALLOWABLE OPERATING PRESSURE FEDERAL REGISTER VOL-36 NO-176 9/10/71
990000040 ITSON,F.K. APCI APPROVED ALLOY STEELS IN CRYOGENIC SERVICE APCI-SAFETY-GRAM-NO-10-REV-1 1P 10/25/63
990002160 S STUDY OF WELDED ALUMINUM ALLOY-5083 ASME WINTER ANNUAL-MEETING NEW/YORK 8P 11/29/70-12/3/70
990001540 RACTERISTICS OF METALS AND ALLOYS ARS JOURNAL P917-23 7P 7/61
990005190 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- CARBON STEEL- NON-OXYGEN SERVICE WITH POSS
990005230 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- MUNTZ-METAL 60-40-TYPE COMPOSITION CU-5
990005160 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A351-GR-CF8 APCI-IA
990005240 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALPHA BRASS-TYPE TCL-100 OR DTD-5019 TUNGU
990005200 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SHPEROIDAL-GRAPHITE IRON CONTINENTAL-STAND
990005140 APCI METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BRASS-SHEET OR PLATE ASTM-B36 APCI-IA6A

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990005150            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- MONEL ASTM-B164   APCI-IA6A-29  2P  2/21/7
990005210            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SILVER   APCI-IA6A-35  1P  2/21/72
990005220            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- NOVONOX STAINLESS STEEL  ALLOY TO DIN GERM
990005170            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS  9-PERCENT NICKEL STEEL ASTM-A35
990004990            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM B361-WP6061-T6   APCI-IA6A-13  2P
990005080            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL-TYPE-304 UNIDENTIFIED AS T
990005070            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A182-F-304 AND ASTM-A
990005110            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BERYLLIUM COPPER   APCI-IA6A-25  2P  2/21/
990005010            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A312-TP304   APCI-IA6
990005060            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEELS-TYPE-416-CADMIUM-PLATED
990004870            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS-  TARSET PITTSBURGH CHEMICAL  CO   APCI-IA6
990004950            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B209-5083-0   APCI-IA6A-09
990005090            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-SILICON ASTM-B98GRB   APCI-IA6A-23
990004900            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-PIPE ASTM-B42   APCI-IA6A-04  1P  2
990005030            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A403-WP304 AND  A403-
990005120            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A269-304   APCI-IA6A-
990004980            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B247-6061-T6   APCI-IA6A-12
990005050            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A194-8T321   APCI-IA6
990004970            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B241-6061-T6   APCI-IA6A-11
990004930            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B211-2024-T4   APCI-IA6A-07
990005000            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- CARBON STEEL  (OXYGEN SERVICE)   APCI-IA6A
990004880            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SEALFAS-MASTIC-31-97 BENJAMIN  FOSTER  CO
990005020            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A240-304   APCI-IA6A-
990004920            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- RED-BRASS-PIPE ASTM-B43   APCI-IA6A-06  1P
990005130            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BRONZE ASTM-B61 OR  B62   APCI-IA6A-27  2P
990005100            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- FREE-MACHING BRASS   APCI-IA6A-24  2P  2/2
990004910            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-TUBE ASTM-B75   APCI-IA6A-05  1P  2
990005040            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A320-B8304   APCI-IA6
990004940            APCI  METLAS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM, ASTM-B-210-3003   APCI-IA6A-08
990004890            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- PLASITE-NO-7122H WISCONSIN  PROTECTIVE  CO
990004960            APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B210-6061-T6   APCI-IA6A-10
990005180            APCI  METLAS, ALLOYS, SOLDERS, AND SURGACE TREATMENTS- COPPER-TUBE  ASTM-B88   APCI-IA6A-32  1P
990004030                   APL  ALOCLENE-100 AND APPLIED CHEMICALS-5.57  1P  2/5/72
990001400 ICONE-DC-44, MORSE GREASE, ALPHA-CORP-MOLYKOTE-MICROSIZE, MONSANTO-PYDRAUL, GULF-MECHANISM-HYDROCARBON, HAVOLI
990003960   EQUIPMENT AT ALCAN-BOOTH ALUMINIUM  WORKS ROGERSTONE/NEWPORT  5/18/71   APL-SAFETY-DEPT-REP-37  7P  6/2/71
990003330 ONNEL-PROTECTIVE-EQUIPMENT ALUMINIZED HEAT  PROTECTIVE CLOTHING   APCI-SAFETY-STD-627.4.7  2P  5/68
990001580 ND BELOW  300-PSIG-MAX-OWG ALUMINUM   APCI-DES-ENG-STD-571.4  3P  11/67
990001560  AND BELOW  30PSIG-MAX-OWG ALUMINUM   APCI-DES-ENG-STD-571.2  3P  11/67
990001570 ND BELOW  150-PSIG-MAX-OWG ALUMINUM   APCI-DES-ENG-STD-571.3  4P  11/67
990002160  TOUGHNESS STUDY OF WELDED ALUMINUM ALLOY-5083   ASME  WINTER  ANNUAL-MEETING  NEW/YORK  8P  11/29/70-12/3/70
990004950 S, AND SURFACE TREATMENTS- ALUMINUM ASTM-B209-5083-0   APCI-IA6A-09  2P  2/21/72
990004960 S, AND SURFACE TREATMENTS- ALUMINUM ASTM-B210-6061-T6   APCI-IA6A-10  2P  2/21/72
990004930 S, AND SURFACE TREATMENTS- ALUMINUM ASTM-B211-2024-T4   APCI-IA6A-07  2P  2/21/72
990004970 S, AND SURFACE TREATMENTS- ALUMINUM ASTM-B241-6061-T6   APCI-IA6A-11  2P  2/21/72
990004980 S, AND SURFACE TREATMENTS- ALUMINUM ASTM-B247-6061-T6   APCI-IA6A-12  2P  2/21/72
990004990 S, AND SURFACE TREATMENTS- ALUMINUM B361-WP6061-T6   APCI-IA6A-13  2P  2/21/72
990000870             APCI  BRAZED ALUMINUM HEAT-EXCHANGER CLEANING REQUIREMENTS   APCI-QUAL-CONT-LAYOUT-119F  2P  7/1
990003070 -12/71 LIQUID-OXYGEN PUMPS ALUMINUM IN OXYGEN SERVICE LIQUID-CARBONIC-LIQUID-OXYGEN TRAILER- ACCIDENT VICTORY-
990004010 E FOR INTERNAL CLEANING OF ALUMINUM  TANKERS AND STATIC-TANKS FOR  OXYGEN SERVICE   APL-QCP-Q12  REV.0  1P
990000370 ING- TRANSITION-JOINTS AND ALUMINUM TO STAINLESS-STEEL   APCI-DES-ENG-STD-579.15  2P  9/66
990001890 UN-OXIDES, TALC, ASBESTOS, ALUMINUM-CHIPS, STEEL-WOOL, MAGNESIUM-CHIPS, MAGNESIUM-SHEET, DYE-PENETRANTS, MAGNO
990001110 T CHEMICAL  PRODUCTS  INC, ALUMINUM-OXIDE, SEAM COMPOUND GEON POLYVINYLCHLORIDE, PLASTIC LEAD SEAL-NO-2-JOHN C
990001550 S- PLAIN-AND-THREADED-ENDS ALUMINUM-PIPE   APCI-DES-ENG-STD-571.1  5P  10/65
990001020 IPE AND FITTINGS, CLEANING ALUMINUM-PIPE  FITTINGS  PARTS AND FABRICATIONS, CLEANING STAINLESS-STEEL AND COPPE
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990001600 ND BELOW  900-PSIG-MAX-OWG ALUMINUM-TUBE   APCI-DES-ENG-STD-571.51  2P  11/1/68
990001590 ND BELOW  400-PSIG-MAX-OWG ALUMINUM-TUBE   APCI-DES-ENG-STD-571.50  2P  11/1/68
990004940 S, AND SURFACE TREATMENTS- ALUMINUM, ASTM-B-210-3003   APCI-IA6A-08  2P  2/21/72
990001910   CONSUMER  SITES PROPOSED AMENDMENTS  PART II   AMENDMENTS TO  NFPA-NO-566  3P  PASSED  5/71   NFPA-NO-50
990003140 ANUFACTURED LOX TANKERS BY AMETEK   APCI-MEMO-71  06/22/71  1P
990002950 USTRIES  SAFETY IN AIR AND AMMONIA PLANTS   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS  V-2  P
990000630 10, INDOPOL-POLYBUTENE-OIL AMOCO-H-100, PENTON, T-FILM-THREAD COMPOUND   APCI-MAR-87-0-8821  1P  11/61
990000630 65, INDOPOL-POLYBUTENE-OIL AMOCO-L-10, INDOPOL-POLYBUTENE-OIL AMOCO-H-100, PENTON, T-FILM-THREAD COMPOUND   AP
990002240          SCOTT,D.J.  APCI  ANALYSES REQUIRED ON QUALITY-CONTROL-SAMPLES   APCI-MEMO-68  05/1/68  1P
990002260                      APCI  ANALYSES REQUIREMENTS SUMMARY   APCI-DIST-OPER-MAN-V-1-SEC-6.32  7P  3/70
990003580        MCSWAIN,C.B.  APCI  ANALYSIS OF WATER-HAMMER IN CRYOGENIC  TRANSFER-LINES BIBLIOGRAPHY   APCI-REPORT  P
990001110 EAD LUBRICANT AND SEALANT, ANDEROL-L-536 RUST-PREVENTIVE LEHIGH CHEMICAL  CO-CHESTERTOWN-MD., PERMACEL-RIBBON-
990001220               BROPHY,M.+ APCI  PERMATEX SEALANT-1516- COMPATABILITY TESTS WITH HIGH-PRESSURE OXYGEN   APCI-R
990002210 -IPD INSPECTION, REGARDING APCI CLEANLINESS REQUIREMENTS   APCI-MEMO-71  07/22/71  2P
990002050   MARYLAND  CASUALTY  CO   APCI FIELD INSPECTION CONTRACT WITH MARYLAND  CASUALTY  CO   APCI-POM-SEC-6.09-ATTC
990005680 R MALFUNCTION AND FAILURES APCI INCIDENTS INVOLVING OXYGEN-TRANSFER-EQUIPMENT OR INSTRUMENTATION   APCI-IIF3-2
990005610  PIPELINE  TRANSPORTATION- APL OXYGEN PIPELINE  DESIGN CONCEPTS AND CRITERIA   APCI-IIF2-2  1P  2/21/72
990005590 TRANSFER  SYSTEMS SYSTEMS- APL OXYGEN-TRANSFER METHODS TYPICAL  INSTALLATIONS, AND  OPERATIONS DEPARTMENT  OVE
990000650 DARD IGNITION TEST METHOD, APL PIPING-RESIDUE, METHYLENE-CHLORIDE   APCI-MAR-87-0-8821  1P  1/62
990005900 ENCIES HAZARDS  PROTECTION APL-BULLETINS AND REPORTS ON  VARIOUS PROBLEMS RELATED TO OXYGEN-SAFETY   APCI-IVE-
990005930 T INVESTIGATION AND REPORT APL-SAFETY-BULLETINS AND  APL-SAFETY DEPARTMENTS REPORTS RELATED TO  ACCIDENTS INVO
990000040        KITSON,F.K.  APCI   APPROVED ALLOY STEELS IN CRYOGENIC SERVICE   APCI-SAFETY-GRAM-NO-10-REV-1  1P  10/2
990001180 ELBERGER,F.  APCI  PIPING- APPROVED PIPE THREAD SEALANTS   APCI-DES-ENG-STD-570.5.1  1P  11/11/60
990003020 EETING  HELD ON  BOARD HMS ARK-ROYAL  8/11/71 TO DISCUSS LIQUID-OXYGEN SAFETY  REGULATIONS  3P  9/13/71 PLUS N
990003020 LUS NOTES ON  VISIT TO HMS ARK-ROYAL ON  11/8/71 TO  DISCUSS SAFETY OF SHIPBOARD LUX-PLANTS  2P  9/13/71
990003090 ITH  OXYGEN JOHNS-MANVILLE ASBESTOS  SHEET  PACKING  STYLE-NO-61 GARLOCK-900   APCI-IWO-NO-L8-0795   APCI-ANAL
990003100 900 DURABLA JOHNS-MANVILLE ASBESTOS  SHEET  PACKING  STYLE-61   APCI-MEMO-71  06/2/71  1P PLUS  2P  ATTACHMENT
990001440 NT IN GRAPHITE IMPREGNATED ASBESTOS-PACKING TEFLON  COATED  ASBESTOS-BLUE   APCI-MEMO-60  09/30/60  2P PLUS  1
990000660 -PACKING, AND  IMPREGNATED ASBESTOS-ROPE MATERIAL   APCI-MAR-87-0-8821  1P  2/62
990001890 RUBBER, IRON-OXIDES, TALC, ASBESTOS, ALUMINUM-CHIPS, STEEL-WOOL, MAGNESIUM-CHIPS, MAGNESIUM-SHEET, DYE-PENETRA
990003450   COMPRESSED  GAS  ASSOC   ASSEMBLY OF INDUSTRIAL PRACTICES USED FOR  GASEOUS OXYGEN TRANSMISSION AND DISTRIBU
990001100        KITSON,F.K.  APCI   ASSEMBLY OF OXYGEN REGULATORS T-FILM   APCI-MEMO-61  11/30/61  1P
990005070 REATMENTS- STAINLESS STEEL ASTM-A182-F-304 AND ASTM-A182-F-316   APCI-IA6A-21  2P  2/21/72
990005070  STEEL ASTM-A182-F-304 AND ASTM-A182-F-316   APCI-IA6A-21  2P  2/21/72
990005050 REATMENTS- STAINLESS STEEL ASTM-A194-8T321   APCI-IA6A-19  2P  2/21/72
990005020 REATMENTS- STAINLESS STEEL ASTM-A240-304   APCI-IA6A-16  2P  2/21/72
990005120 REATMENTS- STAINLESS STEEL ASTM-A269-304   APCI-IA6A-26  2P  2/21/72
990005010 REATMENTS- STAINLESS STEEL ASTM-A312-TP304   APCI-IA6A-15  2P  2/21/72
990005040 REATMENTS- STAINLESS STEEL ASTM-A320-B8304   APCI-IA6A-18  2P  2/21/72
990005160 REATMENTS- STAINLESS STEEL ASTM-A351-GR-CF8   APCI-IA6A-30  2P  2/21/72
990005170 SS  9-PERCENT NICKEL STEEL ASTM-A353GB   APCI-IA6A-31  2P  2/21/72
990005030 REATMENTS- STAINLESS STEEL ASTM-A403-WP304 AND  A403-WP304L   APCI-IA6A-17  2P  2/21/72
990005150  SURFACE TREATMENTS- MONEL ASTM-B164   APCI-IA6A-29  2P  2/21/72
990004950 RFACE TREATMENTS- ALUMINUM ASTM-B209-5083-0   APCI-IA6A-09  2P  2/21/72
990004960 RFACE TREATMENTS- ALUMINUM ASTM-B210-6061-T6   APCI-IA6A-10  2P  2/21/72
990004930 RFACE TREATMENTS- ALUMINUM ASTM-B211-2024-T4   APCI-IA6A-07  2P  2/21/72
990004970 RFACE TREATMENTS- ALUMINUM ASTM-B241-6061-T6   APCI-IA6A-11  2P  2/21/72
990004980 RFACE TREATMENTS- ALUMINUM ASTM-B247-6061-T6   APCI-IA6A-12  2P  2/21/72
990005140 NTS- BRASS-SHEET OR  PLATE ASTM-B36   APCI-IA6A-28  2P  2/21/72
990004900 CE TREATMENTS- COPPER-PIPE ASTM-B42   APCI-IA6A-04  1P  2/21/72
990004920 TREATMENTS- RED-BRASS-PIPE ASTM-B43   APCI-IA6A-06  1P  2/21/72
990005130 SURFACE TREATMENTS- BRONZE ASTM-B61 OR  B62   APCI-IA6A-27  2P  2/21/72
990004910 CE TREATMENTS- COPPER-TUBE ASTM-B75   APCI-IA6A-05  1P  2/21/72
990005090 TREATMENTS- COPPER-SILICON ASTM-B98GRB   APCI-IA6A-23  2P  2/21/72
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990004940 FACE TREATMENTS- ALUMINUM, ASTM-B-210-3003 APCI-IA6A-08 2P 2/21/72
990001400 O, UCON-HB170, UCON-HB660, AURALUBE-FS, FLUOROLUBE-FS5, KEL-F-LF3, VERSILUBE-F-50, SF81(40)-SILICONE, PYDRAUL-
990002490 MASTER,H.H. APCI AUTO LOAD SYSTEMS APCI-MEMO-71 05/4/71 2P PLUS 3P ATTACHMENTS
990001140 I T-FILM THREAD COMPOUND, AUTOIGNITION TEST APCI-ANAL-REP-61-683 APCI-IWO-NO-80-0068 1P 9/18/61
990002480 MASTER,H.H. APCI LATHROP AUTO-LOAD SYSTEM APCI-MEMO-71 03/22/71 2P PLUS 3P ATTACHMENTS

990004990 RFACE TREATMENTS- ALUMINUM B361-WP6061-T6 APCI-IA6A-13 2P 2/21/72
990005660 SPORTATION ROAD, RAILROAD, BARGE AND PIPELINE TRANSPORTATION VIBRATION AND CONTROLLED SLOSHING APCI-IIF2E
990005650 SPORTATION ROAD, RAILROAD, BARGE AND PIPELINE TRANSPORTATION VEHICLE ACCIDENT PROCEDURES APCI-IIF2D-1 1P
990005640 SPORTATION ROAD, RAILROAD, BARGE AND PIPELINE TRANSPORTATION OXYGEN-DISPERSAL FROM VENTS AND LINES APCI-I
990004450 APCI LUBRICANTS- ESSO BEACON-325 APCI-IA1A-17 1P 2/21/72
990004510 DING COMPOUNDS- MOLYLUBE-N BEL-RAY CO FARMINGDALE/NJ APCI-IA2A-05 1P 2/21/72
990004400 CI LUBRICANTS- MOLYLUBE-N BEL-RAY CO FARMINGDALE/NJ APCI-IA1A-12 1P 2/21/72
990004880 ENTS- SEALFAS-MASTIC-31-97 BENJAMIN FOSTER CO APCI-IA6A-02 1P 2/21/72
990005110 S, AND SURFACE TREATMENTS- BERYLLIUM COPPER APCI-IA6A-25 2P 2/21/72
990001470 I PRODUCTION OF ROCK WOOL BETHLEHEM-STEEL-CO APCI-MEMO-59 11/12/59 2P
990003580 CRYOGENIC TRANSFER-LINES BIBLIOGRAPHY APCI-REPORT P86 2/28/64
990002120 CTION CODE- A MANUAL FOR BOILER AND PRESSURE VESSEL INSPECTORS 150P 1968
990000610 - SPARK-IGNITION, STANDARD BOMB TEST, LED-PLATE-251, PIPE-DOPE APCI-MAR-87-0-8820 1P 9/61
990000600 TESTING- STANDARD PRESSURE BOMBS AND SPARK-IGNITION, DOW-CORNING FLUORINATED SILICON-OILS, SHELL POLYURETHANE
990000350 APCI PIPING- EXTENDED BONNET VALVE CODE APCI-DES-ENG-STD-579.4 3P 4/63
990000780 CLEANING REQUIREMENTS FOR BOURDON-TUBE TYPE GAUGES USED FOR OXYGEN SERVICE APCI-QUAL-CONT-LAYOUT-102F 3P
990004130 OGENIC TANKERS BY PUMP AT BRACKNELL APL-IGD-ENGR-MAN-50-02 3P 5/27/71
990000580 EFLON-HOSES, SUPPORTED BY BRAIDED STAINLESS-STEEL-HOUSING, AND RUBBER-HOSES PLASITE-NO-7122H APCI-MAR-87-0
990005100 E TREATMENTS- FREE-MACHING BRASS APCI-IA6A-24 2P 2/21/72
990001510 AIN-AND-THREADED-ENDS- RED BRASS-PIPE APCI-DES-ENG-STD-572.1 5P 5/62
990005140 S, AND SURFACE TREATMENTS- BRASS-SHEET OR PLATE ASTM-B36 APCI-IA6A-28 2P 2/21/72
990005240 SURFACE TREATMENTS- ALPHA BRASS-TYPE TCL-100 OR DTD-5019 TUNGUM CO LTD/UK COMPOSITION- COPPER-86-PERCENT
990000870 APCI BRAZED ALUMINUM HEAT-EXCHANGER CLEANING REQUIREMENTS APCI-QUAL-CONT-LAYOUT-119F
990003680 PEGRAM,J.W. APL BRAZED CORE EXTENDED SURFACE HEAT-EXCHANGERS APL-ENGR-SPEC-E.02 9P 6/28/70
990003870 VERSON,I. APL FAILURE OF BRAZED JOINTS IN HIGH-PRESSURE GASEOUS OXYGEN-LINE AT A CYLINDER FILLING DEPOT A
990002110 STANDARD FOR WELDING AND BRAZING PROCEDURES, WELDERS, BRAZERS, AND WELDING AND BRAZING OPERATORS ASME
990005130 S, AND SURFACE TREATMENTS- BRONZE ASTM-B61 OR B62 APCI-IA6A-27 2P 2/21/72
990003440 ILDING OFFICIALS UNIFORM BUILDING CODE VOL-1 1970
990005880 TEM-EMERGENCIES PROTECTION BUILDINGS AND ADJACENT SYSTEMS PROTECTION APCI-IVC2-1 4P 1/10/72
990001920 REQUIREMENTS FOR CUSTOMER BULK GAS SUPPLY SYSTEM APCI-DIST-OPER-MAN-V-1-SEC-4.1.3 2P 6/71
990001930 NSPECTION REQUIREMENTS FOR BULK LIQUID CUSTOMER INSTALLATIONS APCI-DIST-OPER-MAN-V-1-SEC-4.2.3 1P 5/69
990001900 ON ASSOC INSTALLATION OF BULK OXYGEN SYSTEMS AT CONSUMER SITES-1965 NFPA-NO-566 10P 1965
990001910 ON ASSOC INSTALLATION OF BULK OXYGEN SYSTEMS AT CONSUMER SITES PROPOSED AMENDMENTS PART II AMENDMENTS
990001890 YMERS, POLYSULFIDE-SEALER, BUNA-N, NEOPRENE, EPOXY-ADHESIVE, PHENOLIC-MOLDED, MELAMINE-MOLDED, POLYESTER-GLASS
990003880 OSION AND FIRE OCCURRED IN BURCKHARDT CENTRIFUGAL LOX-PUMP-TYPE-GB114-NO-29224 APL-SAFETY-DEPT-REP-16 6P 2
990004210 OF THE INVESTIGATION INTO BURCKHARDT CENTRIFUGAL PUMP EXPLOSION AND TANKER FIRE AT SHEEPBRIDGE ALLOY CASTIN
990003860 ERSON,I. LANBA,J.S. APL BURCKHARDT OXYGEN COMPRESSOR FIRE AT SSPC ROGNAC PLANT 3/2/71 APL-SAFETY-BULL-1
990005950 DALY,J. APCI BURNING OF METALS IN OXYGEN ATMOSPHERES (80 TO 100-PERCENT) APCI-TM-186 44P
990001860 KEHAT,E. APCI BURNING OF STEEL PIPES IN A FLOWING OXYGEN STREAM APCI-MEMO-61 04/17/61 3P PL
990001480 BROPHY,M. APCI PIPE BURNING TESTS APCI-R+D-NOTEBOOK-111 P26-9 4P 4/17/61
990002790 APCI NEAR-MISS ACCIDENT- BURNS/HARBOR APCI-MEMO-71 02/8/71 2P
990001890 UORINATED-SILOXANE, LS-53, BUTYL-RUBBER, IRON-OXIDES, TALC, ASBESTOS, ALUMINUM-CHIPS, STEEL-WOOL, MAGNESIUM-CH
990002860 APCI BYRON-JACKSON OXYGEN PUMP WASHOUT PROCEDURE FOR ANALYTICAL PURPOSES APCI-POM-SE

990000730 OLYKOTE-TYPES-Z AND X-15, CABOSIL-M-5 FORMICA-LAMINATE BONDED WITH A PHENOLIC RESIN, CUTTING-OILS, HEXADECAN
990001890 822, SUPERIOR-GRAPHITE-CO, CALQUARTZ-SODIUM SILICATE, 3M-DC1252-MARKER-PUTTY, DURABLE-MANUFACTURING COMPANY-GA
990000620 AND MAPLE WOOD, ACTIVATED CARBON APCI-MAR-87-0-8821 1P 10/61
990001730 O 100F 3600-PSIG-MAX-OWG CARBON STEEL APCI-DES-ENG-STD-578.10.6 3P 6/62

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990001690 TO  100F  275-PSIG-MAX-OWG CARBON STEEL   APCI-DES-ENG-STD-578.10.2  4P  10/69
990001870  APCI  IGNITION-LIMITS OF CARBON STEEL IN OXYGEN-NITROGEN-ATMOSPHERES   APCI-IWO-NO-LB-0043   APCI-TM-112  6P
990005000 S, AND SURFACE TREATMENTS- CARBON STEEL  (OXYGEN SERVICE)   APCI-IA6A-14  3P  2/21/72
990001020          APCI  CLEANING OF CARBON STEEL PIPE AND FITTINGS, CLEANING ALUMINUM-PIPE  FITTINGS  PARTS AND FABRICA
990001850 1/2-INCH SAFETY VALVE WITH CARBON STEEL SPRING   APCI-IWO-NO-10-7071   APCI-PROJECT-NO-00-5-3246-51.12.50   AP
990005190 S, AND SURFACE TREATMENTS- CARBON STEEL- NON-OXYGEN SERVICE WITH POSSIBLE  EXPOSURE TO  OXYGEN   APCI-IA6A-33
990001710 O  100F  1440-PSIG-MAX-OWG CARBON STEEL-PIPE   APCI-DES-ENG-STD-578.10.4  4P  1/64
990001840 TO  100F  150-PSIG-MAX-OWG CARBON STEEL-PIPE   APCI-DES-ENG-STD-578.10.19  2P  6/62
990001720 O  100F  2000-PSIG-MAX-OWG CARBON STEEL-PIPE   APCI-DES-ENG-STD-578.10.5  4P  1/64
990001680 - PLAIN-AND-THREADED-ENDS- CARBON STEEL-PIPE   APCI-DES-ENG-STD-578.10.1  6P  10/65
990001700 TO  100F  720-PSIG-MAX-OWG CARBON STEEL-PIPE   APCI-DES-ENG-STD-578.10.3  3P  6/62
990000640 AND EXPLOSION TESTING- CS2 CARBON-DISULFIDE ALIQUIPPA PUMP-SUCTION-FILTER-DEFROST CYL-SEAL SEALING COMPOUND
990004050  AND SAFETY  SATNDARDS FOR CARBON-STEEL  GASEOUS  OXYGEN TRANSMISSION-LINES   APL-ENGR-STD-LS.30/2  3P  1/12/7
990005280 CALS, SOLVENTS, AND  MISC- CARBON-TETRACHLORIDE   APCI-IA7A-04  1P  2/21/72
990001060       SCHMOYER,W.W.  APCI  CARBON-TETRACHLORIDE   APCI-SAFETY-GRAM-NO-68  1P  2/21/69
990001360 OETHANE- TRICHLORETHYLENE- CARBON-TETRACHLORIDE- CHLOROFORM   APCI-PROJECT-NO-87-8-8821   APCI-MEMO-62  01/3/6
990004120 YOGENIC TANKER BY  PUMP AT CARRINGTON   APL-IGD-ENGR-MAN-50-01  3P  5/27/71
990003950 TAR-GB.114-PUMP-NO-C.75 AT CARRINGTON  2/17/71 AS REPORTED IN  SAFETY  DEPT-REP-35   APL-SAFETY-DEPT-REP-36  6
990003940 KER-400-11  2/17/71 AT THE CARRINGTON  PLANT   APL-SAFETY-DEPT-REP-35  7P PLUS  APPENDIX I THROUGH VI  19P  3/
990002670 STOMPLER,R.D.  APCI  PAUL, CARTER, AND COSMODYNE LOX-PUMP SAFETY   APCI-MEMO-71  1/01/26/71  2P
990000560       SCHMOYER,W.W.  APCI  CAUTION- SNIFF TESTING CYLINDERS HAS ITS HAZARDS   APCI-SAFETY-GRAM-NO-49  2P  3/26
990003810 APL  INSULATION- PREFORMED CELLULAR  GLASS SECTION FOR PIPELINES   APL-ENGR-SPEC-N.05  5P  10/1/70
990001400 UALITIES OF CELLULUBE-220, CELLULUBE-150, UCON-LB283, UCON-LB550, UCON-LB300, UCON-LB170, UCON-HB170, UCON-HB6
990000740 ES CELLULUBE-300, DTE-103, CELLULUBE-200 RECENT FIRES AT DUPONT-NEW/JOHNSONVILLE-PLANT TITANIUM, TITANIUM-DIOX
990000730 UT STUDIES, CELLULUBE-300, CELLULUBE-220   APCI-MAR-87-0-8822  2P  6/63
990000760 -OUT STUDIES CELLULUBE-300 CELLULUBE-220   APCI-MAR-87-0-8822  1P  7/63
990001400 IRE-RESISTANT QUALITIES OF CELLULUBE-220, CELLULUBE-150, UCON-LB283, UCON-LB550, UCON-LB300, UCON-LB170, UCON-
990000760 OS- PLANT-WASH-OUT STUDIES CELLULUBE-300 CELLULUBE-220   APCI-MAR-87-0-8822  1P  7/63
990000730 I, PLANT WASH-OUT STUDIES, CELLULUBE-300, CELLULUBE-220   APCI-MAR-87-0-8822  2P  6/63
990000750 ARDS- PLANT-WASH-OUT STUDY CELLULUBE-300, DTE 103, RECENT FIRES AT DUPONT-NEW/JOHNSONVILLE-PLANT SOLNUS-500, T
990000740 OS- PLANT-WASH-OUT STUDIES CELLULUBE-300, DTE-103, CELLULUBE-200 RECENT FIRES AT DUPONT-NEW/JOHNSONVILLE-PLANT
990003110 DTE-105 TEXACO-CAPPELLA-AA CELLULUBE-550 FLUOROLUBE SEARS-THREAD-CUTTING-OIL   APCI-ANAL-REP  1P  7/15/71
990003360  GENERAL SPECIFICATION FOR CENTRIFUGAL COMPRESSORS   APCI-550-SD-16A  37P  4/15/65
990003710            OLIVER,R.  APL  CENTRIFUGAL CRYOGENIC PUMPS   APL-ENGR-SPEC-G.03  14P  4/1/71
990003880 IRE OCCURRED IN BURCKHARDT CENTRIFUGAL LOX-PUMP-TYPE-GB114-NO-29224   APL-SAFETY-DEPT-REP-16  6P  2/28/69
990000270 CHINERY- FIELD TESTING AND CENTRIFUGAL OXYGEN COMPRESSORS   APCI-DES-ENG-STD-551.2.8.1  18P  2/3/71
990004100                       APL  CENTRIFUGAL OXYGEN COMPRESSOR  MANUAL HATTINGEN  PLANT  15P  APPENDIX I II III  8P
990004210 ESTIGATION INTO BURCKHARDT CENTRIFUGAL PUMP EXPLOSION AND TANKER FIRE AT SHEEPBRIDGE  ALLOY  CASTINGS  LTD   A
990002690 GASSEN,K.F.  FIRE TESTS ON CENTRIFUGAL PUMPS FOR LIQUID-OXYGEN   CRYOGENICS  V-10  PP241-248  8P  6/70
990003070 ALL,W.L.  APCI  MINUTES OF CGA AIR-SEPARATION EQUIPMENT  COMMITTEE  HELD AT FT/LAUDERDALE  FLORIDA  5/11-12/71
990001950  TANK-TRUCK  SPECIFICATION CGA-341 FOR COLD LIQUEFIED-GASES   CGA-PAMPHLET-341-TENTATIVE-STANDARDS  13P  1970
990003450 NSMISSION AND DISTRIBUTION CGA-DOCKET  70-11   CGA-THIRD  DRAFT  23P  3/22/72
990003830 PL  ACCIDENT AT AN  OXYGEN CHARGING MANIFOLD   APL-SAFETY-BULL-046  2P
990000520            BALL,W.L.  APCI  CHECK-LIST- AIR-SEPARATION PLANT-SITE   APCI-SAFETY-STD-610.1.1  5P  11/28/60
990002180          KITSON,F.K.  APCI  CHECK-LIST-AIR-SEPARATION-PLANT OPERATION   APCI-SAFETY-STD-610.1/5  17P  2/16/61
990005350 MPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPARIBILITY, QUALITY-CONTROL-APL   APCI-IB1D(2)-2  2P  2/21/72
990005340 MPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, QUALITY-CONTROL-APCI   APCI-IB1D(2)-1  3P  9/9/71
990005310 MPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, CLEANING-PROCEDURES-APCI   APCI-IB1C-01  14P  2/21/72
990005320 MPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, CLEANING-PROCEDURES-APL   APCI-IB1C-02  1P  2/21/72
990005330 MPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, QUALITY-CONTROL, FIRE  HAZARDS   APCI-IB1D(1)-1  2P  9/9
990005360 MPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY   APCI-IB2-1  2P  2/10/72
990005380 MPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY NOTCH-SENSITIVITY OF MATERIALS   APCI-IB2
990005400 MPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY MATERIALS AND PARTS SUITABILITY  CONTROLS
990005370 MPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY   APCI-IB2A-1  2P  9/2/71
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990005390 MPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY FABRICATION AND WELDING APCI-IB2D-1 2P
990004420 LUBRICANTS- FLUORO-GLIDE, CHEMPLAST INC APCI-IA1A-14 1P 2/21/72
990004580 OUNDS- SODIUM-SILICATE AND CHINA-CLAY-PASTE APCI-IA2A-12 1P 2/21/72
990001890 BON-GREASE, HYDRAULIC-OIL, CHLORINATED-BIPHENYL-AROCLOR-1254, GRAPHITE-CHLOR-BIPHENYL, VINYL-CHLORIDE, CIS-DIC
990005270 CALS, SOLVENTS, AND MISC- CHLOROFORM APCI-IA7A-03 1P 2/21/72
990001360 ENE- CARBON-TETRACHLORIDE- CHLOROFORM APCI-PROJECT-NO-87-8-8821 APCI-MEMO-62 01/3/62 5P
990001890 URIDE, METHYLENE-CHLORIDE, CHLOROFORM, ETHYL-CHLORIDE, DICHLOROETHANE, DICHLOROETHANE, TRICHLOROETHANE POLYMER
990001890 COTITE-CERAMIC-INSULATION, CHROMATE-DYED-GLASS CLOTH, 3M-SAFETY-WALK-TYPE-B-M-0070, WALK-SYNTHETIC-CORK, MASKI
990001890 -BIPHENYL, VINYL-CHLORIDE, CIS-DICHLOROETHYLENE, TRANS-DICHLOROETHYLENE, VINYLIDENA-CHLORIDE, TRICHLOROETHYLEN
990000250 APCI CIVIL-STRUCTURAL- PERSONNEL PROTECTIVE SHIELDS AND OXYGEN-SYSTEMS APCI-DES-ENG-ST
990000840 I REQUIREMENTS FOR VENDOR CLASS-A CLEANING APCI-QUAL-CONT-LAYOUT-115F 2P 7/1/71
990003610 APL ACCEPTANCE TESTS FOR CLASS-A CLEANING APL-ENGR-SPEC-A.02 3P 5/12/69
990000800 APCI CLASS-A CLEANLINESS REQUIREMENTS APCI-QUAL-CONT-LAYOUT-105F 3P 7/1/71
990000850 I REQUIREMENTS FOR VENDOR CLASS-AA CLEANING APCI-QUAL-CONT-LAYOUT-116F 2P 7/1/71
990003620 APL ACCEPTANCE TEST FOR CLASS-AA CLEANLINESS (OXYGEN-CLEAN) APL-ENGR-SPEC-A.03 4P 4/1/71
990000810 APCI CLASS-AA CLEANLINESS REQUIREMENTS APCI-QUAL-CONT-LAYOUT-106F 3P 7/1/71
990000860 I REQUIREMENTS FOR VENDOR CLASS-AAA CLEANING APCI-QUAL-CONT-LAYOUT-117F 3P 7/1/71
990000820 APCI CLASS-AAA CLEANLINESS REQUIREMENTS APCI-QUAL-CONT-LAYOUT-107F 3P 7/1/71
990000830 I REQUIREMENTS FOR VENDOR CLASS-B CLEANING APCI-QUAL-CONT-LAYOUT-114F 2P 7/1/71
990003600 APL ACCEPTANCE TEST FOR CLASS-B CLEANLINESS APL-ENGR-SPEC-A-01 2P 5/12/69
990000790 APCI CLASS-B CLEANLINESS REQUIREMENTS APCI-QUAL-CONT-LAYOUT-104F 1P 7/1/71
990001980 SED GAS ASSOC EQUIPMENT CLEANED FOR OXYGEN SERVICE CGA-PAMPHLET-G-4.1 21P 3/59
990000540 MITH,H. APCI SOLVENT AND CLEANERS- DEVIATIONS CLEANING FOR OXYGEN SERVICE APCI-SAFETY-STD-629.0.10 1P 6/
990001010 APCI CLEANING APCI-CONSTR-SPEC-230.15 ON P8 1P 9/16/69
990000890 R,H.H. APCI STORAGE TANK CLEANING APCI-MEMO-63 01/24/63 1P
990002220 OR-CLASS-AA AND CLASS-AAA CLEANING APCI-MEMO-71 07/22/71 1P
990000830 REMENTS FOR VENDOR CLASS-B CLEANING APCI-QUAL-CONT-LAYOUT-114F 2P 7/1/71
990000840 REMENTS FOR VENDOR CLASS-A CLEANING APCI-QUAL-CONT-LAYOUT-115F 2P 7/1/71
990000860 MENTS FOR VENDOR CLASS-AAA CLEANING APCI-QUAL-CONT-LAYOUT-117F 3P 7/1/71
990000850 EMENTS FOR VENDOR CLASS-AA CLEANING APCI-QUAL-CONT-LAYOUT-116F 2P 7/1/71
990003610 CEPTANCE TESTS FOR CLASS-A CLEANING APL-ENGR-SPEC-A.02 3P 5/12/69
990003650 PING ERECTION, TESTING AND CLEANING APL-ENGR-SPEC-M.02 9P PLUS APPENDIX I II III 4/19/71
990003970 ING ERECTION, TESTING AND CLEANING APL-ENGR-SPEC-M.02 8P APPENDIX I II III 3P 4/19/71
990001020 N STEEL PIPE AND FITTINGS, CLEANING ALUMINUM-PIPE FITTINGS PARTS AND FABRICATIONS, CLEANING STAINLESS-STEEL
990000950 APCI CLEANING AND INSPECTION FOR EQUIPMENT IN AIR PLANTS AND IN OXYGEN SERVICE APCI-PO
990000500 APCI CLEANING AND INSPECTION- MATERIALS AND OXYGEN SERVICE APCI-SAFETY-STD-608.1 7P
990003350 GENERAL SPECIFICATION FOR CLEANING FOR OXYGEN SERVICE APCI-550-SD-27A 5P 12/10/59
990000540 T AND CLEANERS- DEVIATIONS CLEANING FOR OXYGEN SERVICE APCI-SAFETY-STD-629.0.10 1P 6/19/61
990000940 KITSON,F.K. APCI CLEANING FOR OXYGEN SERVICE APCI-MEMO-63 08/5/63 2P PLUS 9P ATTACHMENTS
990000960 BASSLER,E.J. APCI CLEANING FOR OXYGEN SERVICE 17P 1/60
990000900 HATLEY,A.L. APCI CLEANING LOX STORAGE TANK-NO-6 SANTA/SUSANA APCI-MEMO-64 03/11/64 1P PLUS 1P A
990004010 ITY PROCEDURE FOR INTERNAL CLEANING OF ALUMINUM TANKERS AND STATIC-TANKS FOR OXYGEN SERVICE APL-QCP-Q12 R
990001020 APCI CLEANING OF CARBON STEEL PIPE AND FITTINGS, CLEANING ALUMINUM-PIPE FITTINGS PARTS
990004020 ITY PROCEDURE FOR INTERNAL CLEANING OF 9% NICKEL AND HI-PROOF STAINLESS STATIC-TANKS FOR OXYGEN SERVICE AP
990000930 PENNSALT CORP CLEANING OF LIQUIEFIED-GAS PROCESSING EQUIPMENT PENNSALT-TECHNICAL-BULLETIN 6P
990000360 NG- VALVE PROCUREMENT AND CLEANING PROCEDURE APCI-DES-ENG-STD-579.5 3P 8/12/60
990005820 MAINTENANCE PROGRAM SAFE CLEANING PROCEDURES FOR FILTERS, TRAPS, AND INSTRUMENTS APCI-IIIB-1 2P 11/1/71
990000870 ED ALUMINUM HEAT-EXCHANGER CLEANING REQUIREMENTS APCI-QUAL-CONT-LAYOUT-119F 2P 7/1/71
990000780 APCI CLEANING REQUIREMENTS FOR BOURDON-TUBE TYPE GAUGES USED FOR OXYGEN SERVICE APCI-Q
990000770 APCI CLEANING REQUIREMENTS FOR AIR-PLANT EQUIPMENT APCI-QUAL-CONT-LAYOUT-101F 2P PLUS
990001020 S PARTS AND FABRICATIONS, CLEANING STAINLESS-STEEL AND COPPER-PIPE FITTINGS PARTS AND FABRICATIONS DESCRIPT
990001050 L FIRE HAZARD WHEN VAPOUR CLEANING WITH TRICHLOROETHYLENE (T.C.E.) APL-SAFETY-DEPT-INFO-SHEET-38 2P 2/10
990002850 MAHR,A.J. APCI LIST OF CLEANING-AGENTS, ASSOCIATED EQUIPMENT AND SUPPLIES APPROVED FOR USE IN APCI MANUF
990001020 ABRICATIONS DESCRIPTION OF CLEANING-MEDIUMS, INSPECTION OF DECONTAMINATED COMPONENTS, AND PICKLING OF CARBON-

990005310 CHECK, FIRE-COMPATIBILITY, CLEANING-PROCEDURES-APCI APCI-IB1C-01 14P 2/21/72
990005320 CHECK, FIRE-COMPATIBILITY, CLEANING-PROCEDURES-APL APCI-IB1C-02 1P 2/21/72
990003600 CCEPTANCE TEST FOR CLASS-B CLEANLINESS APL-ENGR-SPEC-A-01 2P 5/12/69
990003620 CEPTANCE TEST FOR CLASS-AA CLEANLINESS (OXYGEN-CLEAN) APL-ENGR-SPEC-A.03 4P 4/1/71
990005450 DISPOSAL OF VENTED GASES CLEANLINESS OF DISPOSAL SYSTEM APCI-IIB1-1 2P 2/12/72
990005470 DISPOSAL OF VENTED GASES CLEANLINESS OF OXYGEN PIPING APCI-IIB1-2 1P 2/19/72
990000810 APCI CLASS-AA CLEANLINESS REQUIREMENTS APCI-QUAL-CONT-LAYOUT-106F 3P 7/1/71
990000790 APCI CLASS-B CLEANLINESS REQUIREMENTS APCI-QUAL-CONT-LAYOUT-104F 1P 7/1/71
990000800 APCI CLASS-A CLEANLINESS REQUIREMENTS APCI-QUAL-CONT-LAYOUT-105F 3P 7/1/71
990000820 APCI CLASS-AAA CLEANLINESS REQUIREMENTS APCI-QUAL-CONT-LAYOUT-107F 3P 7/1/71
990002210 INSPECTION, REGARDING APCI CLEANLINESS REQUIREMENTS APCI-MEMO-71 07/22/71 2P
990003330 LUMINIZED HEAT PROTECTIVE CLOTHING APCI-SAFETY-STD-627.4.7 2P 5/68
990001890 NVILLE-76 GASKET MATERIAL, CLOTH-ASBESTOS, GLASS-COTTON-ALUMINIZED-MIL-C-8240, COCOTITE-CERAMIC-INSULATION, CH
990001890 ATION, CHROMATE-DYED-GLASS CLOTH, 3M-SAFETY-WALK-TYPE-B-M-0070, WALK-SYNTHETIC-CORK, MASKING-TAPE, SHERLOCK-LE
990002520 FIRE INCIDENT IN AN OXYGEN CLOUD FIRE JOURNAL PP76-8 AND 81 4P 1/71
990001500 APCI PLASITE PROTECTIVE COATING APCI-MEMO-60 06/9/60 2P
990001890 TON-ALUMINIZED-MIL-C-8240, COCOTITE-CERAMIC-INSULATION, CHROMATE-DYED-GLASS CLOTH, 3M-SAFETY-WALK-TYPE-B-M-007
990002040 APCI CODED VESSEL REPAIRS APCI-POM-SEC-6.09 4P 11/29/68 FOR ATTCHMTS SEE 205 206
990002280 APCI CODED VESSEL REPAIRS APCI-POM-SEC-6.09 4P 15P OF ATTCHMTS 11/29/68
990001950 SPECIFICATION CGA-341 FOR COLD LIQUEFIED-GASES CGA-PAMPHLET-341-TENTATIVE-STANDARDS 13P 1970
990001850 FOSTER,R.H. APCI COLD TEST OF 1/2-INCH SAFETY VALVE WITH CARBON STEEL SPRING APCI-IWO-NO-10-7071
990002270 APCI COLD-BOX LEAKS APCI-POM-SEC-1.14 5P 10/30/68
990000450 APCI PLANT COMPONENTS- COLD-BOXES APCI-SAFETY-STD-607.1.5 7P 1/63
990000380 PERLITE IN AIR-SEPARATION COLD-BOXES APCI-TB-39 1P 6/14/71
990000390 INSULATION AND PAINTING- COLD-BOXES THERMAL TANKS PERLITE APCI-DES-ENG-STD-581.1 4P 5/26/61
990000410 INSULATION AND PAINTING- COLD-BOXES, THERMAL TANKS, GLASS WOOL APCI-DES-ENG-STD-581.3 1P 10/24/60
990001800 APCI PIPING-SS36- COLD-BOX-SERVICE 100F AND BELOW 3600-PSIG-MAX-OWG STAINLESS STEEL-PIPE APCI-DES
990001770 APCI PIPING-SS12- COLD-BOX-SERVICE 100F AND BELOW 1235-PSIG-MAX-OWG STAINLESS STEEL-PIPE APCI-DES
990001810 APCI PIPING-SS7.2- COLD-BOX-SERVICE 100F AND BELOW 720-PSIG-MAX-OWG STAINLESS STEEL-PIPE APCI-DES-
990001750 APCI PIPING-SS2.7- COLD-BOX-SERVICE 100F AND BELOW 275-PSIG-MAX-OWG STAINLESS STEEL-PIPE APCI-DES-
990001760 APCI PIPING-SS6- COLD-BOX-SERVICE 100F AND BELOW 615-PSIG-MAX-OWG STAINLESS STEEL-PIPE APCI-DES-
990001790 APCI PIPING-SS30- COLD-BOX-SERVICE 100F AND BELOW 3000-PSIG-MAX-OWG STAINLESS STEEL-PIPE APCI-DES
990001620 APCI PIPING-CT2- COLD-BOX-SERVICE 100F AND BELOW 200-PSIG-MAX-OWG COPPER-TUBE APCI-DES-ENG-STD-
990001570 APCI PIPING-AA1.5- COLD-BOX-SERVICE 100F AND BELOW 150-PSIG-MAX-OWG ALUMINUM APCI-DES-ENG-STD-571.
990001630 APCI PIPING-CT4- COLD-BOX-SERVICE 100F AND BELOW 400-PSIG-MAX-OWG COPPER-TUBE APCI-DES-ENG-STD-
990001580 APCI PIPING-AA3- COLD-BOX-SERVICE 100F AND BELOW 300-PSIG-MAX-OWG ALUMINUM APCI-DES-ENG-STD-571.
990001560 APCI PIPING-AA.3- COLD-BOX-SERVICE 150F AND BELOW 30PSIG-MAX-OWG ALUMINUM APCI-DES-ENG-STD-571.2
990001640 APCI PIPING-ICT4- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 400-PSIG-MAX-OWG COPPER
990001600 APCI PIPING-IAA9- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 900-PSIG-MAX-OWG ALUMIN
990001670 APCI PIPING-ICT23- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 2300-PSIG-MAX-OWG COPPE
990001650 APCI PIPING-ICT9- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 900-PSIG-MAX-OWG COPPER
990001590 APCI PIPING-IAA4- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW 400-PSIG-MAX-OWG ALUMIN
990001660 APCI PIPING-ICT10- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING 100F AND BELOW -1000-PSIG-MAX-OWG COPP
990000400 INSULATION AND PAINTING- COLD-INSULATION AND MINERAL FIBER GRANULATED APCI-DES-ENG-STD-581.2 2P 6/26/69
990001440 BALL,W.L. APCI COMBUSTIBLE CONTAMINANT CONTENT IN GRAPHITE IMPREGNATED ASBESTOS-PACKING TEFLON CO
990001420 KET MATERIALS WITH OXYGEN COMBUSTION IN OXYGEN AND SOXHLET ETHER-EXTRACTION GARLOCK-900, KM-226, KM-246 AP
990001410 RATH MATERIAL WITH OXYGEN COMBUSTION IN OXYGEN AND SOXHLET ETHER-EXTRACTION MELRATH GARLOCK-900 APCI-ANAL-R
990001200 BROPHY,M. APCI OXYGEN COMPATABILITY TESTS- MOLYLUBE-KOTE-AR AND MOLYLUBE-N APCI-R+D-NOTEBOOK-130 P16-
990001220 CI PERMATEX SEALANT-1516- COMPATABILITY TESTS WITH HIGH-PRESSURE OXYGEN APCI-R+D-NOTEBOOK-111 P152 1P 1/
990001370 APCI HIGH-PRESSURE OXYGEN COMPATABILITY TESTS WITH SILICONE-RUBBER GASKET COMPOUND- RTV-60-NP-134372-M235 A
990001420 R. APCI GASKET MATERIALS COMPATBILITY OF GASKET MATERIALS WITH OXYGEN COMBUSTION IN OXYGEN AND SOXHLET ET
990005350 I MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPARIBILITY, QUALITY-CONTROL-APL APCI-IB1D(2)-2 2P
990005330 I MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, QUALITY-CONTROL, FIRE HAZARDS APCI-IB1D
990005340 I MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, QUALITY-CONTROL-APCI APCI-IB1D(2)-1 3P

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990005320 I  MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, CLEANING-PROCEDURES-APL   APCI-IB1C-02  1P
990005310 I  MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, CLEANING-PROCEDURES-APCI   APCI-IB1C-01  1
990005370 I  MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY   APCI-IB2A-1  2P  9/2/71
990005400 I  MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY MATERIALS AND PARTS SUITABI
990005380 I  MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY NOTCH-SENSITIVITY OF MATERI
990005360 I  MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY   APCI-IB2-1  2P  2/10/72
990005390 I  MATERIAL-COMPATIBILITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY FABRICATION AND WELDING   A
990005970    NASA-KENNEDY  MATERIALS COMPATIBILITY FOR GASEOUS OXYGEN  SYSTEMS   MAB-3268-69  9P  11/5/69
990001130 R.A.  APCI  GASEOUS OXYGEN COMPATIBILITY OF CROSSLITE FLUOROCARBON TAPE THREE-M-FLUOROCARBON-TAPE, PERMACEL-TA
990003090  L.G.  LATSHAW,D.R.  APCI  COMPATIBILITY OF MATERIAL WITH  OXYGEN JOHNS-MANVILLE ASBESTOS  SHEET  PACKING  STY
990005960 T.AL  UNION  CARBIDE CORP  COMPATIBILITY OF MATERIALS WITH  7500-PSI OXYGEN   AD608260  71P  10/64
990001270 EHL,W.A.  NASA-HUNTSVILLE  COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN   NASA-TMX-985  72P  8/64
990001280 EHL,W.A.  NASA-HUNTSVILLE  COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN   MTP-P+VE-M-63-14  94P  12/4/63
990001260 KEY,C.F.  NASA-HUNTSVILLE  COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN IV   NASA-TMX-53773  50P  8/23/68
990001250 KEY,C.F.  NASA-HUNTSVILLE  COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN III   NASA-TMX-53533  54P  11/3/66
990001240 KEY,C.F.  NASA-HUNTSVILLE  COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN   NASA-TMX-53052  34P  5/26/64
990000510      SCHMOYER,W.W.  APCI  COMPATIBILITY OF MATERIALS- OXYGEN COMPATIBLE MATERIALS   APCI-SAFETY-STD-609.1  8P
990001890   HAUSER,R.L.  MARTIN  CO  COMPATIBILITY OF MATERIALS WITH LIQUID OXYGEN METHYL-CHLORIDE, METHYLENE-CHLORIDE,
990001410 R.  APCI  GASKET MATERIAL COMPATIBILITY OF MELRATH MATERIAL WITH  OXYGEN COMBUSTION IN OXYGEN AND SOXHLET ETH
990001170 R.A.  APCI  GASEOUS OXYGEN COMPATIBILITY TEST ON MOLY-LUBE-NO-99   APCI-MEMO-63  06/11/63  1P
990001110      DINAN,E.  APCI  OXYGEN COMPATIBILITY TESTS FOR  VARIOUS MATERIALS- ABMA THREAD LUBRICANT AND SEALANT, ANDE
990001230  BROPHY,M.  APCI  MOLLY-99 COMPATIBILITY TESTS WITH HIGH-PRESSURE OXYGEN   APCI-R+D-NOTEBOOK-130  P3  1P  6/63
990001320 KEL-F HIGH-PRESSURE OXYGEN COMPATIBILITY- NYLON   APCI-MEMO-63  05/17/63  1P
990000510 ILITY OF MATERIALS- OXYGEN COMPATIBLE MATERIALS   APCI-SAFETY-STD-609.1  8P  6/65
990002370 ANADIAN  STANDARDS  ASSOC  COMPRESSED  GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS   CSA-B96  57P  1965
990002360 MERICAN  STANDARDS  ASSOC  COMPRESSED  GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS   ASA-B57.1  57P  1965
990002350    COMPRESSED  GAS  ASSOC  COMPRESSED  GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS   CGA-PAMPHLET-V-1  57P
990002880 RUCTION FOR REGULATORS AND COMPRESSED  GASES   APCI-BROCHURE  4P  4/70
990002710 S  ASSOC  SAFE HANDLING OF COMPRESSED  GASES   CGA-PAMPHLET-P-1  10P  1965
990001960 RDS  PART-1- CYLINDERS FOR COMPRESSED  GASES   CGA-PAMPHLET-S-1.1  20P  1969
990004230  I.  APL  FIRE  HAZARDS IN COMPRESSED-AIR AND  OXYGEN RICH  ENVIRONMENTS   APL-SAFETY-DEPT-INFO-SHEET-33  6P
990003150 EF DEVICE  STANDARDS  PT-3 COMPRESSED-GAS  STORAGE-CONTAINERS   CGA-PAMPHLET-S-1.3  11P  1966
990000490 URAGE, VACUUM-SYSTEMS, AND COMPRESSED-GASES   APCI-SAFETY-STD-607.2.2.5  P1-4  3/65  P5-6  1/64
990003380 EQUIPMENT  ERECTION OXYGEN COMPRESSION  SYSTEM EL/SEGUNDO/CALIF   APCI-CONSTR-SPEC-200.0 TO  200.20  20P  8/7/
990001340 BEHAVIOR OF TRANSITE UNDER COMPRESSIVE-LOADS AT  AMBIENT AND  LIQUID-NITROGEN  TEMPERATURES   APCI-TR-53   APC
990000440 S- AIR-SEPARATION, OXYGEN, COMPRESSOR   APCI-SAFETY-STD-607.1.2.3  6P  12/62
990002600    BALL,W.L.  APCI  OXYGEN COMPRESSOR FIRE   APCI-SAFETY-GRAM-NO-03  2P  7/7/61
990003860 S.  APL  BURCKHARDT OXYGEN COMPRESSOR FIRE AT SSPC ROGNAC  PLANT  3/2/71   APL-SAFETY-BULL-107  3P  4/14/71
990004100    APL  CENTRIFUGAL OXYGEN COMPRESSOR  MANUAL HATTINGEN  PLANT  15P  APPENDIX I II III  8P
990002910 REENS TO BE USED IN OXYGEN COMPRESSOR  SUCTION   APCI-MEMO-71  07/26/71  2P
990002560       APCI  PIPING- OXYGEN COMPRESSOR  SYSTEM  APCI  OPERATED   APCI-DES-ENG-STD-570.7  32P  7/19/71
990000290       APCI  PIPING- OXYGEN COMPRESSOR LOCATION   APCI-DES-ENG-STD-570.6  2P  1/15/71
990003050 G  KA-27-IV/KA-4-IV OXYGEN COMPRESSOR VITON-A  (BLACK) VITON-E60  (GREEN)   DEMAG-LETTER TO  APCI  1P  8/11/71
990003370 FICATION FOR RECIPROCATING COMPRESSORS   APCI-550-SD-01A  37P  3/9/64
990003360 CIFICATION FOR CENTRIFUGAL COMPRESSORS   APCI-550-SD-16A  37P  4/15/65
990000260 G AND RECIPROCATING OXYGEN COMPRESSORS   APCI-DES-ENG-STD-551.1.9.1  14P  2/3/71
990000270 ING AND CENTRIFUGAL OXYGEN COMPRESSORS   APCI-DES-ENG-STD-551.2.8.1  18P  2/3/71
990005700 MALFUNCTIONS AND  FAILURES COMPRESSORS AND PUMPS   APCI-IIF3-4  15P  1/23/72
990001110 BRUNSWICK/NEW/JERSEY, WEST CONCRETE FLOOR TREATMENT WEST CHEMICAL  PRODUCTS  INC, ALUMINUM-OXIDE, SEAM COMPOUN
990002200  W.L.  APCI  LOX-SPILL NCG CONSHOHOCKEN   APCI-MEMO-68  05/23/68  2P
990001440 LL,W.L.  APCI  COMBUSTIBLE CONTAMINANT CONTENT IN GRAPHITE IMPREGNATED ASBESTOS-PACKING TEFLON  COATED  ASBEST
990005550 APCI  OPERATIONAL-HAZARDS- CONTAMINANTS ACCUMULATION   APCI-IIE-1  1P  7/21/71
990001150  PERCENT ETHER EXTRACTABLE CONTAMINANTS AND FLUORESCENCE DAMCO-TEFLON TAPE, SANDEM-INDUSTRIAL, CRANE  PACKING
990001080 CI  NOTES ON LIQUID OXYGEN CONTAMINANTS MISSILE-PROGRAM  10P  1/6/58
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990000970 APCI  AIR-SEPARATION-PLANT CONTAMINATION- HISTORY, SAMPLING, AND  ANALYSIS   APCI PLANT  MANAGERS  SAFETY  MEE
990005630 D  PIPELINE-TRANSPORTATION CONTAMINATION-CONTROL   APCI-IIF2B-1  1P  9/3/71
990002050 CO  APCI FIELD INSPECTION CONTRACT WITH MARYLAND  CASUALTY  CO   APCI-POM-SEC-6.09-ATTCHMT-1  2P  8/27/69
990002430             APCI  OXYGEN CONTROL-PANEL   APCI-DES-ENG-STD-534.1  (TO BE PUBLISHED)
990000570          GEIST,J.M.  APCI  CONTROLLED KINETICS EXPERIMENTATION- TEFLON-HOSE   APCI-MAR-87-0-8820  1P  5/60
990000580          GEIST,J.M.  APCI  CONTROLLED KINETICS EXPERIMENTS- TEFLON-HOSES,  SUPPORTED BY BRAIDED STAINLESS-STEE
990005110 FACE TREATMENTS- BERYLLIUM COPPER   APCI-IA6A-25  2P  2/21/72
990004900 S, AND SURFACE TREATMENTS- COPPER-PIPE ASTM-B42   APCI-IA6A-04  1P  2/21/72
990001020 EANING STAINLESS-STEEL AND COPPER-PIPE  FITTINGS  PARTS AND FABRICATIONS DESCRIPTION OF CLEANING-MEDIUMS, INSP
990005090 S, AND SURFACE TREATMENTS- COPPER-SILICON ASTM-B98GRB   APCI-IA6A-23  2P  2/21/72
990001610 RATING  TABLES- PLAIN-ENDS COPPER-TUBE   APCI-DES-ENG-STD-574.1  5P  5/62
990001660  BELOW  -1000-PSIG-MAX-DWG COPPER-TUBE   APCI-DES-ENG-STD-574.52  1P  4/67
990001650 ND BELOW  900-PSIG-MAX-DWG COPPER-TUBE   APCI-DES-ENG-STD-574.51  2P  11/1/68
990001640 ND BELOW  400-PSIG-MAX-DWG COPPER-TUBE   APCI-DES-ENG-STD-574.50  2P  11/1/68
990001670 D BELOW  2300-PSIG-MAX-DWG COPPER-TUBE   APCI-DES-ENG-STD-574.54  2P  1/64
990004910 S, AND SURFACE TREATMENTS- COPPER-TUBE ASTM-B75   APCI-IA6A-05  1P  2/21/72
990005180 S, AND SURGACE TREATMENTS- COPPER-TUBE  ASTM-B88   APCI-IA6A-32  1P  2/21/72
990003680   PEGRAM,J.W.  APL  BRAZED CORE EXTENDED SURFACE HEAT-EXCHANGERS   APL-ENGR-SPEC-H.02  9P  6/28/70
990003560 STANDARDS REQUIREMENTS FOR CORROSION  CONTROL   FEDERAL  REGISTER  VOL-36  NO-126  6/30/71
990003550 TANDARDS FOR GAS PIPELINES CORROSION-PITTING- NOTICE OF PUBLIC  HEARING   FEDERAL  REGISTER  VOL-36  NO-126  6
990002670   APCI  PAUL, CARTER, AND COSMODYNE LOX-PUMP SAFETY   APCI-MEMO-71  1/01/26/71  2P
990002250 UALITY  ASSURANCE  PROGRAM COST-PROCEDURES DIST-OPER-MAN-VOL-4-SECT-6.3   APCI-MEMO-66  10/17/66  2P PLUS  SCH
990005490 APCI  OPERATIONAL-HAZARDS- COUPLING TO OTHER  SYSTEMS   APCI-IIC1-1   APCI-IIC2-1  1P  12/22/71
990002160  R.  LEHIGH  UNIV  FATIGUE CRACK  GROWTH-RATES AND FRACTURE TOUGHNESS STUDY OF WELDED ALUMINUM ALLOY-5083   AS
990002140 F  MEAN  STRESS ON FATIGUE CRACK-PROPAGARION IN  PLATES UNDER  EXTENSION AND  BENDING   ASME  WINTER  ANNUAL
990002130 UNIV  COMPARATIVE STUDY OF CRACK-PROPAGATION IN  PLATES UNDER  EXTENSION AND  BENDING   INTERNATIONAL  CONFERE
990001110 LASTIC LEAD SEAL-NO-2-JOHN CRANE   APCI-MEMO-59  01/28/59  2P
990001150 N TAPE, SANDEM-INDUSTRIAL, CRANE  PACKING  CO   APCI-ANAL-REP-70-368,70-369  1P  10/7/70
990004530 S AND THREADING COMPOUNDS- CRANE  PACKING  CO-TAPE   APCI-IA2A-09  2P  2/21/72
990002810  APCI  NEAR-MISS ACCIDENT- CREIGHTON   APCI-MEMO-68  06/4/68  2P
990003120 ESIN-  7139-CATALYST) FROM CREST  PRODUCTS  CO   APCI-IWD-NO-XD-0134   APCI-ANAL-REP-71-446  1P  10/25/71
990001130 US OXYGEN COMPATIBILITY OF CROSSLITE FLUOROCARBON TAPE THREE-M-FLUOROCARBON-TAPE, PERMACEL-TAPE   APCI-MEMO-63
990004520 S AND THREADING COMPOUNDS- CROSSLITE-FLUOROCARBON-TAPE   APCI-IA2A-06  2P  2/21/72
990002380 OCEDURE FOR  TRANSPORTABLE CRYOGENIC CONTAINERS  (250-GALLON CAPACITY OR  LARGER) GENERAL   APCI-POM-SEC-2.02
990002390 OCEDURE FOR  TRANSPORTABLE CRYOGENIC CONTAINERS  (250-GALLON CAPACITY OR  LARGER)   APCI-DIST-OPER-MAN-9.1  6P
990004150   APL  PURGE PROCEDURE FOR CRYOGENIC  LIQUID CONTAINER   APL-IGD-ENGR-MAN-52-02  7P  6/3/71
990003780          PEGRAM,J.W.  APL  CRYOGENIC  LIQUID HOSE-COUPLINGS FOR USE IN THE  U.K   APL-ENGR-STD-LS.08  6P  10/2
990005580 SYSTEMS- FIELD  FABRICATED CRYOGENIC  LIQUID STORAGE TANKS   APCI-IIF1-3  1P  2/3/72
990003750    APL  TRANSFER  HOSE FOR CRYOGENIC  LIQUIDS   APL-ENGR-SPEC-L.11  3P  7/7/69
990002830    APCI  SAFE HANDLING OF CRYOGENIC  LIQUIDS AND ASSOCIATED EQUIPMENT   APCI-POM-SEC-1.17  8P  4/23/69
990002920   INSULATION MATERIALS FOR CRYOGENIC  SYSTEMS MILFOAM URETHANE INSULATION NATIONAL-GYPSUM-BLUE LOX-SYSTEMS FOA
990003580 NALYSIS OF WATER-HAMMER IN CRYOGENIC  TRANSFER-LINES BIBLIOGRAPHY   APCI-REPORT  P86  2/28/64
990000150 URE-VESSELS- VAPORIZER AND CRYOGENIC LIQUID DISPOSAL   APCI-DES-ENG-STD-514.6.2  4P  5/26/61
990003410 ION FOR A FIELD-FABRICATED CRYOGENIC LIQUID STORAGE-TANK  (FLAT-BOTTOM)   APCI-99820A  18P  9/15/71
990002150 CS TO SAFE-LIFE  DESIGN IN CRYOGENIC PRESSURE-VESSELS   ESSO-REPORT-NO-EE.26ER.70  17P  8/24/70
990003710 LIVER,R.  APL  CENTRIFUGAL CRYOGENIC PUMPS   APL-ENGR-SPEC-S.03  14P  4/1/71
990006010                  APCI  CRYOGENIC SAFETY   APCI  CRYOGENIC  SAFETY  CONFERENCE  ALLENTOWN  145P  7/59
990000040   APPROVED ALLOY STEELS IN CRYOGENIC SERVICE   APCI-SAFETY-GRAM-NO-10-REV-1  1P  10/25/63
990004170  FOR THE INSTALLATION OF A CRYOGENIC TANK   APL-IGD-ENGR-MAN-60-01  6P  5/19/71
990004120 APL  PROCEDURE FOR FILLING CRYOGENIC TANKER BY  PUMP AT CARRINGTON   APL-IGD-ENGR-MAN-50-01  3P  5/27/71
990004140 APL  PROCEDURE FOR FILLING CRYOGENIC TANKERS BY  PUMP AT STOKE-ON-TRENT   APL-IGD-ENGR-MAN-50-03  3P  5/27/71
990004130 APL  PROCEDURE FOR FILLING CRYOGENIC TANKERS BY  PUMP AT BRACKNELL   APL-IGD-ENGR-MAN-50-02  3P  5/27/71
990000480 AGE, CONVERTER-SYSTEM, AND CRYOGENIC-LIQUIDS   APCI-SAFETY-STD-607.2.1.1  3P  4/62
990000470 NTS- AIR-SEPARATION PLANT, CRYOGENIC-LIQUID, AND DISPOSAL   APCI-SAFETY-STD-607.1.20  3P  4/62
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990003590 S  COUNCIL  SAFETY  PANEL  CRYOGENICS SAFETY  MANUAL  P122  1970
990003930  1.  APL  INVESTIGATION OF CRYOSTAR LOX-PUMP EXPLOSION AT STOKE  PLANT  8/7/70   APL-SAFETY-DEPT-REP-34  14P
990003920 LOSION AND FIRE DUE TO THE CRYOSTAR-GB114 LOX-PUMP ON AN SSPC  LOX-TANKER   APL-SAFETY-DEPT-REP-32  9P  7/10/7
990003940 PL  REPORT ON EXPLOSION OF CRYOSTAR-GB.114-PUMP-NO-C.75 ON TANKER-400-11  2/17/71 AT THE CARRINGTON  PLANT  A
990003950  ARISING FROM EXPLOSION OF CRYOSTAR-GB.114-PUMP-NO-C.75 AT CARRINGTON  2/17/71 AS REPORTED IN  SAFETY  DEPT-RE
990000640 DS, AND EXPLOSION TESTING- CS2 CARBON-DISULFIDE ALIQUIPPA PUMP-SUCTION-FILTER-DEFROST CYL-SEAL SEALING COMPOUN
990004840 ETS AND PACKINGS- SINDANYO CS-51-ASBESTOS AND  CEMENT  BOARDS. NATURAL-UNTREATED-FINISH TURNERS  ASBESTOS  CEM
990001920 NSEPCTION REQUIREMENTS FOR CUSTOMER BULK GAS SUPPLY  SYSTEM   APCI-DIST-OPER-MAN-V-1-SEC-4.1.3  2P  6/71
990001930 QUIREMENTS FOR BULK LIQUID CUSTOMER  INSTALLATIONS   APCI-DIST-OPER-MAN-V-1-SEC-4.2.3  1P  5/69
990002420 S  SYSTEMS FOR WELDING AND CUTTING   NFPA-NO-51  8P  1969 AND  CUTTING AND  WELDING PROCESSES   NFPA-NO-51B  3
990002720 ETY  SAFETY IN WELDING AND CUTTING   USAS-Z49.1  49P  1967
990002890 DUCTS REDI-SET WELDING AND CUTTING  OUTFITS   APCI-BROCHURE  11P  9/25/69
990002010  THE CHEMICAL STRUCTURE OF CUTTING OILS TO THEIR OXYGEN-COMPATIBILITY   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR
990000720 RDS- KEL-F-POLYMER, NYLON, CUTTING-OILS   APCI-MAR-87-0-8822  1P  5/63
990000730 DED WITH A PHENOLIC RESIN, CUTTING-OILS, HEXADECANE, HYDROCARBON TYPE CUTTING-OILS, KNOWN AS TYPE-GROUP-II, PL
990000730 XADECANE, HYDROCARBON TYPE CUTTING-OILS, KNOWN AS TYPE-GROUP-II, PLANT WASH-OUT STUDIES, CELLULUBE-300, CELLUL
990000160 LS- GASEOUS OXYGEN STORAGE CYLINDER   APCI-DES-ENG-STD-515.1.3  3P  10/17/60
990000050 CHMOYER,W.W.  APCI  OXYGEN CYLINDER FAILURE   APCI-SAFETY-GRAM-NO-13  2P  6/1/62
990004160 ERS,J.  APL  PROCEDURE FOR CYLINDER FILLING AND QUALITY  CONTROL  (STANDARD  PURITY  GASES)   APL-IGO-ENGR-MAN
990003870   GASEOUS OXYGEN-LINE AT A CYLINDER FILLING DEPOT   APL-SAFETY-BULL-114  3P  7/13/71
990000010  F.K.  APCI  DON_T  TURN A CYLINDER INTO A ROCKET   APCI-SAFETY-GRAM-NO-04C  1P  8/7/61
990002370 DS  ASSOC  COMPRESSED  GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS   CSA-B96  57P  1965
990002350 AS  ASSOC  COMPRESSED  GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS   CGA-PAMPHLET-V-1  57P  1965
990002360 DS  ASSOC  COMPRESSED  GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS   ASA-B57.1  57P  1965
990000100 ER,W.W.  APCI  SNIFF THOSE CYLINDERS BEFORE REFILLING   APCI-SAFETY-GRAM-NO-31  2P  8/21/63
990001960 DEVICE  STANDARDS  PART-1- CYLINDERS FOR COMPRESSED  GASES   CGA-PAMPHLET-S-1.1  20P  1969
990000560 CI  CAUTION- SNIFF TESTING CYLINDERS HAS ITS HAZARDS   APCI-SAFETY-GRAM-NO-49  2P  3/26/65
990000640 UMP-SUCTION-FILTER-DEFROST CYL-SEAL SEALING COMPOUND   APCI-MAR-87-0-8821  1P  12/61

990004530 S AND THREADING COMPOUNDS- DAMCO TAPE   APCI-IA2A-07  2P  2/21/72
990001150 TAMINANTS AND FLUORESCENCE DAMCO-TEFLON TAPE, SANDEM-INDUSTRIAL, CRANE  PACKING  CO   APCI-ANAL-REP-70-368,70-
990003190   APCI  AND THEN THERE WAS DARKNESS   APCI-SAFETY-GRAM-NO-58  1P  3/15/67
990005940 EOUS OXYGEN SAFETY  REVIEW DATA- ACCIDENT/INCIDENT INVESTIGATION AND REPORT-APCI  DOCUMENTS LIST  COVERING  SA
990001290 DESIGN GUIDELINES AND TEST DATA-HANDBOOK   MSC-02681  380P  5/29/70
990001020 ING-MEDIUMS, INSPECTION OF DECONTAMINATED COMPONENTS, AND PICKLING OF  CARBON-STEEL  PIPE AND  FITTINGS   APCI
990003640 VES-OXYGEN SERVICE-MINIMUM DECONTAMINATION AND TEST REQUIREMENTS   APL-ENGR-SPEC-L.06  4P  7/7/69
990003990 APL  GENERAL PROCEDURE FOR DECONTAMINATION OF STATIC-TANK AND ROAD-VEHICLE-ASSEMBLIES FOR  OXYGEN SERVICE   AP
990003490 THIELSCH,H.  GRINNELL  CO  DEFECTS AND FAILURES IN PRESSURE-VESSELS AND PIPING REINHOLD  PUBLISHING CORP  427P
990001070 QUIPPA PUMP-SUCTION FILTER DEFROST AND OF METHYLENE-CHLORIDE   APCI-MEMO-61  12/11/61  2P
990002500  PROBLEM VAPOR-CLOUDS FROM DEFROST OPERATIONS ALLEGEDLY CAUSED HIGHWAY ACCIDENT   APCI-SAFETY-GRAM-NO-17  1P
990003630          PEGRAM,J.W.  APL  DEGREASING ACCEPTANCE TESTS FOR OXYGEN SERVICE  COMPRESSORS   APL-ENGR-SPEC-K.02  3
990004000 RING QUALITY PROCEDURE FOR DEGREASING OF PIPEWORK   APL-QCP-Q11  REV.0  2P
990000550 FIRE-PROTECTION EQUIPMENT- DELUGE-SYSTEM AND LOX LOADING  FACILITY   APCI-SAFETY-STD-630.2.6  3P  1/64
990003870 LINE AT A CYLINDER FILLING DEPOT   APL-SAFETY-BULL-114  3P  7/13/71
990003430 NST  RECOMMENDED RULES FOR DESIGN AND CONSTRUCTION OF LARGE, WELDED, LOW-PRESSURE STORAGE  TANKS   API  STANDA
990004050          PEGRAM,J.W.  APL  DESIGN AND SAFETY  SATNDARDS FOR CARBON-STEEL  GASEOUS  OXYGEN TRANSMISSION-LINES
990001290 TON  NONMETALLIC MATERIALS DESIGN GUIDELINES AND TEST DATA-HANDBOOK   MSC-02681  380P  5/29/70
990001070           KEHAT,E.  APCI  DETONATION TESTS OF OIL FROM ALIQUIPPA PUMP-SUCTION FILTER DEFROST AND OF METHYLENE
990000660 E-GREASES, EPOXY COMPOUNDS DEVCON-2-TON AND DEVCON-F, FOAM-TYPE INSULATIONS STYROFOAM AND POLYURETHANE-FOAM-IN
990000660 COMPOUNDS DEVCON-2-TON AND DEVCON-F, FOAM-TYPE INSULATIONS STYROFOAM AND POLYURETHANE-FOAM-INSULATION, RAYBEST
990001360 N TEST METHYLENE-CHLORIDE- DICHLOROETHANE- TRICHLOROETHANE- TRICHLORETHYLENE- CARBON-TETRACHLORIDE- CHLOROFORM
990001890 HLOROFORM, ETHYL-CHLORIDE, DICHLOROETHANE, DICHLOROETHANE, TRICHLOROETHANE POLYMERS, POLYSULFIDE-SEALER, BUNA-
990001890 -CHLORIDE, DICHLOROETHANE, DICHLOROETHANE, TRICHLOROETHANE POLYMERS, POLYSULFIDE-SEALER, BUNA-N, NEOPRENE, EPO
990005250  SOLVENTS, AND  MISC-  1,1 DICHLOROTHANE   APCI-IA7A-01  1P  2/21/72
990005220  STAINLESS STEEL  ALLOY TO DIN GERMAN  NATIONAL  STANDARDS  COMPOSITION  5-PERCENT-CR  17-PERCENT-NI  4-PERCEN
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990001890 YABLE-A, DRILUBE-1, TEFLON DISPERSION-T-FILM, HYDROCARBON-GREASE, HYDRAULIC-OIL, CHLORINATED-BIPHENYL-AROCLOR-
990000150 KIZER AND CRYOGENIC LIQUID DISPOSAL   APCI-DES-ENG-STD-514.6.2  4P  5/26/61
990000470 ANT, CRYOGENIC-LIQUID, AND DISPOSAL   APCI-SAFETY-STD-607.1.20  3P  4/62
990005510 AGE DRAINAGE AND  ULTIMATE DISPOSAL ARRANGEMENTS   APCI-IID1-1  2P  8/22/71
990005450 NTED  GASES CLEANLINESS OF DISPOSAL  SYSTEM   APCI-IIB1-1  2P  2/12/72
990005520 LS AND IGNITION SOURCES IN DISPOSAL  SYSTEMS   APCI-IID2-1  1P  8/22/71
990005480 APCI  OPERATIONAL-HAZARDS- DISPOSAL OF VENTED  GASES PROCEDURAL ARRANGEMENTS   APCI-IIB4-1  1P  2/19/72
990005440 APCI  OPERATIONAL-HAZARDS- DISPOSAL OF VENTED  GASES COMPANY PRACTICES   APCI-IIB-1  5P  11/1/71
990005470 APCI  OPERATIONAL-HAZARDS, DISPOSAL OF VENTED  GASES CLEANLINESS OF  OXYGEN PIPING   APCI-IIB1-2  1P  2/19/72
990005450 APCI  OPERATIONAL-HAZARDS- DISPOSAL OF VENTED  GASES CLEANLINESS OF DISPOSAL  SYSTEM   APCI-IIB1-1  2P  2/12/7
990002470    APCI  LOX AND LIN VAPOR DISPOSAL-TANK-500-GAL   APCI-DRAWING-92483D  REV-B  9/30/68
990002250 E  PROGRAM COST-PROCEDURES DIST-OPER-MAN-VOL-4-SECT-6.3   APCI-MEMO-66  10/17/66  2P PLUS  SCHEDULE FOR  SUBMI
990000010       KITSON,F.K.  APCI  DON_T  TURN A CYLINDER INTO A ROCKET   APCI-SAFETY-GRAM-NO-04C  1P  8/7/61
990000600  BOMBS AND SPARK-IGNITION, DOW-CORNING FLUORINATED SILICON-OILS, SHELL POLYURETHANE FOAM (EPON-FOAM-H-60)   AP
990001400 40)-SILICONE, PYDRAUL-F-9, DOW-CORNING-4 COMPOUND SILICONE, DOW-CORNING-4X COMPOUND-SILICONE, FAIRBANKS-SILICO
990001400 RNING-4 COMPOUND SILICONE, DOW-CORNING-4X COMPOUND-SILICONE, FAIRBANKS-SILICONE-DC-44, MORSE GREASE, ALPHA-COR
990000630 NG-RF-1-0065, SILICON-OILS DOW-CORNING-RF-1-0065, INDOPOL-POLYBUTENE-OIL AMOCO-L-10, INDOPOL-POLYBUTENE-OIL AM
990000630 SION TESTING- SILICON-OILS DOW-CORNING-RF-1-0065, SILICON-OILS DOW-CORNING-RF-1-0065, INDOPOL-POLYBUTENE-OIL A
990001890 ICONE, PAINT-ON-GALBESTOS, DOW-CORNING-SILICONE-PAINT-XP-7-1003, GRIP-CLAD-PRIMER, SHERWIN-WILLIAMS-E41A4, SUP
990001890 OPER, PROTECTIVE-COATINGS, DOW-CORNING-SILICONE, PAINT-ON-GALBESTOS, DOW-CORNING-SILICONE-PAINT-XP-7-1003, GRI
990005510 AZARDS- SPILLS AND LEAKAGE DRAINAGE AND  ULTIMATE DISPOSAL ARRANGEMENTS   APCI-IID1-1  2P  8/22/71
990000060       SCHMOYER,W.W.  APCI  DRAIN-LINE EXPLOSION   APCI-SAFETY-GRAM-NO-24  2P  1/17/63
990003080  SCHNYDER,R.  APCI  MASTER DRAWING 1200-SERIES REGULATIONS   APCI-DRAWING-000-0-407004E  1P  3/4/68
990000680 ANTS, MOLY-SPRAY-KOTE, AND DRI-LUBE   APCI-MAR-87-0-8821  1P  4/62
990001890   ELECTROFILM-SPRAYABLE-A, DRILUBE-1, TEFLON DISPERSION-T-FILM, HYDROCARBON-GREASE, HYDRAULIC-OIL, CHLORINATED
990000330             APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  720-PSIG-MAX  CARBON-STEEL   APCI-DES-ENG-STD-5
990000310             APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  275-PSIG-MAX  CARBON-STEEL   APCI-DES-ENG-STD-5
990000320             APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  500-PSIG-MAX-DWG  CARBON-STEEL   APCI-DES-ENG-S
990000300             APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  150-PSIG-MAX  CARBON-STEEL   APCI-DES-ENG-STD-5
990005240 LPHA BRASS-TYPE TCL-100 OR DTD-5019 TUNGUM  CO  LTD/UK COMPOSITION-  COPPER-86-PERCENT  ALUM-1.20-PERCENT  NIC
990000750 H-OUT STUDY CELLULUBE-300, DTE 103, RECENT FIRES AT DUPONT-NEW/JOHNSONVILLE-PLANT SOLNUS-500, TITANIUM-TETRACH
990000740 OUT STUDIES CELLULUBE-300, DTE-103, CELLULUBE-200 RECENT FIRES AT DUPONT-NEW/JOHNSONVILLE-PLANT TITANIUM, TITA
990004290 RICANTS- KRYTOX-143-AA-OIL DUPONT   APCI-IA1A-01  1P  2/21/72
990004360 RICANTS- KRYTOX-143-AB-OIL DUPONT   APCI-IA1A-08  1P  2/21/72
990004370 RICANTS- KRYTOX-143-AC-OIL DUPONT   APCI-IA1A-09  1P  2/21/72
990004380 RICANTS- KRYTOX-143-AZ-OIL DUPONT   APCI-IA1A-10  1P  2/21/72
990004430 RICANTS- KRYTOX-143-AD-OIL DUPONT   APCI-IA1A-15  1P  2/21/72
990004710 RS, AND ADHESIVES- VITON-A DUPONT   APCI-IA4A-06  1P  2/21/72
990004820 KETS AND PACKINGS- TEFLON, DUPONT   APCI-IA5A-10  2P  2/21/72
990004830 KETS AND PACKINGS- VITON-A DUPONT   APCI-IA5A-11  1P  2/21/72
990000740 LULUBE-200 RECENT FIRES AT DUPONT-NEW/JOHNSONVILLE-PLANT TITANIUM, TITANIUM-DIOXIDE, SOLNUS-500, HYDROCARBON-O
990000750   DTE 103, RECENT FIRES AT DUPONT-NEW/JOHNSONVILLE-PLANT SOLNUS-500, TITANIUM-TETRACHLORIDE   APCI-MAR-87-0-88
990003100 SKET MATERIALS GARLOCK-900 DURABLA JOHNS-MANVILLE ASBESTOS  SHEET  PACKING  STYLE-61   APCI-MEMO-71  06/2/71
990001890 E, 3M-DC1252-MARKER-PUTTY, DURABLE-MANUFACTURING COMPANY-GASKET MATERIAL, JOHNS-MANVILLE-76 GASKET MATERIAL, C
990001890 UM-CHIPS, MAGNESIUM-SHEET, DYE-PENETRANTS, MAGNOGLO-PASTE10 IN  KEROSENE, TURCO-DYE-CHECK-STEP-2-LIQUID, TURCO
990001890 YGLO-ZL-22, ZYGLO-ZLX-390, DYE-PROCESS-SOLUTIONS, TURCO-DYE-CHECK PROCESS, ZYGLO-ZE-2-EMULSIFIER, ZYGLO-ZP-5-O

990004490 HREADING COMPOUNDS- T-FILM ECO  MFGR  CO   APCI-IA2A-03  1P  2/21/72
990002590  AT GREAT-LAKES-STEEL-CORP ECORSE-MICHIGAN  2P  6/21/61
990004700            APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- NEOPRENE   APCI-I44A-05  1P  2/21/72
990004670            APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- KEENE-BINDER   APCI-I44A-02  1P  2/21/72
990004660            APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- RTV-60, SILICONE-RUBBER COMPOUND WITH SS-4004-SILICONE-P
990004720            APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- NYLON-66 ICI  LTD/UK   APCI-I44A-07  1P  2/21/72
990004690            APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- NYLON   APCI-I44A-04  1P  2/21/72
990004680            APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- KEL-F-81   APCI-I44A-03  1P  2/21/72
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990004710 APCI PLASTICS, ELASTOMERS, AND ADHESIVES- VITON-A DUPONT APCI-IA4A-06 1P 2/21/72
990004590 APCI THERMAL AND ELECTRICAL INSULATIONS- FOAMGLAS (CELLULAR-GLASS) INSULATION, PITTSBURGH-CORNING
990004610 APCI THERMAL AND ELECTRICAL INSULATIONS- GLASS-WOOL APCI-IA3A-03 1P 2/21/72
990004620 APCI THERMAL AND ELECTRICAL INSULATIONS- MINERAL-WOOL APCI-IA3A-04 1P 2/21/72
990004640 APCI THERMAL AND ELECTRICAL INSULATIONS- MILFOAM MILFOAM CORP APCI-IA3A-06 1P 2/21/72
990004650 APCI THERMAL AND ELECTRICAL INSULATIONS- NATIONAL-GYPSUM-BLUE NATIONAL-GYPSUM CORP APCI-IA3A-07
990004630 APCI THERMAL AND ELECTRICAL INSULATIONS- PERLITE APCI-IA3A-05 1P 2/21/72
990004600 APCI THERMAL AND ELECTRICAL INSULATIONS- TRANSITE, JOHNS-MANVILLE APCI-IA3A-02 1P 2/21/72
990001890 DENUM-DISULFIDE, GRAPHITE, ELECTROFILM-SPRAYABLE-A, DRILUBE-1, TEFLON DISPERSION-T-FILM, HYDROCARBON-GREASE, H
990003380 OXYGEN COMPRESSION SYSTEM EL/SEGUNDO/CALIF APCI-CONSTR-SPEC-200.0 TO 200.20 20P 8/7/70
990000530 AFETY CONTROL PROCEDURES- EMERGENCY PROCEDURES APCI-SAFETY-STD-626.3.8 8P 5/62
990003000 W.L. APCI DISCUSSION OF ENERGY RELEASE IN A LIQUID OXYGEN PUMP AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND
990005990 S ADVANCES IN CRYOGENIC ENGINEERING V-13 P555-565 11P 1968
990005530 AZARDS- SPILLS AND LEAKAGE ENVIRONMENTAL WARNINGS AND ESCAPE SYSTEMS APCI-IID3-1 1P 8/22/71
990000680 DS, AND EXPLOSION TESTING- EPON-H-60, POLYCEL-440R, AND STYROFOAM, LUBRICANTS, MOLY-SPRAY-KOTE, AND DRI-LUBE
990000660 PPARATUS, FLORUBE-GREASES, EPOXY COMPOUNDS DEVCON-2-TON AND DEVCON-F, FOAM-TYPE INSULATIONS STYROFOAM AND POLY
990001890 -SEALER, BUNA-N, NEOPRENE, EPOXY-ADHESIVE, PHENOLIC-MOLDED, MELAMINE-MOLDED, POLYESTER-GLASS, NYLON, MOLYBDENU
990003120 OMPATABILITY WITH TWO-PART EPOXY-COMPOUND (7343-RESIN- 7139-CATALYST) FROM CREST PRODUCTS CO APCI-IWO-NO
990002830 IC LIQUIDS AND ASSOCIATED EQUIPMENT APCI-POM-SEC-1.17 8P 4/23/69
990000770 REQUIREMENTS FOR AIR-PLANT EQUIPMENT APCI-QUAL-CONT-LAYOUT-101F 2P PLUS 5P OF ATTCHMTS 7/1/71
990002450 OUTSIDE HYDRANT-HOUSE AND EQUIPMENT APCI-SAFETY-STD-630.2.3 3P REV-6/15/70
990003850 MORE ACCIDENTS ON OXYGEN EQUIPMENT APL-SAFETY-BULL-102 1P 2/8/71
990004220 AIR PRODUCTS LTD OXYGEN EQUIPMENT APL-SAFETY-DEPT-INFO-SHEET-19 9P
990000930 LIQUIEFIED-GAS PROCESSING EQUIPMENT PENNSALT-TECHNICAL-BULLETIN 6P 2/3/60
990002850 LEANING-AGENTS, ASSOCIATED EQUIPMENT AND SUPPLIES APPROVED FOR USE IN APCI MANUFACTURING FACILITIES APCI-Q
990001980 COMPRESSED GAS ASSOC EQUIPMENT CLEANED FOR OXYGEN SERVICE CGA-PAMPHLET-G-4.1 21P 3/59
990002840 BSS,M.H. APCI TEST GAUGE EQUIPMENT FAILURE SHAKOPEE APCI-MEMO-68 06/12/68 2P
990000950 LEANING AND INSPECTION FOR EQUIPMENT IN AIR PLANTS AND IN OXYGEN SERVICE APCI-POM-SEC-1.08 7P PLUS 3P ATTA
990003070 UTES OF CGA AIR-SEPARATION EQUIPMENT COMMITTEE HELD AT FT/LAUDERDALE FLORIDA 5/11-12/71 LIQUID-OXYGEN PUMP
990003380 GENERAL CONSTRUCTION AND EQUIPMENT ERECTION OXYGEN COMPRESSION SYSTEM EL/SEGUNDO/CALIF APCI-CONSTR-SPEC-
990005710 L-HAZARDS- OXYGEN-TRANSFER EQUIPMENT MALFUNCTIONS AND FAILURES GAS-PRESSURE-REGULATORS APCI-IIF3A-1 3P 1
990005700 L-HAZARDS- OXYGEN TRANSFER EQUIPMENT MALFUNCTIONS AND FAILURES COMPRESSORS AND PUMPS APCI-IIF3-4 15P 1/2
990003180 SMITH,H.W. APCI SAFETY EQUIPMENT NEVER PREVENTS AN ACCIDENT- IT ONLY PREVENTS AN INJURY APCI-SAFETY-GR
990000980 CHANGER, PLANT, AND PLANT EQUIPMENT SOLVENT WASHOUT-FREQUENCIES APCI-POM-SEC-5.07 3P 7/15/70
990000550 K. APCI FIRE-PROTECTION EQUIPMENT- DELUGE-SYSTEM AND LOX LOADING FACILITY APCI-SAFETY-STD-630.2.6 3P 1
990002460 APCI FIRE PROTECTION EQUIPMENT- INSIDE- OUTSIDE APCI-SAFETY-STD-630.3.2 3P 5/68
990002440 H. APCI FIRE PROTECTION EQUIPMENT- OUTSIDE FIRE-HYDRANT APCI-SAFETY-STD-630.2.2 1P 7/26/61
990002450 APCI FIRE PROTECTION EQUIPMENT- OUTSIDE HYDRANT-HOUSE AND EQUIPMENT APCI-SAFETY-STD-630.2.3 3P REV-6
990003650 SPECIFICATION FOR PIPING ERECTION, TESTING AND CLEANING APL-ENGR-SPEC-M.02 9P PLUS APPENDIX I II III 4/
990005530 NVIRONMENTAL WARNINGS AND ESCAPE SYSTEMS APCI-IID3-1 1P 8/22/71
990004450 APCI LUBRICANTS- ESSO BEACON-325 APCI-IA1A-17 1P 2/21/72
990001150 APCI TEFLON TAPE PERCENT ETHER EXTRACTABLE CONTAMINANTS AND FLUORESCENCE DAMCO-TEFLON TAPE, SANDEM-INDUSTRIA
990001420 ION IN OXYGEN AND SOXHLET ETHER-EXTRACTION GARLOCK-900, KM-226, KM-246 APCI-ANAL-REP-70-013,70-014,70-015
990001410 TION IN OXYGEN AND SOXHLET ETHER-EXTRACTION MELRATH GARLOCK-900 APCI-ANAL-REP-70-026 APCI-IWO-NO-EA-7027
990001890 LORIDE, TRICHLOROETHYLENE, ETHYL-ALCOHOL, METHYL-ETHYL-KETONE, KEROSENE, GLYCERINE, POLYETHYLENE-LOW-DENSITY,
990001890 LENE-CHLORIDE, CHLOROFORM, ETHYL-CHLORIDE, DICHLOROETHANE, DICHLOROETHANE, TRICHLOROETHANE POLYMERS, POLYSULFI
990000980 APCI EXCHANGER, PLANT, AND PLANT EQUIPMENT SOLVENT WASHOUT-FREQUENCIES APCI-POM-SEC-5
990003790 PEGRAM,J.W. APL EXPANDED PERLITE APL-ENGR-SPEC-N.01 3P 1/2/70
99000261A F AN AIR-SEPARATION PLANT EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-6 PP41-4
990002970 TO OXYGEN PLANT VAPORIZER EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-3 PP9-12
990002940 E AIR-FRACTIONATION PLANT EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-4 PP71-8
990002960 AL OXYGEN PLANT REBOILER EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-2 PP31-3
990002980 L.G. LINDE OXYGEN PLANT EXPLOSION AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-3 PP12-1
990000030 YER,W.W. APCI DRAIN-LINE EXPLOSION APCI-SAFETY-GRAM-NO-24 2P 1/17/63

990002800 ASSOC INC LIQUID-OXYGEN EXPLOSION MCA-CASE-HISTORY-NO-824 2P 8/62
990002610 PCI REPORT OF OXYGEN PUMP EXPLOSION AIRCO-BUTLER APCI-MEMO-63 10/21/63 1P PLUS 6P ATTACHMENTS
990003920 EVERSON,I. APL EXPLOSION AND FIRE DUE TO THE CRYOSTAR-GB114 LOX-PUMP ON AN SSPC LOX-TANKER APL-
990003880 TE PLANT 2/26/69 WHEN AN EXPLOSION AND FIRE OCCURRED IN BURCKHARDT CENTRIFUGAL LOX-PUMP-TYPE-GB114-NO-29224
990004210 URCKHARDT CENTRIFUGAL PUMP EXPLOSION AND TANKER FIRE AT SHEEPBRIDGE ALLOY CASTINGS LTD APL-MEMO-64 02/5/
990003930 ATION OF CRYOSTAR LOX-PUMP EXPLOSION AT STOKE PLANT 8/7/70 APL-SAFETY-DEPT-REP-34 14P 8/24/70
990000730 A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- HALOCARBON, MOLYLUBE-99, MOLYKOTE-TYPES-Z AND X-15, CABOSIL-M-5
990000720 A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- KEL-F-POLYMER, NYLON, CUTTING-OILS APCI-MAR-87-0-8822 1P 5/6
990000710 A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- OXYGEN-PRESSURE-GAUGE TWF WOOL, SPINTEX-305, MOLYKOTE-TYPE-Z AND
990000760 A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDIES CELLULUBE-300 CELLULUBE-220 APCI-MAR-87
990000750 A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDY CELLULUBE-300, DTE 103, RECENT FIRES AT DUP
990000740 A. APCI FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDIES CELLULUBE-300, DTE-103, CELLULUBE-200 REC
990003950 COMMENDATIONS ARISING FROM EXPLOSION OF CRYOSTAR-GB.114-PUMP-NO-C.75 AT CARRINGTON 2/17/71 AS REPORTED IN SA
990003940 EVERSON,I. APL REPORT ON EXPLOSION OF CRYOSTAR-GB.114-PUMP-NO-C.75 ON TANKER-400-11 2/17/71 AT THE CARRINGT
990003890 NAYLOR,R. APL REPORT ON EXPLOSION OF LOX-PUMP ON TANKER-400-11 1/7/70 AT JOHN/SUMMERS STEEL WORKS/SHOTTO
990003960 PHERO,N. EVERSON,I. APL EXPLOSION ON OXY-FUEL-BURNER EQUIPMENT AT ALCAN-BOOTH ALUMINIUM WORKS ROGERSTONE/
990000640 APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- CS2 CARBON-DISULFIDE ALIQUIPPA PUMP-SUCTION-FILTER-DEFROST CYL-S
990000680 APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- EPON-H-60, POLYCEL-440R, AND STYROFOAM, LUBRICANTS, MOLY-SPRAY-K
990000690 APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- HOUDRY FOAM INSULATION, AND HAVEG GLASS-FIBER-REINFORCED PLASTIC
990000660 APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- IGNITION TEST-APPARATUS, FLORUBE-GREASES, EPOXY COMPOUNDS DEVCON
990000620 APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- PINE AND MAPLE WOOD, ACTIVATED CARBON APCI-MAR-87-0-8821 1P
990000670 APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- POLYESTER RESIN IMPREGNATED FIBERGLASS LAVA APCI-MAR-87-0-882
990000630 APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- SILICON-OILS DOW-CORNING-RF-1-0065, SILICON-OILS DOW-CORNING-RF-
990000610 APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- SPARK-IGNITION, STANDARD BOMB TEST, LED-PLATE-251, PIPE-DOPE A
990000600 APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- STANDARD PRESSURE BOMBS AND SPARK-IGNITION, DOW-CORNING FLUORINA
990000650 APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- STANDARD IGNITION TEST METHOD, APL PIPING-RESIDUE, METHYLENE-CHL
990000700 APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- TALCUM-POWDER AS A LUBRICANT, TARSET, PLASITE APCI-MAR-87-0-88
990000590 APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- UCON-TYPE LUBRICANTS, STEEL-PIPES APCI-MAR-87-0-8820 1P 4/61
990005730 ATIONAL-HAZARDS- FIRES AND EXPLOSIONS APCI-IIG-1 6P 11/1/71
990002580 APCI LOX-PUMP FIRES AND EXPLOSIONS APCI-MEMO-70 06/26/70 3P
990001150 TEFLON TAPE PERCENT ETHER EXTRACTABLE CONTAMINANTS AND FLUORESCENCE DAMCO-TEFLON TAPE, SANDEM-INDUSTRIAL, CRA
990003160 NNEL-PROTECTIVE-EQUIPMENT- EYE PROTECTION APCI-SAFETY-STD-627.4.2 5P 10/62
990003170 SSES SAVE ANOTHER PAIR OF EYES APCI-SAFETY-GRAM-NO-01 1P 6/1/61

990002850 USE IN APCI MANUFACTURING FACILITIES APCI-QUAL-CONT-LAYOUT-103F 11P REV 12/14/65
990002640 H. APCI OXYGEN PIPE-LINE FAILURE APCI-MEMO-67 12/29/67 1P
990000050 W. APCI OXYGEN CYLINDER FAILURE APCI-SAFETY-GRAM-NO-13 2P 6/1/62
990005690 -TRANSFER MALFUNCTIONS AND FAILURE INCIDENTS WHICH OCCURRED WITH OTHER OXYGEN-EQUIPMENT APCI-IIF3-6 2P 2/3
990003870 LLOTI,E. EVERSON,I. APL FAILURE OF BRAZED JOINTS IN HIGH-PRESSURE GASEOUS OXYGEN-LINE AT A CYLINDER FILLIN
990003170 APCI PRESSURE-GAUGE FAILURE SAFETY GLASSES SAVE ANOTHER PAIR OF EYES APCI-SAFETY-GRAM-NO-01 1P 6/1
990002840 APCI TEST GAUGE EQUIPMENT FAILURE SHAKOPEE APCI-MEMO-68 06/12/68 2P
990003010 AIRCO LIQUID OXYGEN PUMP FAILURES AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-9 P5 196
990005670 N-TRANSFER MALFUNCTION AND FAILURES APCI-IIF3-1 1P 11/12/71
990000110 ER,W.W. APCI VACUUM PUMP FAILURES APCI-SAFETY-GRAM-NO-35 1P 10/4/63
990000120 W.W. APCI PRESSURE GAUGE FAILURES APCI-SAFETY-GRAM-NO-43 2P 5/8/64
990005680 N-TRANSFER MALFUNCTION AND FAILURES APCI INCIDENTS INVOLVING OXYGEN-TRANSFER-EQUIPMENT OR INSTRUMENTATION AP
990005730 -TRANSFER MALFUNCTIONS AND FAILURES GEISERING, EXCESSIVE VIBRATIONS, SHOCK (THERMAL AND PRESSURE), LINE-SURG
990003490 GRINNELL CO DEFECTS AND FAILURES IN PRESSURE-VESSELS AND PIPING REINHOLD PUBLISHING CORP 427P 1965
990005740 -TRANSFER MALFUNCTIONS AND FAILURES INSULATION SYSTEM DUE TO VIBRATIONS DETERIORATION APCI-IIF3C-1 1P 12
990002630 AIRCO LIQUID OXYGEN PUMP FAILURES RE-99000301
990001400 NING-4X COMPOUND-SILICONE, FAIRBANKS-SILICONE-DC-44, MORSE GREASE, ALPHA-CORP-MOLYKOTE-MICROSIZE, MONSANTO-PYD
990002160 ROBERTS,R. LEHIGH UNIV FATIGUE CRACK GROWTH-RATES AND FRACTURE TOUGHNESS STUDY OF WELDED ALUMINUM ALLOY-5
990002140 EFFECT OF MEAN STRESS ON FATIGUE CRACK-PROPAGARION IN PLATES UNDER EXTENSION AND BENDING ASME WINTER
990003510 GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS ESTABLISHMENT OF MINIMUM STANDARDS FEDERAL REGISTER
990003570 GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS EXTENSION OF TIME FOR CONFIRMATION OR REVISION OF MAXIMU

990003520 GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS FILING OF INSPECTION AND MAINTENANCE PLANS FEDERAL REG
990003550 PIPELINE SAFETY MINIMUM FEDERAL SAFETY-STANDARDS FOR GAS PIPELINES CORROSION-PITTING- NOTICE OF PUBLIC HEA
990003540 GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS MISC AMENDMENTS FEDERAL REGISTER V-35 N-223 11/17/
990003530 GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS ODORIZATION OF GAS FEDERAL REGISTER VOL-35 NO-220 1
990003560 GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS REQUIREMENTS FOR CORROSION CONTROL FEDERAL REGISTER V
990002310 VENTIVE MAINTENANCE REPORT FEED-BACK-CARD FORM-3610A
990000400 CLD-INSULATION AND MINERAL FIBER GRANULATED APCI-DES-ENG-STD-581.2 2P 6/26/69
990000670 LYESTER RESIN IMPREGNATED FIBERGLASS LAVA APCI-MAR-87-0-8821 1P 3/62
990001310 O ESTABLISH ACCEPTANCE OF FIBERIZED MINERAL WOOL INSULATION APCI-QUAL-CONT-LAYOUT-103L 2P 7/1/71
990002050 RYLAND CASUALTY CO APCI FIELD INSPECTION CONTRACT WITH MARYLAND CASUALTY CO APCI-POM-SEC-6.09-ATTCHMT-1
990005580 TRANSFER SYSTEMS SYSTEMS- FIELD FABRICATED CRYOGENIC LIQUID STORAGE TANKS APCI-IIF1-3 1P 2/3/72
990005430 RE INTEGRITY OF INSULATION FIELD FABRICATED FLAT-BOTTOM LOX STORAGE TANKS APCI-IIA4-2 1P 12/30/71
990000270 APCI MACHINERY- FIELD TESTING AND CENTRIFUGAL OXYGEN COMPRESSORS APCI-DES-ENG-STD-551.2.8.1 18P
990000260 APCI MACHINERY- FIELD TESTING AND RECIPROCATING OXYGEN COMPRESSORS APCI-DES-ENG-STD-551.1.9.1 14
990003410 ANDARD SPECIFICATION FOR A FIELD-FABRICATED CRYOGENIC LIQUID STORAGE-TANK (FLAT-BOTTOM) APCI-99820A 18P 9
990003520 M FEDERAL SAFETY-STANDARDS FILING OF INSPECTION AND MAINTENANCE PLANS FEDERAL REGISTER VOL-35 NO-205 10
990004270 AZARD LEVEL OF HYDROCARBON FILMS IN OXYGEN SYSTEMS APL-SAFETY-DEPT-INFO-SHEET-41 2P 4/8/71
990003030 AZARD LEVEL OF HYDROCARBON FILMS IN SYSTEMS CONTAINING LIQUID AND GASEOUS OXYGEN USAF-CONTRACT-AF33(616)6
990001990 AZARD LEVEL OF HYDROCARBON FILMS IN SYSTEMS CONTAINING LIQUID AND GASEOUS OXYGEN ADVANCES IN CRYOGENIC
990002000 ZARD LEVEL OF HYDROCARBON FILMS IN OXYGEN SYSTEMS AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLAN
990001070 ROM ALIQUIPPA PUMP-SUCTION FILTER DEFROST AND OF METHYLENE-CHLORIDE APCI-MEMO-61 12/11/61 2P
990002340 APCI OXYGEN PUMP FILTER ASSEMBLY APCI-DRAWING-58521C REV-B 12/18/57
990005820 FE CLEANING PROCEDURES FOR FILTERS, TRAPS, AND INSTRUMENTS APCI-IIIB-1 2P 11/1/71
990002990 R GAS CO OXYGEN TRAILER FIRE AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-4 PP49-50 19
990002600 APCI OXYGEN COMPRESSOR FIRE APCI-SAFETY-GRAM-NO-03 2P 7/7/61
990004210 PUMP EXPLOSION AND TANKER FIRE AT SHEEPBRIDGE ALLOY CASTINGS LTD APL-MEMO-64 02/5/64 16P
990003860 RCKHARDT OXYGEN COMPRESSOR FIRE AT SSPC ROGNAC PLANT 3/2/71 APL-SAFETY-BULL-107 3P 4/14/71
990003920 SON,I. APL EXPLOSION AND FIRE DUE TO THE CRYOSTAR-GB114 LOX-PUMP ON AN SSPC LOX-TANKER APL-SAFETY-DEPT-RE
990001050 SON,K.J. EVERSON,I. APL FIRE HAZARD WHEN VAPOUR CLEANING WITH TRICHLOROETHYLENE (T.C.E.) APL-SAFETY-DEPT
990004260 UPON THE HUMAN ASPECTS OF FIRE IN ARTIFICIAL GAS ENVIRONMENTS FPRC/1270 28P 9/67
990002590 A.G. LINDE ACCIDENT AND FIRE IN OXYGEN GENERATING PLANT AT GREAT-LAKES-STEEL-CORP ECORSE-MICHIGAN 2P 6/
990000020 KITSON,F.K. APCI FIRE IN OXYGEN-LINE APCI-SAFETY-GRAM-NO-05 1P 10/20/61
990003820 APL FIRE IN OXYGEN-LINE APL-SAFETY-BULL-028 1P 1/68
990002520 GAYLE,J.B. NASA-KENNEDY FIRE INCIDENT IN AN OXYGEN CLOUD FIRE JOURNAL PP76-8 AND 81 4P 1/71
990001970 APCI FLEET SAFETY- FIRE EXTINGUISHMENT APCI-SAFETY-STD-635.30 5P 2/68
990005330 TIBILITY, QUALITY-CONTROL, FIRE HAZARDS APCI-IB1D(1)-1 2P 9/9/71
990004230 EVERSON,I. APL FIRE HAZARDS IN COMPRESSED-AIR AND OXYGEN RICH ENVIRONMENTS APL-SAFETY-DEPT-IN
990002460 APCI FIRE PROTECTION EQUIPMENT- INSIDE- OUTSIDE APCI-SAFETY-STD-630.3.2 3P 5/68
990002450 APCI FIRE PROTECTION EQUIPMENT- OUTSIDE HYDRANT-HOUSE AND EQUIPMENT APCI-SAFETY-STD-6
990002440 SMITH,H. APCI FIRE PROTECTION EQUIPMENT- OUTSIDE FIRE-HYDRANT APCI-SAFETY-STD-630.2.2 1P 7/2
990004240 ENGLAND ASSESSMENT OF THE FIRE RISKS OF THE OXYGEN ENVIRONMENT EXPERIMENTS FPRC/MEMO-217 24P 1/65
990003880 6/69 WHEN AN EXPLOSION AND FIRE OCCURRED IN BURCKHARDT CENTRIFUGAL LOX-PUMP-TYPE-GB114-NO-29224 APL-SAFETY-D
990003320 HUBBS,M.H. APCI FIRE PROTECTION CGA AIR-SEPARATION PLANT SAFETY SYMPOSIUM PP175-184 10P 10
990004250 ARNBOROUGH HANTS ENGLAND FIRE RISKS TO MAN OF OXYGEN RICH GAS ENVIRONMENTS FPRC/MEMO-223 12P 7/65
990002690 GENER,W. WINOGASSEN,K.F. FIRE TESTS ON CENTRIFUGAL PUMPS FOR LIQUID-OXYGEN CRYOGENICS V-10 PP241-248 8P
990005350 LITY, COMPATIBILITY CHECK, FIRE-COMPARIBILITY, QUALITY-CONTROL-APL APCI-IB1D(2)-2 2P 2/21/72
990005320 LITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, CLEANING-PROCEDURES-APL APCI-IB1C-02 1P 2/21/72
990005310 LITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, CLEANING-PROCEDURES-APCI APCI-IB1C-01 14P 2/21/72
990005340 LITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, QUALITY-CONTROL-APCI APCI-IB1D(2)-1 3P 9/9/71
990005330 LITY, COMPATIBILITY CHECK, FIRE-COMPATIBILITY, QUALITY-CONTROL, FIRE HAZARDS APCI-IB1D(1)-1 2P 9/9/71
990003310 I MAINTENANCE OF PORTABLE FIRE-EXTINGUISHERS APCI-POM-SEC-1.13 5P 3/30/67
990002440 TECTION EQUIPMENT- OUTSIDE FIRE-HYDRANT APCI-SAFETY-STD-630.2.2 1P 7/26/61
990000550 KITSON,F.K. APCI FIRE-PROTECTION EQUIPMENT- DELUGE-SYSTEM AND LOX LOADING FACILITY APCI-SAFETY-ST
990001400 APCI INVESTIGATION OF THE FIRE-RESISTANT QUALITIES OF CELLULUBE-220, CELLULUBE-150, UCON-LB283, UCON-LB550, U

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990002620 TURAL CHEMICAL  CO  OXYGEN FIRES   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS  V-8  PP19-20  2
990005750 APCI  OPERATIONAL-HAZARDS- FIRES AND EXPLOSIONS    APCI-IIG-1  6P  11/1/71
990002580 TTINI,B.J.  APCI  LOX-PUMP FIRES AND EXPLOSIONS    APCI-MEMO-70  06/26/70  3P
990000740 -103, CELLULUBE-200 RECENT FIRES AT DUPONT-NEW/JOHNSONVILLE-PLANT TITANIUM, TITANIUM-DIOXIDE, SOLNUS-500, HYDR
990000750 ULUBE-300, DTE 103, RECENT FIRES AT DUPONT-NEW/JOHNSONVILLE-PLANT SOLNUS-500, TITANIUM-TETRACHLORIDE   APCI-MA
990003910 PL  INVESTIGATION OF VALVE FIRES AT TEXAS  INSTRUMENTS  LTD-BEDFORD   APL-SAFETY-DEPT-REP-31  5P  REV-1  2/11/
990001020 G OF CARBON STEEL PIPE AND FITTINGS, CLEANING ALUMINUM-PIPE  FITTINGS  PARTS AND FABRICATIONS, CLEANING STAINL
990000750           WALDE,R.A.  APCI  FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDY CELLULUBE-300, DTE 103, RE
990000720           WALDE,R.A.  APCI  FLAMMABILITY AND EXPLOSION HAZARDS- KEL-F-POLYMER, NYLON, CUTTING-OILS   APCI-MAR-8
990000760           WALDE,R.A.  APCI  FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDIES CELLULUBE-300 CELLULUBE-
990000730           WALDE,R.A.  APCI  FLAMMABILITY AND EXPLOSION HAZARDS- HALOCARBON, MOLYLUBE-99, MOLYKOTE-TYPES-Z AND
990000740           WALDE,R.A.  APCI  FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDIES CELLULUBE-300, DTE-103,
990000710           WALDE,R.A.  APCI  FLAMMABILITY AND EXPLOSION HAZARDS- OXYGEN-PRESSURE-GAUGE TWF WOOL, SPINTEX-305, MO
990001300  APCI  SEALING MATERIALS- FLAMMABILITY IN  100-PERCENT  GASEOUS OXYGEN  FOAMSEAL-30-45-LIQUID, FOAMSEAL-30-45
990001210  SAFETY-VALVE-SEAT OXOMAT FLAMMABILITY IN  100-PERCENT  GASEOUS OXYGEN   APCI-ANAL-REP-61-435   APCI-IWO-NO-1
990001390 DER,L.  APCI  FLUORO-GLIDE FLAMMABILITY IN  100-PERCENT  GASEOUS  OXYGEN   APCI-ANAL-REP-61-262  1P  4/11/61
990001120 ALYSIS FOR OIL CONTENT AND FLAMMABILITY  TEMPERATURE   APCI-MEMO-59  12/11/59  1P
990001460          KITSON,F.K.  APCI  FLAMMABILITY TEST OF GASKETS IN  OXYGEN  ATMOSPHERES JOHN-DORE-CO, MELRATH-GASKET-C
990002930        SCHMAUCH,G.E.  APCI  FLAMMABILITY TESTS ON INSULATION MATERIALS VASCOCEL MILFOAM NATIONAL-GYPSUM  (GREEN
990001970                       APCI  FLEET SAFETY- FIRE  EXTINGUISHMENT   APCI-SAFETY-STD-635.30  5P  2/68
990001940                       APCI  FLEET SAFETY- LOADING AND UNLOADING OPERATIONS   APCI-SAFETY-STD-635.19  6P  2/68
990001300 DRY, FLEXFAS-82-10-LIQUID, FLEXFAS-82-10-DRY, SEALFAS-MASTIC-31-97-LIQUID, SEALFAS-MASTIC-31-97-DRY, PITTSEAL-
990001300 IQUID, FOAMSEAL-30-45-DRY, FLEXFAS-82-10-LIQUID, FLEXFAS-82-10-DRY, SEALFAS-MASTIC-31-97-LIQUID, SEALFAS-MASTI
990003760          PEGRAM,J.W.  APL   FLEXIBLE  HOSES FOR  CHARGING AND  DISCHARGING MANIFOLDS OXYGEN SERVICE   APL-ENGR-
990001110 /NEW/JERSEY, WEST CONCRETE FLOOR TREATMENT WEST CHEMICAL  PRODUCTS  INC, ALUMINUM-OXIDE, SEAM COMPOUND GEON PO
990000600 - IGNITION TEST-APPARATUS, FLORUBE-GREASES, EPOXY COMPOUNDS DEVCON-2-TON AND DEVCON-F, FOAM-TYPE INSULATIONS S
990002730  MASTER,H.H.  APCI  OXYGEN FLOW-METER RING SEAL-FLUID   APCI-MEMO-70  02/27/70  1P
990001150 TRACTABLE CONTAMINANTS AND FLUORESCENCE DAMCO-TEFLON TAPE, SANDEM-INDUSTRIAL, CRANE  PACKING  CO   APCI-ANAL-R
990003110  L.G.  LATSHAW,D.R.  APCI  FLUORESCENCE OF VARIOUS TYPES OF OILS- MOBIL-DTE-105 TEXACO-CAPPELLA-AA CELLULUBE-5
990001890 UPYLENE VITON A VINYLIDENO FLUORIDE, POLYDIMETHYLSILOXANE, FLUORINATED-SILOXANE, LS-53, BUTYL-RUBBER, IRON-OXI
990000600 PARK-IGNITION, DOW-CORNING FLUORINATED SILICON-OILS, SHELL POLYURETHANE FOAM (EPON-FOAM-H-60)   APCI-MAR-87-0-
990001890 IDE, POLYDIMETHYLSILOXANE, FLUORINATED-SILOXANE, LS-53, BUTYL-RUBBER, IRON-OXIDES, TALC, ASBESTOS, ALUMINUM-CH
990001130 COMPATIBILITY OF CROSSLITE FLUOROCARBON TAPE THREE-M-FLUOROCARBON-TAPE, PERMACEL-TAPE   APCI-MEMO-63  07/30/63
990004570 READING COMPOUNDS- THREE-M FLUOROCARBON-TAPE   APCI-IA2A-11  2P  2/21/72
990001460 RGE-GASKET-CO LOX TRANSFER FLUOROGREEN-E-600   APCI-MEMO-70  10/23/70  1P
990004760 PCI  GASKETS AND PACKINGS- FLUOROGREEN-E-600, JOHN/DORE  CO   APCI-IA5A-04  1P  2/21/71
990001390            YODER,L.  APCI  FLUORO-GLIDE FLAMMABILITY IN  100-PERCENT  GASEOUS  OXYGEN   APCI-ANAL-REP-61-262
990004420            APCI  LUBRICANTS- FLUORO-GLIDE, CHEMPLAST INC   APCI-IA1A-14  1P  2/21/72
990003110 -CAPPELLA-AA CELLULUBE-550 FLUOROLUBE SEARS-THREAD-CUTTING-OIL   APCI-ANAL-REP  1P  7/15/71
990001400  UCON-HB660, AURALUBE-FS, FLUOROLUBE-FS5, KEL-F-LF3, VERSILUBE-F-50, SF81(40)-SILICONE, PYDRAUL-F-9, DOW-CORN
990004390            APCI  LUBRICANTS- FLUOROLUBE, FS-5, HOOKER CHEMICAL   APCI-IA1A-11  1P  2/21/72
990004350            APCI  LUBRICANTS- FLUOROLUBE, FS, HOOKER CHEMICAL   APCI-IA1A-07  1P  2/21/72
990001300 POROUS-INSULATING-MATERIAL FOAM GLASS   APCI-ANAL-REP-61-034 TO  61-40 AND  61-42   APCI-IWO-NO-10-0589  1P  2
990000690  EXPLOSION TESTING- HOUDRY FOAM INSULATION, AND HAVEG GLASS-FIBER-REINFORCED PLASTIC   APCI-MAR-87-0-8821  1P
990000600 N-OILS, SHELL POLYURETHANE FOAM (EPON-FOAM-H-60)   APCI-MAR-87-0-8820  1P  8/61
990004590 D ELECTRICAL  INSULATIONS- FOAMGLAS  (CELLULAR-GLASS)  INSULATION, PITTSBURGH-CORNING CORP   APCI-IA3A-01  1P
990002930 M NATIONAL-GYPSUM  (GREEN) FOAM-GLAS  (CORNING)   APCI-IWO-NO-LA-0333   APCI-MEMO-68  10/24/68  2P
990002920 AL-GYPSUM-BLUE LOX-SYSTEMS FOAM-GLASS LIQUID-HYDROGEN-PIPING-SYSTEMS LNG-SYSTEMS INERT-CRYOGENES BELOW THE  DE
990000660 DEVCON-2-TON AND DEVCON-F, FOAM-TYPE INSULATIONS STYROFOAM AND POLYURETHANE-FOAM-INSULATION, RAYBESTOS-MANHATT
990001300 EN  FOAMSEAL-30-45-LIQUID, FOAMSEAL-30-45-DRY, FLEXFAS-82-10-LIQUID, FLEXFAS-82-10-DRY, SEALFAS-MASTIC-31-97-L
990001300 O-PERCENT  GASEOUS OXYGEN  FOAMSEAL-30-45-LIQUID, FOAMSEAL-30-45-DRY, FLEXFAS-82-10-LIQUID, FLEXFAS-82-10-DRY,
990004460            APCI  LUBRICANTS- FORMBLIN-Y04 MONTECATINI-EDISON   APCI-IA1A-18  1P  2/21/72
990000730 S-Z AND  X-15, CABOSIL-M-5 FORMICA-LAMINATE  BONDED WITH A PHENOLIC RESIN, CUTTING-OILS, HEXADECANE, HYDROCARB
990002160 UE CRACK  GROWTH-RATES AND FRACTURE TOUGHNESS STUDY OF WELDED ALUMINUM ALLOY-5083   ASME  WINTER  ANNUAL-MEETI
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990002150 A.J.  ESSO  APPLICATION OF FRACTURE-MECHANICS TO SAFE-LIFE  DESIGN IN CRYOGENIC PRESSURE-VESSELS   ESSO-REPORT
990005100 S, AND SURFACE TREATMENTS- FREE-MACHING BRASS   APCI-IA6A-24  2P  2/21/72
990001160 ND SEALER-  TAPE-SEAL FROM FRIESLAND-PLASTIC COMPANY, PERMACEL-TAPE   APCI-ANAL-REP-60-495,61-3   APCI-IWO-NO-
990004390 I  LUBRICANTS- FLUOROLUBE, FS-5, HOOKER CHEMICAL   APCI-IA1A-11  1P  2/21/72
990004350 I  LUBRICANTS- FLUOROLUBE, FS, HOOKER CHEMICAL   APCI-IA1A-07  1P  2/21/72
990003070 IPMENT  COMMITTEE  HELD AT FT/LAUDERDALE  FLORIDA  5/11-12/71 LIQUID-OXYGEN PUMPS ALUMINUM IN OXYGEN SERVICE L

990004790 ASBESTOS  GASKET MATERIAL) GARLOCK  MFG  CO   APCI-IA5A-07  1P  2/21/72
990001410 T ETHER-EXTRACTION MELRATH GARLOCK-900   APCI-ANAL-REP-70-026   APCI-IWO-NO-EA-7027  2P  1/30/70
990003090 HEET  PACKING  STYLE-NO-61 GARLOCK-900   APCI-IWO-NO-LB-0795   APCI-ANAL-REP-71-264  2P  5/28/71
990003100 OMPATIBLE GASKET MATERIALS GARLOCK-900 DURABLA JOHNS-MANVILLE ASBESTOS  SHEET  PACKING  STYLE-61   APCI-MEMO-7
990004790 PCI  GASKETS AND PACKINGS- GARLOCK-900  (SHEET-ASBESTOS  GASKET MATERIAL) GARLOCK  MFG  CO   APCI-IA5A-07  1P
990003040  (GREEN) VITON-A  (BLACK) GARLOCK-900 JOHNS-MANVILLE .ASBESTOS-61  SHEET   APCI-ANAL-REP-71-344 AND   APCI-A
990001420 D SOXHLET ETHER-EXTRACTION GARLOCK-900, KM-226, KM-246   APCI-ANAL-REP-70-013,70-014,70-015   APCI-123   APCI-
990002420 D OPERATION OF OXYGEN-FUEL GAS  SYSTEMS FOR WELDING AND CUTTING   NFPA-NO-51  8P  1969 AND  CUTTING AND  WELDI
990003500 OF  MECHANICAL  ENGINEERS  GAS  TRANSMISSION AND  DISTRIBUTION PIPING  SYSTEMS   ANSI-B31.8  108P  1968
990003550 DERAL SAFETY-STANDARDS FOR GAS PIPELINES CORROSION-PITTING- NOTICE OF PUBLIC  HEARING   FEDERAL  REGISTER  VOL
990001920 IREMENTS FOR CUSTOMER BULK GAS SUPPLY  SYSTEM   APCI-DIST-OPER-MAN-V-1-SEC-4.1.3  2P  6/71
990000070        SCHMOYER,W.W.  APCI  GASEOUS OXYGEN   APCI-SAFETY-GRAM-NO-23C  6P  1/10/63
990001170           WALDE,R.A.  APCI  GASEOUS OXYGEN COMPATIBILITY TEST ON MOLY-LUBE-NO-99   APCI-MEMO-63  06/11/63  1P
990001130           WALDE,R.A.  APCI  GASEOUS OXYGEN COMPATIBILITY OF CROSSLITE FLUOROCARBON TAPE THREE-M-FLUOROCARBON-TA
990005970 ATERIALS COMPATIBILITY FOR GASEOUS OXYGEN  SYSTEMS   MAB-3268-69  9P  11/5/69
990000160   APCI  PRESSURE-VESSELS- GASEOUS OXYGEN STORAGE CYLINDER   APCI-DES-ENG-STD-515.1.3  3P  10/17/60
990005710 MALFUNCTIONS AND  FAILURES GAS-PRESSURE-REGULATORS   APCI-IIF3A-1  3P  12/10/71
990001370 TESTS WITH SILICONE-RUBBER GASKET COMPOUND- RTV-60-NP-134372-M235   APCI-R+D-NOTEBOOK-111  P149  1P  1/63
990001410          LATSHAW,D.R.  APCI  GASKET MATERIAL COMPATIBILITY OF MELRATH MATERIAL WITH  OXYGEN COMBUSTION IN OXYGEN
990001420          LATSHAW,D.R.  APCI  GASKET MATERIALS COMPATBILITY OF  GASKET MATERIALS WITH  OXYGEN COMBUSTION IN  OXYG
990003100  W.  APCI  LOX  COMPATIBLE GASKET MATERIALS GARLOCK-900 DURABLA JOHNS-MANVILLE ASBESTOS  SHEET  PACKING  STYLE
990001890 ATERIAL, JOHNS-MANVILLE-76 GASKET MATERIAL, CLOTH-ASBESTOS, GLASS-COTTON-ALUMINIZED-MIL-C-8240, COCOTITE-CERAM
990004760                       APCI  GASKETS AND PACKINGS- FLUOROGREEN-E-600, JOHN/DORE  CO   APCI-IA5A-04  1P  2/21/71
990004790                       APCI  GASKETS AND PACKINGS- GARLOCK-900  (SHEET-ASBESTOS  GASKET MATERIAL) GARLOCK  MFG
990004730                       APCI  GASKETS AND PACKINGS- GRAPHITE-IMPREGNATED-ASBESTOS-PACKING   APCI-IA5A-01  1P  2/2
990004857                       APCI  GASKETS AND PACKINGS- KLINGERIT-661 RICHARD  KLINGER  LTD/UK
990004780                       APCI  GASKETS AND PACKINGS- KM226-SHEET  ASBESTOS  GASKET MATERIAL NICOLET INDUSTRIES INC
990004810                       APCI  GASKETS AND PACKINGS- KM246  SHEET-ASBESTOS  GASKET MATERIAL NICOLET  INDUSTRIES   A
990004770                       APCI  GASKETS AND PACKINGS- MELRATH-150  (SHEET-ASBESTOS  GASKET MATERIAL)   APCI-IA5A-05
990004840                       APCI  GASKETS AND PACKINGS- SINDANYO CS-51-ASBESTOS AND  CEMENT  BOARDS. NATURAL-UNTREATE
990004820                       APCI  GASKETS AND PACKINGS- TEFLON, DUPONT   APCI-IA5A-10  2P  2/21/72
990004740                       APCI  GASKETS AND PACKINGS- TFE-GF-GREEN, MELRATH  GASKETS  CO   APCI-IA5A-02  1P  2/21/7
990004860                       APCI  GASKETS AND PACKINGS- TYGAFLOR  CEMENTABLE  PTFE  TAPES TYGADURE  LTD/UK   APCI-IA5
990004750                       APCI  GASKETS AND PACKINGS- VALLEGREEN, VALLEY/FORGE  GASKET  CO   APCI-IA5A-03  1P  2/21
990004830                       APCI  GASKETS AND PACKINGS- VITON-A DUPONT   APCI-IA5A-11  1P  2/21/72
990004800                       APCI  GASKETS AND PACKINGS- VULCANIZED-RED-FIBRE-GASKETS   APCI-IA5A-08  1P  2/21/72
990001460 APCI  FLAMMABILITY TEST OF GASKETS IN  OXYGEN  ATMOSPHERES JOHN-DORE-CO, MELRATH-GASKET-CO, VALLEY-FORGE-GASKE
990002840    HUBBS,M.H.  APCI  TEST GAUGE EQUIPMENT FAILURE SHAKOPEE   APCI-MEMO-68  06/12/68  2P
990000120 MOYER,W.W.  APCI  PRESSURE GAUGE FAILURES   APCI-SAFETY-GRAM-NO-43  2P  5/8/64
990002570  W.W.  APCI  SPECIALTY-GAS GAUGE-FAILURE   APCI-MEMO-64  04/13/64  4P
990000780 ENTS FOR BOURDON-TUBE TYPE GAUGES USED FOR OXYGEN SERVICE   APCI-QUAL-CONT-LAYOUT-102F  3P  7/1/71
990004660 TH SS-4004-SILICONE-PRIMER GE THERMOLITE-12-CURING-CATALYST   APCI-IA4A-01  1P  2/21/72
990005730  MALFUNCTIONS AND FAILURES GEISERING, EXCESSIVE VIBRATIONS, SHOCK  (THERMAL AND  PRESSURE), LINE-SURGES   APCI
990001110 MINUM-OXIDE, SEAM COMPOUND GEON POLYVINYLCHLORIDE, PLASTIC LEAD SEAL-NO-2-JOHN CRANE   APCI-MEMO-59  01/28/59
990005220 INLESS STEEL  ALLOY TO DIN GERMAN  NATIONAL  STANDARDS  COMPOSITION  5-PERCENT-CR  17-PERCENT-NI  4-PERCENT-CU
990005980               MERKBLATTER  GERMAN PRESSURE VESSEL  CODE-AD MERKBLATTER  (ENGLISH  TRANSLATION)  304P  9/71
990001300 S-INSULATING-MATERIAL FOAM GLASS   APCI-ANAL-REP-61-034 TO  61-40 AND  61-42   APCI-IWO-NO-10-0589  1P  2/3/61
990000410 COLD-BOXES, THERMAL TANKS, GLASS WOOL   APCI-DES-ENG-STD-581.3  1P  10/24/60
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990003170 SSURE-GAUGE FAILURE SAFETY GLASSES SAVE ANOTHER PAIR OF EYES APCI-SAFETY-GRAM-NO-01 1P 6/1/61
990001890 MATERIAL, CLOTH-ASBESTOS, GLASS-COTTON-ALUMINIZED-MIL-C-8240, COCOTITE-CERAMIC-INSULATION, CHROMATE-DYED-GLAS
990000690 FOAM INSULATION, AND HAVEG GLASS-FIBER-REINFORCED PLASTIC APCI-MAR-87-0-8821 1P 6/62
990004610 D ELECTRICAL INSULATIONS- GLASS-WOOL APCI-IA3A-03 1P 2/21/72
990001890 YL-ETHYL-KETONE, KEROSENE, GLYCERINE, POLYETHYLENE-LOW-DENSITY, POLYETHYLENE-IRRADIATED, POLYVINYLCHLORIDE, PO
990002770 HOSE-CONNECTOR ACCIDENT- GRANITE/CITY APCI-MEMO-67 12/15/67 1P
990002780 APCI NEAR-MISS ACCIDENT- GRANITE/CITY FACILITY APCI-MEMO-67 12/15/67 1P
990000400 SULATION AND MINERAL FIBER GRANULATED APCI-DES-ENG-STD-581.2 2P 6/26/69
990001440 BLE CONTAMINANT CONTENT IN GRAPHITE IMPREGNATED ASBESTOS-PACKING TEFLON COATED ASBESTOS-BLUE APCI-MEMO-60
990001890 TED-BIPHENYL-AROCLOR-1254, GRAPHITE-CHLOR-BIPHENYL, VINYL-CHLORIDE, CIS-DICHLOROETHYLENE, TRANS-DICHLOROETHYLE
990004730 PCI GASKETS AND PACKINGS- GRAPHITE-IMPREGNATED-ASBESTOS-PACKING APCI-IA5A-01 1P 2/21/72
990001890 LON, MOLYBDENUM-DISULFIDE, GRAPHITE, ELECTROFILM-SPRAYABLE-A, DRILUBE-1, TEFLON DISPERSION-T-FILM, HYDROCARBON
990001400 ANKS-SILICONE-DC-44, MORSE GREASE, ALPHA-CORP-MOLYKOTE-MICROSIZE, MONSANTO-PYDRAUL, GULF-MECHANISM-HYDROCARBON
990002590 XYGEN GENERATING PLANT AT GREAT-LAKES-STEEL-CORP ECORSE-MICHIGAN 2P 6/21/61
990001690 -SILICONE-PAINT-XP-7-1003, GRIP-CLAD-PRIMER, SHERWIN-WILLIAMS-E41A4, SUPERFLAKE-1822, SUPERIOR-GRAPHITE-CO, CA
990001290 NMETALLIC MATERIALS DESIGN GUIDELINES AND TEST DATA-HANDBOOK MSC-02681 380P 5/29/70
990001400 CROSIZE, MONSANTO-PYDRAUL, GULF-MECHANISM-HYDROCARBON, HAVOLINE-HD-HYDROCARBON, SHELL-2-1176-A-HYDROCARBON, IN

990004310 ICANTS- HALOCARBON-11-14E, HALOCARBON PRODUCTS CORP APCI-IA1A-03 1P 2/21/72
990004340 - HALOCARBON-25-5S-GREASE, HALOCARBON PRODUCTS CORP APCI-IA1A-06 1P 2/21/72
990004300 ICANTS- HALOCARBON-11-21E, HALOCARBON PRODUCTS CORP APCI-IA1A-02 1P 2/21/72
990004320 ANTS- HALOCARBON-6-25-WAX, HALOCARBON PRODUCTS CORP APCI-IA1A-04 1P 2/21/72
990004310 APCI LUBRICANTS- HALOCARBON-11-14E, HALOCARBON PRODUCTS CORP APCI-IA1A-03 1P 2/21/72
990004300 APCI LUBRICANTS- HALOCARBON-11-21E, HALOCARBON PRODUCTS CORP APCI-IA1A-02 1P 2/21/72
990004340 APCI LUBRICANTS- HALOCARBON-25-5S-GREASE, HALOCARBON PRODUCTS CORP APCI-IA1A-06 1P 2/21/72
990004320 APCI LUBRICANTS- HALOCARBON-6-25-WAX, HALOCARBON PRODUCTS CORP APCI-IA1A-04 1P 2/21/72
990001380 SCHMOYER,W.W. APCI HALOCARBON-WAX-6-25 APCI-MEMO-69 02/6/69 1P
990000730 ITY AND EXPLOSION HAZARDS- HALOCARBON, MOLYLUBE-99, MOLYKOTE-TYPES-Z AND X-15, CABOSIL-M-5 FORMICA-LAMINATE
990001630 APCI PIPING- INTRODUCTION HAND VALVE-CODE APCI-DES-ENG-STD-579.3 12P 1/63
990004240 ION MEDICINE FARNBOROUGH HANTS ENGLAND ASSESSMENT OF THE FIRE RISKS OF THE OXYGEN ENVIRONMENT EXPERIME
990004250 ION MEDICINE FARNBOROUGH HANTS ENGLAND FIRE RISKS TO MAN OF OXYGEN RICH GAS ENVIRONMENTS FPRC/MEMO-2
990004260 ION MEDICINE FARNBOROUGH HANTS ENGLAND FURTHER STUDIES UPON THE HUMAN ASPECTS OF FIRE IN ARTIFICIAL GAS
990003200 QUIPMENT- WEARING APPAREL HARD HATS APCI-SAFETY-STD-627.4.1 1P 6/15/70
990004100 OXYGEN COMPRESSOR MANUAL HATTINGEN PLANT 15P APPENDIX I II III 8P
990000690 JUDRY FOAM INSULATION, AND HAVEG GLASS-FIBER-REINFORCED PLASTIC APCI-MAR-87-0-8821 1P 6/62
990001400 ULF-MECHANISM-HYDROCARBON, HAVOLINE-HD-HYDROCARBON, SHELL-2-1176-A-HYDROCARBON, INDOIL CHEMICAL INDOPOL-I-10-P
990002000 BALL,W.L. APCI HAZARD LEVEL OF HYDROCARBON FILMS IN OXYGEN SYSTEMS AICHE-CEP-TECH-MANUAL SAFE
990003030 KEHAT,E. APCI HAZARD LEVEL OF HYDROCARBON FILMS IN SYSTEMS CONTAINING LIQUID AND GASEOUS OXYGE
990001990 KEHAT,E. APCI HAZARD LEVEL OF HYDROCARBON FILMS IN SYSTEMS CONTAINING LIQUID AND GASEOUS OXYG
990004270 EVERSON,I. APL HAZARD LEVEL OF HYDROCARBON FILMS IN OXYGEN SYSTEMS APL-SAFETY-DEPT-INFO-SHEET-
990001050 J. EVERSON,I. APL FIRE HAZARD WHEN VAPOUR CLEANING WITH TRICHLOROETHYLENE (T.C.E.) APL-SAFETY-DEPT-INFO
990000560 TESTING CYLINDERS HAS ITS HAZARDS APCI-SAFETY-GRAM-NO-49 2P 3/26/65
990005900 APCI SYSTEM-EMERGENCIES HAZARDS PROTECTION APL-BULLETINS AND REPORTS ON VARIOUS PROBLEMS RELATED TO OXYGE
990005890 APCI SYSTEM-EMERGENCIES HAZARDS PROTECTION GENERAL PRECAUTIONS APCI-IVE-1 2P 11/8/71
990000730 FLAMMABILITY AND EXPLOSION HAZARDS- HALOCARBON, MOLYLUBE-99, MOLYKOTE-TYPES-Z AND X-15, CABOSIL-M-5 FORMICA-L
990000720 FLAMMABILITY AND EXPLOSION HAZARDS- KEL-F-POLYMER, NYLON, CUTTING-OILS APCI-MAR-87-0-8822 1P 5/63
990000710 FLAMMABILITY AND EXPLOSION HAZARDS- OXYGEN-PRESSURE-GAUGE TWF WOOL, SPINTEX-305, MOLYKOTE-TYPE-Z AND TYPE-X-1
990000740 FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDIES CELLULUBE-300, DTE-103, CELLULUBE-200 RECENT FIRES
990000760 FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDIES CELLULUBE-300 CELLULUBE-220 APCI-MAR-87-0-8822 1
990000750 FLAMMABILITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDY CELLULUBE-300, DTE 103, RECENT FIRES AT DUPONT-NEW/JO
990002510 H.H. APCI PRODUCT VAPOR HAZARDS- SAFETY INFORMATION RELATIVE TO LIQUID-VAPOR-CLOUDS APCI-PAPER 7P 1971
990000630 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- SILICON-OILS DOW-CORNING-RF-1-0065, SILICON-OILS DO
990000610 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- SPARK-IGNITION, STANDARD BOMB TEST, LED-PLATE-251,
990000590 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- UCON-TYPE LUBRICANTS, STEEL-PIPES APCI-MAR-87-0-8
990000600 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- STANDARD PRESSURE BOMBS AND SPARK-IGNITION, DOW-COR

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990000640    KEHAT,E.  APCI  SAFETY, HAZARDS, AND EXPLOSION TESTING- CS2 CARBON-DISULFIDE ALIQUIPPA PUMP-SUCTION-FILTER-
990000620    KEHAT,E.  APCI  SAFETY, HAZARDS, AND EXPLOSION TESTING- PINE AND MAPLE WOOD, ACTIVATED CARBON  APCI-MAR-87
990000680 FOSTER,R.H.  APCI  SAFETY, HAZARDS, AND EXPLOSION TESTING- EPON-H-60, POLYCEL-440K, AND STYROFOAM, LUBRICANTS,
990000690 FOSTER,R.H.  APCI  SAFETY, HAZARDS, AND EXPLOSION TESTING- HOUDRY FOAM INSULATION, AND HAVEG GLASS-FIBER-REINF
990000660 FOSTER,R.H.  APCI  SAFETY, HAZARDS, AND EXPLOSION TESTING- IGNITION TEST-APPARATUS, FLORUBE-GREASES, EPOXY COM
990000650 FOSTER,R.H.  APCI  SAFETY, HAZARDS, AND EXPLOSION TESTING- STANDARD IGNITION TEST METHOD, APL PIPING-RESIDUE,
990000700 FOSTER,R.H.  APCI  SAFETY, HAZARDS, AND EXPLOSION TESTING- TALCUM-POWDER AS A LUBRICANT, TARSET, PLASITE  APC
990000670 FOSTER,R.H.  APCI  SAFETY, HAZARDS, AND EXPLOSION TESTING- POLYESTER RESIN IMPREGNATED FIBERGLASS LAVA  APCI
990000210    APCI  PRESSURE-VESSELS- HEAD-DESIGN  APCI-DES-ENG-STD-510.3  13P  8/62
990003330 CTIVE-EQUIPMENT ALUMINIZED HEAT  PROTECTIVE CLOTHING  APCI-SAFETY-STD-627.4.7  2P  5/68
990000870      APCI  BRAZED ALUMINUM HEAT-EXCHANGER CLEANING REQUIREMENTS  APCI-QUAL-CONT-LAYOUT-119F  2P  7/1/71
990003680 AZED CORE EXTENDED SURFACE HEAT-EXCHANGERS  APL-ENGR-SPEC-E.02  9P  6/28/70
990000730 NOLIC RESIN, CUTTING-OILS, HEXADECANE, HYDROCARBON TYPE CUTTING-OILS, KNOWN AS TYPE-GROUP-II, PLANT WASH-OUT S
990003870 AILURE OF BRAZED JOINTS IN HIGH-PRESSURE  GASEOUS OXYGEN-LINE AT A CYLINDER FILLING DEPOT  APL-SAFETY-BULL-11
990001230 9 COMPATIBILITY TESTS WITH HIGH-PRESSURE OXYGEN  APCI-R+D-NOTEBOOK-130  P3  1P  6/63
990001220 - COMPATABILITY TESTS WITH HIGH-PRESSURE OXYGEN  APCI-R+D-NOTEBOOK-111  P152  1P  1/63
990002190 LOW-TEMPERATURE-FLUIDS AND HIGH-PRESSURE OXYGEN  NATIONAL  SAFETY  CONGRESS  CHICAGO  7P PLUS  9P FIGURES PRE
990001370          BROPHY,M.  APCI  HIGH-PRESSURE OXYGEN COMPATABILITY TESTS WITH SILICONE-RUBBER GASKET COMPOUND- RTV-
990001320    WALDE,R.A.  APCI  KEL-F HIGH-PRESSURE OXYGEN COMPATIBILITY- NYLON  APCI-MEMO-63  05/17/63  1P
990002500 PERATIONS ALLEGEDLY CAUSED HIGHWAY ACCIDENT  APCI-SAFETY-GRAM-NO-17  1P  8/10/62
990004020 CLEANING OF  9% NICKEL AND HI-PROOF STAINLESS STATIC-TANKS FOR  OXYGEN SERVICE  APL-QCP-013  REV.0  1P
990000970 ATION-PLANT CONTAMINATION- HISTORY, SAMPLING, AND  ANALYSIS  APCI PLANT  MANAGERS  SAFETY  MEETING-CREIGHTON/
990003020 EPORT ON SERVICE  VISIT TO H.M.S.-EAGLE  APL-X0425  5P PLUS  APPENDIX A AND B  8/18/71 PLUS MINUTES OF  MEETI
990003020 F  MEETING  HELD ON  BOARD HMS ARK-ROYAL  8/11/71 TO DISCUSS LIQUID-OXYGEN SAFETY  REGULATIONS  3P  9/13/71 PL
990003020 71 PLUS NOTES ON  VISIT TO HMS ARK-ROYAL ON  11/8/71 TO  DISCUSS SAFETY OF SHIPBOARD LOX-PLANTS  2P  9/13/71
990004390 RICANTS- FLUOROLUBE, FS-5, HOOKER CHEMICAL  APCI-IA1A-11  1P  2/21/72
990004350 UBRICANTS- FLUOROLUBE, FS, HOOKER CHEMICAL  APCI-IA1A-07  1P  2/21/72
990002770          BALL,W.L.  APCI  HOSE-CONNECTOR ACCIDENT- GRANITE/CITY  APCI-MEMO-67  12/15/67  1P
990003780 W.  APL  CRYOGENIC  LIQUID HOSE-COUPLINGS FOR USE IN THE  U.K  APL-ENGR-STD-LS.08  6P  10/21/69
990000690 DS, AND EXPLOSION TESTING- HOUDRY FOAM INSULATION, AND HAVEG GLASS-FIBER-REINFORCED PLASTIC  APCI-MAR-87-0-88
990000130      SCHMOYER,W.W.  APCI  HUMAN TORCHES  APCI-SAFETY-GRAM-NO-50C  1P  1/3/66
990002450 TECTION EQUIPMENT- OUTSIDE HYDRANT-HOUSE AND EQUIPMENT  APCI-SAFETY-STD-630.2.3  3P  REV-6/15/70
990001890 -FILM, HYDROCARBON-GREASE, HYDRAULIC-OIL, CHLORINATED-BIPHENYL-AROCLOR-1254, GRAPHITE-CHLOR-BIPHENYL, VINYL-CH
990004270 N,I.  APL  HAZARD LEVEL OF HYDROCARBON FILMS IN  OXYGEN  SYSTEMS  APL-SAFETY-DEPT-INFO-SHEET-41  2P  4/8/71
990003030 E.  APCI  HAZARD LEVEL OF HYDROCARBON FILMS IN  SYSTEMS CONTAINING  LIQUID AND  GASEOUS OXYGEN  USAF-CONTRAC
990001990 E.  APCI  HAZARD LEVEL OF HYDROCARBON FILMS IN  SYSTEMS CONTAINING  LIQUID AND  GASEOUS  OXYGEN  ADVANCES IN
990002000 L.  APCI  HAZARD  LEVEL OF HYDROCARBON FILMS IN OXYGEN  SYSTEMS  AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  A
990000730  CUTTING-OILS, HEXADECANE, HYDROCARBON TYPE CUTTING-OILS, KNOWN AS TYPE-GROUP-II, PLANT WASH-OUT STUDIES, CELL
990001890  TEFLON DISPERSION-T-FILM, HYDROCARBON-GREASE, HYDRAULIC-OIL, CHLORINATED-BIPHENYL-AROCLOR-1254, GRAPHITE-CHLO
990000740 ANIUM-DIOXIDE, SOLNUS-500, HYDROCARBON-OIL, TITANIUM-TETRACHLORIDE  APCI-MAR-87-0-8822  3P  8/63
990002060                     APCI  HYDROSTATIC TESTING-GENERAL  APCI-QUAL-CONT-LAYOUT-117A  2P  7/1/71
990001350 TY TESTS UNDER  WO-81-0095 HYLOMAR-UNIVERSAL-JOINTING COMPOUND SQ-32 AND VITON A  APCI-IWO-NO-81-0095  1P  4/

990004720 S, AND ADHESIVES- NYLON-66 ICI  LTD/UK  APCI-IA4A-07  1P  2/21/72
990001030 Y ASPECTS OF RECONSTRUCTED ICI TONNAGE OXYGEN PLANT  AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLAN
990002250 T,W.L.  APCI  REVISIONS TO IGO QUALITY  ASSURANCE  PROGRAM COST-PROCEDURES DIST-OPER-MAN-VOL-4-SECT-6.3  APCI
990001540 K.  AEROJET-GENERAL CORP  IGNITION CHARACTERISTICS OF METALS AND ALLOYS  ARS  JOURNAL  P917-23  7P  7/61
990001530 ELLE  MEMORIAL  INSTITUTE  IGNITION OF METALS IN OXYGEN  DMIC-REPORT-224  33P PLUS  APPENDIX
990005520 INCOMPATIBLE MATERIALS AND IGNITION SOURCES IN DISPOSAL  SYSTEMS  APCI-IID2-1  1P  8/22/71
990001090 I  DEVELOPMENT OF STANDARD IGNITION TEST  APCI-PROJECT-NO-87-0-8820/1  8P  11/17/61
990000650 XPLOSION TESTING- STANDARD IGNITION TEST METHOD, APL PIPING-RESIDUE, METHYLENE-CHLORIDE  APCI-MAR-87-0-8821
990001360 I  DEVELOPMENT OF STANDARD IGNITION TEST METHYLENE-CHLORIDE- DICHLOROETHANE- TRICHLOROETHANE- TRICHLORETHYLENE
990000660 DS, AND EXPLOSION TESTING- IGNITION TEST-APPARATUS, FLORUBE-GREASES, EPOXY COMPOUNDS DEVCON-2-TON AND DEVCON-F
990001000          KEHAT,E.  APCI  IGNITION TESTS OF T-FILM AND PENTON  APCI-MEMO-61  11/28/61  2P
990001870          BAILEY,B.  APCI  IGNITION-LIMITS OF CARBON STEEL IN OXYGEN-NITROGEN-ATMOSPHERES  APCI-IWO-NO-LB-004
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990001880	BAILEY,B. APCI	IGNITION-LIMITS OF SOME STAINLESS STEELS IN AN OXYGEN-ATMOSPHERE APCI-PROJECT-NO
990001330	EAT USED IN K-G REGULATOR-	IGNITION-TEMPERATURE IN 100-PERCENT OXYGEN ATM APCI-ANAL-REP-60-496 APCI-IWO-N
990001400	HELL-2-1176-A-HYDROCARBON,	INDOIL CHEMICAL INDOPOL-I-10-POLYBUTENE, INDOPOL-H-300-POLYBUTENE, MOBILE-DTE-105-H
990001400	L INDOPOL-I-10-POLYBUTENE,	INDOPOL-H-300-POLYBUTENE, MOBILE-DTE-105-HYDROCARBON APCI-TM-040 7P 9/18/59
990001400	DROCARBON, INDOIL CHEMICAL	INDOPOL-I-10-POLYBUTENE, INDOPOL-H-300-POLYBUTENE, MOBILE-DTE-105-HYDROCARBON APC
990000630	ILS DOW-CORNING-RF-1-0065,	INDOPOL-POLYBUTENE-OIL AMOCO-L-10, INDOPOL-POLYBUTENE-OIL AMOCO-H-100, PENTON, T-FI
990000630	POLYBUTENE-OIL AMOCO-L-10,	INDOPOL-POLYBUTENE-OIL AMOCO-H-100, PENTON, T-FILM-THREAD COMPOUND APCI-MAR-87-0-
990002920	PIPING-SYSTEMS LNG-SYSTEMS	INERT-CRYOGENES BELOW THE DEW-POINT OF AIR-SYSTEMS INERT-CRYOGENS ABOVE THE DEW-
990002920	DEW-POINT OF AIR-SYSTEMS	INERT-CRYOGENS ABOVE THE DEW-POINT OF AIR-SYSTEMS UNARCO APCI-MEMO-63 11/1/63
990001890	L, SODIUM-NITRITE-SOLUTION	INHIBITOR CRYOGENIC ENGINEERING CONFERENCE PROCEEDINGS 1958 ADVANCES IN CF
990003180	CENT- IT ONLY PREVENTS AN	INJURY APCI-SAFETY-GRAM-NO-29 1P 8/1/63
990002360	CYLINDER VALVE OUTLET AND	INLET CONNECTIONS ASA-B57.1 57P 1965
990002350	CYLINDER VALVE OUTLET AND	INLET CONNECTIONS CGA-PAMPHLET-V-1 57P 1965
990002370	CYLINDER VALVE OUTLET AND	INLET CONNECTIONS CSA-B96 57P 1965
990001920	APCI MAINTENANCE AND	INSEPCTION REQUIREMENTS FOR CUSTOMER BULK GAS SUPPLY SYSTEM APCI-DIST-OPER-MAN-V
990003520	SAFETY-STANDARDS FILING OF	INSPECTION AND MAINTENANCE PLANS FEDERAL REGISTER VOL-35 NO-205 10/31/70
990002050	CASUALTY CO APCI FIELD	INSPECTION CONTRACT WITH MARYLAND CASUALTY CO APCI-POM-SEC-6.09-ATTCHMT-1 2P
990000950	APCI CLEANING AND	INSPECTION FOR EQUIPMENT IN AIR PLANTS AND IN OXYGEN SERVICE APCI-POM-SEC-1.08 7
990002120	NSPECTORS NATIONAL BOARD	INSPECTION CODE- A MANUAL FOR BOILER AND PRESSURE VESSEL INSPECTORS 150P 1968
990001020	PTION OF CLEANING-MEDIUMS,	INSPECTION OF DECONTAMINATED COMPONENTS, AND PICKLING OF CARBON-STEEL PIPE AND F
990001930	APCI MAINTENANCE AND	INSPECTION REQUIREMENTS FOR BULK LIQUID CUSTOMER INSTALLATIONS APCI-DIST-OPER-MA
990005810	PROGRAM- SYSTEM CHECK AND	INSPECTION WHERE WHY AND HOW PREVENTIVE MAINTENANCE PROGRAM APCI-IIIA5-2 5P
990005790	PROGRAM- SYSTEM CHECK AND	INSPECTION WHERE WHY AND HOW INSULATION CHECK APCI-IIIA4-1 1P 9/12/71
990005770	PROGRAM- SYSTEM CHECK AND	INSPECTION WHERE WHY AND HOW LEAKS APCI-IIIA2-1 1P 9/12/71
990005780	PROGRAM- SYSTEM CHECK AND	INSPECTION WHERE WHY AND HOW SYSTEM INSTRUMENTATION AND CONTROLS APCI-IIIA3-1
990005800	PROGRAM- SYSTEM CHECK AND	INSPECTION WHERE WHY AND HOW GENERAL CONSIDERATIONS OF THE AGING SYSTEM APCI-III
990005760	PROGRAM SYSTEM CHECK AND	INSPECTION WHERE WHY AND HOW STRUCTURE APCI-IIIA1-1 1P 9/12/71
990000500	APCI CLEANING AND	INSPECTION- MATERIALS AND OXYGEN SERVICE APCI-SAFETY-STD-608.1 7P 10/65
990002210	SSION WITH MR E LUCAS-IPD	INSPECTION, REGARDING APCI CLEANLINESS REQUIREMENTS APCI-MEMO-71 07/22/71 2P
990004110	CHAMBERS,J. APL LOX	INSTALLATION AT CUSTOMER SITES APL-IGD-ENGR-MAN-40-01 7P 7/19/71
990004170	J. APL PROCEDURE FOR THE	INSTALLATION OF A CRYOGENIC TANK APL-IGD-ENGR-MAN-60-01 6P 5/19/71
990001900	FIRE PROTECTION ASSOC	INSTALLATION OF BULK OXYGEN SYSTEMS AT CONSUMER SITES-1965 NFPA-NO-566 10P 1
990001910	FIRE PROTECTION ASSOC	INSTALLATION OF BULK OXYGEN SYSTEMS AT CONSUMER SITES PROPOSED AMENDMENTS PART
990002880	APCI OPERATING AND SAFETY	INSTRUCTION FOR REGULATORS AND COMPRESSED GASES APCI-BROCHURE 4P 4/70
990002890	APCI SET-UP AND OPERATING	INSTRUCTIONS FOR AIR-PRODUCTS REDI-SET WELDING AND CUTTING OUTFITS APCI-BROCHURE
990005680	YGEN-TRANSFER-EQUIPMENT OR	INSTRUMENTATION APCI-IIF3-2 2P 2/4/72
990002290	APCI	INSTRUMENTATION PREVENTIVE MAINTENANCE APCI-POM-SEC-6.05 5P 10/30/68
990000230	APCI	INSTRUMENTATION- ESTABLISHING PRESSURE-SETTINGS OF SAFETY DEVICES APCI-DES-ENG-ST
990002820	APCI	INSTRUMENTATION- MODIFICATION TO EXISTING PRESSURE-GAUGES SNUBBER APCI-DES-ENG-ST
990000220	APCI	INSTRUMENTATION- PRESSURE INDICATORS APCI-DES-ENG-STD-531.2 5P 10/63
990000240	APCI	INSTRUMENTATION- SPECIAL REQUIREMENTS SAFETY AND RELIEF VALVES APCI-DES-ENG-STD-5
990005820	ES FOR FILTERS, TRAPS, AND	INSTRUMENTS APCI-IIIB-1 2P 11/1/71
990001950	COMPRESSED GAS ASSOC	INSULATED TANK-TRUCK SPECIFICATION CGA-341 FOR COLD LIQUEFIED-GASES CGA-PAMPHLET
990001310	OF FIBERIZED MINERAL WOOL	INSULATION APCI-QUAL-CONT-LAYOUT-103L 2P 7/1/71
990000390	APCI	INSULATION AND PAINTING- COLD-BOXES THERMAL TANKS PERLITE APCI-DES-ENG-STD-581.1
990000410	APCI	INSULATION AND PAINTING- COLD-BOXES, THERMAL TANKS, GLASS WOOL APCI-DES-ENG-STD-5
990000400	APCI	INSULATION AND PAINTING- COLD-INSULATION AND MINERAL FIBER GRANULATED APCI-DES-EN
990005790	SPECTION WHERE WHY AND HOW	INSULATION CHECK APCI-IIIA4-1 1P 9/12/71
990005430	OVERPRESSURE INTEGRITY OF	INSULATION FIELD FABRICATED FLAT-BOTTOM LOX STORAGE TANKS APCI-IIA4-2 1P 12
990005740	MALFUNCTIONS AND FAILURES	INSULATION SYSTEM DUE TO VIBRATIONS DETERIORATION APCI-IIF3C-1 1P 12/30/71
990002920	L,W.L. KITSON,F.K. APCI	INSULATION MATERIALS FOR CRYOGENIC SYSTEMS MILFOAM URETHANE INSULATION NATIONAL-GY
990002930	PCI FLAMMABILITY TESTS ON	INSULATION MATERIALS VASCOCEL MILFOAM NATIONAL-GYPSUM (GREEN) FOAM-GLAS (CORNING)
990002920	SYSTEMS MILFOAM URETHANE	INSULATION NATIONAL-GYPSUM-BLUE LOX-SYSTEMS FOAM-GLASS LIQUID-HYDROGEN-PIPING-SYSTE
990005420	OVERPRESSURE INTEGRITY OF	INSULATION SHOP FABRICATED OX STORAGE TANKS APCI-IIA4-1 1P 12/30/71

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990003810          PEGRAM,J.W.  APL  INSULATION- PREFORMED CELLULAR  GLASS SECTION FOR PIPELINES   APL-ENGR-SPEC-N.05  5
990000660 ON AND DEVCON-F, FOAM-TYPE INSULATIONS STYROFOAM AND POLYURETHANE-FOAM-INSULATION, RAYBESTOS-MANHATTAN-PACKING
990000690 OSION TESTING- HOUDRY FOAM INSULATION, AND HAVEG GLASS-FIBER-REINFORCED PLASTIC   APCI-MAR-87-0-8821  1P  6/62
990005430 ONAL-HAZARDS- OVERPRESSURE INTEGRITY OF INSULATION FIELD  FABRICATED  FLAT-BOTTOM LOX  STORAGE  TANKS   APCI-I
990005420 ONAL-HAZARDS- OVERPRESSURE INTEGRITY OF INSULATION SHOP  FABRICATED  OX  STORAGE  TANKS   APCI-IIA4-1  1P  12/
990004010 RING QUALITY PROCEDURE FOR INTERNAL CLEANING OF ALUMINUM  TANKERS AND STATIC-TANKS FOR  OXYGEN SERVICE   APL-Q
990004020 RING QUALITY PROCEDURE FOR INTERNAL CLEANING OF  9% NICKEL AND HI-PROOF STAINLESS STATIC-TANKS FOR  OXYGEN SER
990000880      APCI  REQUIREMENTS FOR IPD SPECIFIED PAINT  SYSTEMS   APCI-QUAL-CONT-LAYOUT-120F  3P  7/1/71
990005200 MENTS- SHPEROIDAL-GRAPHITE IRON CONTINENTAL-STANDARD-GGG-38   APCI-IA6A-34  1P  2/21/72
990001890 XANE, LS-53, BUTYL-RUBBER, IRON-OXIDES, TALC, ASBESTOS, ALUMINUM-CHIPS, STEEL-WOOL, MAGNESIUM-CHIPS, MAGNESIUM
990003130 ITE THREAD COMPOUND   APCI IWO-NO-XD-0134   APCI-ANAL-REP-71-336  1P  10/22/71
990002110 SURE  VESSEL  CODE SECTION IX  88P  1971

990003420           KRILL,W.R.  APCI  JOB SPECIFICATION  310000  GALLON CAPACITY LOX/LIN STORAGE  TANK   APCI-JOB  SPECIF
990001460 TS IN  OXYGEN  ATMOSPHERES JOHN-DORE-CO, MELRATH-GASKET-CO, VALLEY-FORGE-GASKET-CO LOX TRANSFER FLUOROGREEN-E-
990004760 CKINGS- FLUOROGREEN-E-600, JOHN/DORE  CO   APCI-IA5A-04  1P  2/21/71
990003890 N TANKER-400-11  1/7/70 AT JOHN/SUMMERS  STEEL  WORKS/SHOTTON PUMP-TYPE-GB114-SERIAL-NO-79   APL-SAFETY-DEPT-R
990004600 AL  INSULATIONS- TRANSITE, JOHNS-MANVILLE   APCI-IA3A-02  1P  2/21/72
990003090 Y OF MATERIAL WITH  OXYGEN JOHNS-MANVILLE ASBESTOS  SHEET  PACKING  STYLE-NO-61 GARLOCK-900   APCI-IWO-NO-LB-0
990003100 ERIALS GARLOCK-900 DURABLA JOHNS-MANVILLE ASBESTOS  SHEET  PACKING  STYLE-61   APCI-MEMO-71  06/2/71  1P PLUS
990003040 TON-A  (BLACK) GARLOCK-900 JOHNS-MANVILLE  .ASBESTOS-61  SHEET   APCI-ANAL-REP-71-344 AND   APCI-ANAL-REP-71-3
990001890 G COMPANY-GASKET MATERIAL, JOHNS-MANVILLE-76 GASKET MATERIAL, CLOTH-ASBESTOS, GLASS-COTTON-ALUMINIZED-MIL-C-82
990003870 I.  APL  FAILURE OF BRAZED JOINTS IN HIGH-PRESSURE  GASEOUS OXYGEN-LINE AT A CYLINDER FILLING DEPOT   APL-SAFE

990003050          NISSLER,K.H.  DEMAG  KA-27-IV/KA-4-IV OXYGEN COMPRESSOR VITON-A  (BLACK) VITON-E60  (GREEN)   DEMAG-LETT
990004670 ELASTOMERS, AND ADHESIVES- KEENE-BINDER   APCI-IA4A-02  1P  2/21/72
990001320          WALDE,R.A.  APCI  KEL-F HIGH-PRESSURE OXYGEN COMPATIBILITY- NYLON   APCI-MEMO-63  05/17/63  1P
990004680 ELASTOMERS, AND ADHESIVES- KEL-F-81   APCI-IA4A-03  1P  2/21/72
990004330          APCI  LUBRICANTS- KEL-F-90-GREASE, MINNESOTA  MINING   MANUFACTURING  CO   APCI-IA1A-05  1P  2/21/72
990001400 RALUBE-FS, FLUOROLUBE-FS5, KEL-F-LF3, VERSILUBE-F-50, SF81(40)-SILICONE, PYDRAUL-F-9, DOW-CORNING-4 COMPOUND S
990000720 ITY AND EXPLOSION HAZARDS- KEL-F-POLYMER, NYLON, CUTTING-OILS   APCI-MAR-87-0-8822  1P  5/63
990001890 LYTRICHLOUROVINYLCHLORIDE, KEL-F, POLYHEXAFLUOROPROPYLENE VITON A VINYLIDEND FLUORIDE, POLYDIMETHYLSILOXANE, F
990001890 OHOL, METHYL-ETHYL-KETONE, KEROSENE, GLYCERINE, POLYETHYLENE-LOW-DENSITY, POLYETHYLENE-IRRADIATED, POLYVINYLCH
990000570 IST,J.M.  APCI  CONTROLLED KINETICS EXPERIMENTATION- TEFLON-HOSE   APCI-MAR-87-0-8820  1P  5/60
990000580 IST,J.M.  APCI  CONTROLLED KINETICS EXPERIMENTS- TEFLON-HOSES,  SUPPORTED BY BRAIDED STAINLESS-STEEL-HOUSING,
990004440 I  LUBRICANTS- VOLTALEF-3A KINGSLEY AND  KEITH  LTD/UK   APCI-IA1A-16  1P  2/21/72
990001330   APCI  NYLON-SEAT USED IN K-G REGULATOR- IGNITION-TEMPERATURE IN  100-PERCENT OXYGEN ATM   APCI-ANAL-REP-60-4
990004857 PCI  GASKETS AND PACKINGS- KLINGERIT-661 RICHARD  KLINGER  LTD/UK
990004780 PCI  GASKETS AND PACKINGS- KM226-SHEET  ASBESTOS  GASKET MATERIAL NICOLET INDUSTRIES INC   APCI-IA5A-06  1P  2
990004810 PCI  GASKETS AND PACKINGS- KM246  SHEET-ASBESTOS  GASKET MATERIAL NICOLET INDUSTRIES   APCI-IA5A-09  1P  2/21/
990001420 ER-EXTRACTION GARLOCK-900, KM-226, KM-246   APCI-ANAL-REP-70-013,70-014,70-015   APCI-123   APCI-IWO-NO-XD0123
990001420 CTION GARLOCK-900, KM-226, KM-246   APCI-ANAL-REP-70-013,70-014,70-015   APCI-123   APCI-IWO-NO-XD0123  2P  1/
990004290          APCI  LUBRICANTS- KRYTOX-143-AA-OIL DUPONT   APCI-IA1A-01  1P  2/21/72
990004360          APCI  LUBRICANTS- KRYTOX-143-AB-OIL DUPONT   APCI-IA1A-08  1P  2/21/72
990004370          APCI  LUBRICANTS- KRYTOX-143-AC-OIL DUPONT   APCI-IA1A-09  1P  2/21/72
990004430          APCI  LUBRICANTS- KRYTOX-143-AD-OIL DUPONT   APCI-IA1A-15  1P  2/21/72
990004380          APCI  LUBRICANTS- KRYTOX-143-AZ-OIL DUPONT   APCI-IA1A-10  1P  2/21/72

990003430 DESIGN AND CONSTRUCTION OF LARGE, WELDED, LOW-PRESSURE STORAGE  TANKS   API  STANDARD-620  2/70
990002460           MASTER,H.H.  APCI  LATHROP AUTO-LOAD  SYSTEM   APCI-MEMO-71  03/22/71  2P PLUS  3P ATTACHMENTS
990000670 IN  IMPREGNATED FIBERGLASS LAVA   APCI-MAR-87-0-8821  1P  3/62
990001110 POLYVINYLCHLORIDE, PLASTIC LEAD SEAL-NO-2-JOHN CRANE   APCI-MEMO-59  01/28/59  2P
990005500 TIONAL-HAZARDS- SPILLS AND LEAKAGE   APCI-IID-1  2P  9/3/71
990005540 TIONAL-HAZARDS- SPILLS AND LEAKAGE DETECTION- QUANTITY AND RESPONSE  TIME  LIMITS   APCI-IID4-1  1P  8/22/71
990005510 TIONAL-HAZARDS- SPILLS AND LEAKAGE DRAINAGE AND  ULTIMATE DISPOSAL ARRANGEMENTS   APCI-IID1-1  2P  8/22/71
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990005530 TIONAL-HAZARDS- SPILLS AND LEAKAGE ENVIRONMENTAL  WARNINGS AND ESCAPE  SYSTEMS   APCI-IID3-1  1P  8/22/71
990005520 TIONAL-HAZARDS- SPILLS AND LEAKAGE SEPARATION OF INCOMPATIBLE MATERIALS AND IGNITION SOURCES IN DISPOSAL  SYST
990005770 SPECTION WHERE WHY AND HOW LEAKS   APCI-IIIA2-1  1P  9/12/71
990002270              APCI  COLD-BOX LEAKS   APCI-POM-SEC-1.14  5P  10/30/68
990000610 ITION, STANDARD BOMB TEST, LED-PLATE-251, PIPE-DOPE   APCI-MAR-87-0-8320  1P  9/61
990001110 EROL-L-536 RUST-PREVENTIVE LEHIGH CHEMICAL  CO-CHESTERTOWN-MD., PERMACEL-RIBBON-DOPE  PERMACEL-NEW/BRUNSWICK/N
990004260            EVERSON,I.  APL  LIMITING VALUES OF OIL-CONTAMINATION OF STAINLESS-STEEL  SURFACES EXPOSED TO  GASEO
990002470              APCI  LOX AND LIN VAPOR DISPOSAL-TANK-500-GAL   APCI-DRAWING-92483D  REV-8  9/30/68
990005730  (THERMAL AND  PRESSURE), LINE-SURGES   APCI-IIF3B-1  1P  2/18/72
990001950 IFICATION CGA-341 FOR COLD LIQUEFIED-GASES   CGA-PAMPHLET-341-TENTATIVE-STANDARDS  13P  1970
990005940                     APCI  LIQUID AND  GASEOUS OXYGEN SAFETY  REVIEW DATA- ACCIDENT/INCIDENT INVESTIGATION AND
990001930 TION REQUIREMENTS FOR BULK LIQUID CUSTOMER  INSTALLATIONS   APCI-DIST-OPER-MAN-V-1-SEC-4.2.3  1P  5/69
990000150 S- VAPORIZER AND CRYOGENIC LIQUID DISPOSAL   APCI-DES-ENG-STD-514.6.2  4P  5/26/61
990004190      APL  EXPERIMENTS WITH LIQUID  OXYGEN   APL-SAFETY-BULL-025  1P  REPRINTED  1/68
990005990 ON IN THE  ATMOSPHERE FROM LIQUID  OXYGEN  POOLS   ADVANCES IN  CRYOGENIC ENGINEERING  V-13  P555-565  11P  19
990006000 ON IN THE  ATMOSPHERE FROM LIQUID  OXYGEN  POOLS   CGA  AIR-SEPARATION  PLANT  SAFETY  SYMPOSIUM  P12-23  12P
990000170       SCHMOYER,W.W.  APCI  LIQUID OXYGEN   APCI-SAFETY-GRAM-NO-54C  6P  1/31/67  P6  REVISED  1/31/68
990001280 TIBILITY OF MATERIALS WITH LIQUID OXYGEN   MTP-P+VE-M-63-14  94P  12/4/63
990001240 TIBILITY OF MATERIALS WITH LIQUID OXYGEN   NASA-TMX-53052  34P  5/26/64
990001270 TIBILITY OF MATERIALS WITH LIQUID OXYGEN   NASA-TMX-985  72P  8/64
990001080 LBERGER,F.  APCI  NOTES ON LIQUID OXYGEN CONTAMINANTS MISSILE-PROGRAM  10P  1/6/58
990001250 TIBILITY OF MATERIALS WITH LIQUID OXYGEN III  NASA-TMX-53533  54P  11/3/66
990001260 TIBILITY OF MATERIALS WITH LIQUID OXYGEN IV  NASA-TMX-53773  50P  8/23/68
990000030          KITSON,F.K.  APCI  LIQUID OXYGEN LOADING   APCI-SAFETY-GRAM-NO-06  1P  11/17/61
990001890 TIBILITY OF MATERIALS WITH LIQUID OXYGEN METHYL-CHLORIDE, METHYLENE-CHLORIDE, CHLOROFORM, ETHYL-CHLORIDE, DICH
990003000 ON OF ENERGY  RELEASE IN A LIQUID OXYGEN PUMP   AICHE-CEP-TECH-MANUAL   SAFETY IN  AIP AND  AMMONIA  PLANTS  V-
990002630       RENDOS,J.J.  AIRCO  LIQUID OXYGEN PUMP FAILURES  RE-99000301
990003010       RENDOS,J.J.  AIRCO  LIQUID OXYGEN PUMP FAILURES   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  P
990005590 T  OVERHAUL PROCEDURES FOR LIQUID PUMPS   APCI-IIF1-4  1P  2/21/72
990003410 FIELD-FABRICATED CRYOGENIC LIQUID STORAGE-TANK  (FLAT-BOTTOM)   APCI-99820A  18P  9/15/71
990003070 ALUMINUM IN OXYGEN SERVICE LIQUID-CARBONIC-LIQUID-OXYGEN TRAILER- ACCIDENT VICTORY-MEMORIAL-HOSPITAL  5/70   A
990002920 LUE LOX-SYSTEMS FOAM-GLASS LIQUID-HYDROGEN-PIPING-SYSTEMS LNG-SYSTEMS INERT-CRYOGENES BELOW THE  DEW-POINT OF
990002690 S ON CENTRIFUGAL PUMPS FOR LIQUID-OXYGEN    CRYOGENICS  V-10  PP241-248  8P  6/70
990002800 URING CHEMISTS  ASSOC INC  LIQUID-OXYGEN EXPLOSION   MCA-CASE-HISTORY-NO-824  2P  8/62
990003070 RDALE  FLORIDA  5/11-12/71 LIQUID-OXYGEN PUMPS ALUMINUM IN OXYGEN SERVICE LIQUID-CARBONIC-LIQUID-OXYGEN TRAILE
990003020 -ROYAL  8/11/71 TO DISCUSS LIQUID-OXYGEN SAFETY  REGULATIONS  3P  9/13/71 PLUS NOTES ON  VISIT TO HMS ARK-ROYA
990002510 Y  INFORMATION RELATIVE TO LIQUID-VAPOR-CLOUDS   APCI-PAPER  7P  1971
990000930 PENNSALT CORP  CLEANING OF LIQUIEFIED-GAS PROCESSING EQUIPMENT   PENNSALT-TECHNICAL-BULLETIN  6P  2/3/60
990002920 ID-HYDROGEN-PIPING-SYSTEMS LNG-SYSTEMS INERT-CRYOGENES BELOW THE  DEW-POINT OF  AIR-SYSTEMS INERT-CRYOGENS ABO
990002490     MASTER,H.H.  APCI  AUTO LOAD  SYSTEMS   APCI-MEMO-71  05/4/71  2P PLUS  3P ATTACHMENTS
990000030  F.K.  APCI  LIQUID OXYGEN LOADING   APCI-SAFETY-GRAM-NO-06  1P  11/17/61
990001940        APCI  FLEET SAFETY- LOADING AND UNLOADING OPERATIONS   APCI-SAFETY-STD-635.19  6P  2/68
990005570 PORT, TRANSPORT TO  SYSTEM LOADING AND UNLOADING PROCEDURES FOR  LIQUID  OXYGEN  TRANSFER   APCI-IIF1-2  1P  8
990000550 ENT- DELUGE-SYSTEM AND LOX LOADING  FACILITY   APCI-SAFETY-STD-630.2.6  3P  1/64
990000290  PIPING- OXYGEN COMPRESSOR LOCATION   APCI-DES-ENG-STD-570.6  2P  1/15/71
990003460 APCI  SAFETY RELIEF VALVES LOCATION AND PIPING-DESIGN CONSIDERATIONS   APCI  PIPING  GROUP  MEMO-19  10P  11/3
990003430 TRUCTION OF LARGE, WELDED, LOW-PRESSURE STORAGE  TANKS   API  STANDARD-620  2/70
990002190 RGER,F.  APCI  HANDLING OF LOW-TEMPERATURE-FLUIDS AND HIGH-PRESSURE OXYGEN   NATIONAL  SAFETY  CONGRESS  CHICA
990002470                     APCI  LOX AND LIN VAPOR DISPOSAL-TANK-500-GAL   APCI-DRAWING-92483D  REV-8  9/30/68
990004110          CHAMBERS,J.  APL  LOX INSTALLATION AT  CUSTOMER  SITES   APL-IGD-ENGR-MAN-40-01  7P  7/19/71
990003100        ROBINSON,G.W.  APCI  LOX  COMPATIBLE GASKET MATERIALS GARLOCK-900 DURABLA JOHNS-MANVILLE ASBESTOS  SHEET
990005430 D  FABRICATED  FLAT-BOTTOM LOX  STORAGE  TANKS   APCI-IIA4-2  1P  12/30/71
990000550 UIPMENT- DELUGE-SYSTEM AND LOX LOADING  FACILITY   APCI-SAFETY-STD-630.2.6  3P  1/64
990000900 ATLEY,A.L.  APCI  CLEANING LOX STORAGE TANK-NO-6 SANTA/SUSANA   APCI-MEMO-64  03/11/64  1P PLUS  1P ATTACHMENT
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990003140 PTURE DISCS MANUFACTURED LOX TANKERS BY AMETEK APCI-MEMO-71 06/22/71 1P
990000910 MASTER,H.H. APCI LOX TANKS APCI-MEMO-70 06/26/70 1P
990001460 CO, VALLEY-FORGE-GASKET-CO LOX TRANSFER FLUOROGREEN-E-600 APCI-MEMO-70 10/23/70 1P
990002660 MASTER,H.H. APCI LOX TRANSFER PUMP SCREENS APCI-MEMO-69 01/24/69 2P PLUS 3P ATTACHMENTS
990002650 MASTER,H.H. APCI LOX TRANSFER PUMPS APCI-MEMO-68 12/30/68 2P PLUS 2P ATTACHMENTS
990003020 ISCUSS SAFETY OF SHIPBOARD LOX-PLANTS 2P 9/13/71
990003930 INVESTIGATION OF CRYOSTAR LOX-PUMP EXPLOSION AT STOKE PLANT 8/7/70 APL-SAFETY-DEPT-REP-34 14P 8/24/70
990002580 BERRETTINI,B.J. APCI LOX-PUMP FIRES AND EXPLOSIONS APCI-MEMO-70 06/26/70 3P
990003920 DUE TO THE CRYOSTAR-GB114 LOX-PUMP ON AN SSPC LOX-TANKER APL-SAFETY-DEPT-REP-32 9P 7/10/70
990003890 PL REPORT ON EXPLOSION OF LOX-PUMP ON TANKER-400-11 1/7/70 AT JOHN/SUMMERS STEEL WORKS/SHOTTON PUMP-TYPE-C
990002680 STOMPLER,R.D. APCI LOX-PUMP SAFETY APCI-MEMO-71 2/19/71 1P
990002670 AUL, CARTER, AND COSMODYNE LOX-PUMP SAFETY APCI-MEMO-71 1/01/26/71 2P
990003270 STOMPLER,R.D. APCI LOX-PUMP SAFETY-BARRIERS APCI-MEMO-71 02/19/71 2P
990003880 IN BURCKHARDT CENTRIFUGAL LOX-PUMP-TYPE-GB114-NO-29224 APL-SAFETY-DEPT-REP-16 6P 2/28/69
990002200 BALL,W.L. APCI LOX-SPILL NCG CONSHOHOCKEN APCI-MEMO-68 05/23/68 2P
990002920 ATION NATIONAL-GYPSUM-BLUE LOX-SYSTEMS FOAM-GLASS LIQUID-HYDROGEN-PIPING-SYSTEMS LNG-SYSTEMS INERT-CRYOGENES 8
990000920 LYSIS OF SUN-OIL COMPANY_S LOX-TANK VAPORIZER APCI-MEMO-64 04/9/64 1P PLUS 1P ATTACHMENT
990003420 N 310000 GALLON CAPACITY LOX/LIN STORAGE TANK APCI-JOB SPECIFICATION FOR JOB-NO-00-2-2775 APCI-NO-71-
990001890 ANE, FLUORINATED-SILOXANE, LS-53, BUTYL-RUBBER, IRON-OXIDES, TALC, ASBESTOS, ALUMINUM-CHIPS, STEEL-WOOL, MAGNE
990001820 APCI PIPING-SSL1.5- LUBE-OIL-SERVICE -20F TO 150F 150-PSIG-MAX STAINLESS STEEL-PIPE APCI-DES-ENG-S
990001110 OUS MATERIALS- ABMA THREAD LUBRICANT AND SEALANT, ANDEROL-L-536 RUST-PREVENTIVE LEHIGH CHEMICAL CO-CHESTERTOW
990001160 APCI TAPE-SEAL THREAD LUBRICANT AND SEALER- TAPE-SEAL FROM FRIESLAND-PLASTIC COMPANY, PERMACEL-TAPE AP
990000090 SCHMOYER,W.W. APCI LUBRICANTS AND THREAD COMPOUNDS FOR OXYGEN-SYSTEMS APCI-SAFETY-GRAM-NO-27 5P 3/
990004450 APCI LUBRICANTS- ESSO BEACON-325 APCI-IA1A-17 1P 2/21/72
990004420 APCI LUBRICANTS- FLUORO-GLIDE, CHEMPLAST INC APCI-IA1A-14 1P 2/21/72
990004390 APCI LUBRICANTS- FLUOROLUBE, FS-5, HOOKER CHEMICAL APCI-IA1A-11 1P 2/21/72
990004350 APCI LUBRICANTS- FLUOROLUBE, FS, HOOKER CHEMICAL APCI-IA1A-07 1P 2/21/72
990004460 APCI LUBRICANTS- FORMBLIN-Y04 MONTECATINI-EDISON APCI-IA1A-18 1P 2/21/72
990004300 APCI LUBRICANTS- HALOCARBON-11-21E, HALOCARBON PRODUCTS CORP APCI-IA1A-02 1P 2/21/72
990004310 APCI LUBRICANTS- HALOCARBON-11-14E, HALOCARBON PRODUCTS CORP APCI-IA1A-03 1P 2/21/72
990004340 APCI LUBRICANTS- HALOCARBON-25-5S-GREASE, HALOCARBON PRODUCTS CORP APCI-IA1A-06 1P 2
990004320 APCI LUBRICANTS- HALOCARBON-6-25-WAX, HALOCARBON PRODUCTS CORP APCI-IA1A-04 1P 2/21/
990004330 APCI LUBRICANTS- KEL-F-90-GREASE, MINNESOTA MINING MANUFACTURING CO APCI-IA1A-05
990004290 APCI LUBRICANTS- KRYTOX-143-AA-OIL DUPONT APCI-IA1A-01 1P 2/21/72
990004360 APCI LUBRICANTS- KRYTOX-143-AB-OIL DUPONT APCI-IA1A-08 1P 2/21/72
990004370 APCI LUBRICANTS- KRYTOX-143-AC-OIL DUPONT APCI-IA1A-09 1P 2/21/72
990004430 APCI LUBRICANTS- KRYTOX-143-AD-OIL DUPONT APCI-IA1A-15 1P 2/21/72
990004380 APCI LUBRICANTS- KRYTOX-143-AZ-OIL DUPONT APCI-IA1A-10 1P 2/21/72
990004410 APCI LUBRICANTS- MOLY-LUBE-NO-99, MOLY LUBE PRODUCTS GLEN/COVE/NY APCI-IA1A-13 1P
990004400 APCI LUBRICANTS- MOLYLUBE-N BEL-RAY CO FARMINGDALE/NJ APCI-IA1A-12 1P 2/21/72
990004440 APCI LUBRICANTS- VOLTALEF-3A KINGSLEY AND KEITH LTD/UK APCI-IA1A-16 1P 2/21/72
990000680 LYCEL-440R, AND STYROFOAM, LUBRICANTS, MOLY-SPRAY-KOTE, AND DRI-LUBE APCI-MAR-87-0-8821 1P 4/62
990000590 PLOSION TESTING- UCON-TYPE LUBRICANTS, STEEL-PIPES APCI-MAR-87-0-8820 1P 4/61
990000700 ESTING- TALCUM-POWDER AS A LUBRICANT, TARSET, PLASITE APCI-MAR-87-0-8821 1P 7/62
990002210 PCI DISCUSSION WITH MR E LUCAS-IPO INSPECTION, REGARDING APCI CLEANLINESS REQUIREMENTS APCI-MEMO-71 07/22

990000270 APCI MACHINERY- FIELD TESTING AND CENTRIFUGAL OXYGEN COMPRESSORS APCI-DES-ENG-STD-551.
990000260 APCI MACHINERY- FIELD TESTING AND RECIPROCATING OXYGEN COMPRESSORS APCI-DES-ENG-STD-55
990001890 LUMINUM-CHIPS, STEEL-WOOL, MAGNESIUM-CHIPS, MAGNESIUM-SHEET, DYE-PENETRANTS, MAGNOGLO-PASTEIO IN KEROSENE, TU
990001890 EEL-WOOL, MAGNESIUM-CHIPS, MAGNESIUM-SHEET, DYE-PENETRANTS, MAGNOGLO-PASTEIO IN KEROSENE, TURCO-DYE-CHECK-STE
990001890 IUM-SHEET, DYE-PENETRANTS, MAGNOGLO-PASTEIO IN KEROSENE, TURCO-DYE-CHECK-STEP-2-LIQUID, TURCO-4499-1, TUCRO-4
990005670 L-HAZARDS- OXYGEN-TRANSFER MALFUNCTION AND FAILURES APCI-IIF3-1 1P 11/12/71
990005680 L-HAZARDS- OXYGEN-TRANSFER MALFUNCTION AND FAILURES APCI INCIDENTS INVOLVING OXYGEN-TRANSFER-EQUIPMENT OR INST
990005690 L-HAZARDS- OXYGEN-TRANSFER MALFUNCTIONS AND FAILURE INCIDENTS WHICH OCCURRED WITH OTHER OXYGEN-EQUIPMENT APC
990005730 L-HAZARDS- OXYGEN-TRANSFER MALFUNCTIONS AND FAILURES GEISERING, EXCESSIVE VIBRATIONS, SHOCK (THERMAL AND PRE

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990005740 L-HAZARDS- OXYGEN-TRANSFER MALFUNCTIONS AND FAILURES INSULATION  SYSTEM DUE TO VIBRATIONS  DETERIORATION   APC
990005720 L-HAZARDS- OXYGEN-TRANSFER MALFUNCTIONS AND  FAILURES VALVES    APCI-IIF3A(3)-1  1P  12/30/71
990003830 ENT AT AN  OXYGEN CHARGING MANIFOLD    APL-SAFETY-BULL-046  2P
990003840 RISING FROM VENTING-OXYGEN MANIFOLDS CONNECTED TO A COMMON  VENT  PIPE    APL-SAFETY-BULL-075  3P  12/11/69
990003760  CHARGING AND  DISCHARGING MANIFOLDS OXYGEN SERVICE    APL-ENGR-SPEC-L.12.1  2P  7/7/69
990000620 XPLOSION TESTING- PINE AND MAPLE WOOD, ACTIVATED CARBON    APCI-MAR-87-0-8821  1P  10/61
990002050 D INSPECTION CONTRACT WITH MARYLAND  CASUALTY  CO    APCI-POM-SEC-6.09-ATTCHMT-1  2P  8/27/69
990001890 0070, WALK-SYNTHETIC-CORK, MASKING-TAPE, SHERLOCK-LEAK-DETECTOR-TYPE-OG, SHERLOCK-LEAK DETECTOR-WITH-15-PERCEN
990003080         SCHNYDER,R.  APCI  MASTER DRAWING 1200-SERIES REGULATIONS   APCI-DRAWING-000-0-407004E  1P  3/4/68
990003570 NFIRMATION OR  REVISION OF MAXIMUM ALLOWABLE OPERATING PRESSURE   FEDERAL  REGISTER  VOL-36  NO-176  9/10/71
990002220 ERSATION WITH  MR  WILLIAM MCCORMICK REGARDING REQUIREMENTS FOR VENDOR-CLASS-AA AND  CLASS-AAA CLEANING   APCI
990001890 ADHESIVE, PHENOLIC-MOLDED, MELAMINE-MOLDED, POLYESTER-GLASS, NYLON, MOLYBDENUM-DISULFIDE, GRAPHITE, ELECTROFIL
990001410 D SOXHLET ETHER-EXTRACTION MELRATH GARLOCK-900   APCI-ANAL-REP-70-026   APCI-IWO-NO-EA-7027  2P  1/30/70
990004740 ND PACKINGS- TFE-GF-GREEN, MELRATH  GASKETS  CO    APCI-IA5A-02  1P  2/21/72
990001410  MATERIAL COMPATIBILITY OF MELRATH MATERIAL WITH  OXYGEN COMBUSTION IN OXYGEN AND SOXHLET ETHER-EXTRACTION MEL
990004770 PCI  GASKETS AND PACKINGS- MELRATH-150  (SHEET-ASBESTOS  GASKET MATERIAL)   APCI-IA5A-05  1P  2/21/72
990001460  ATMOSPHERES JOHN-DORE-CO, MELRATH-GASKET-CO, VALLEY-FORGE-GASKET-CO LOX TRANSFER FLUOROGREEN-E-600   APCI-MEM
990005980 N PRESSURE VESSEL  CODE-AD MERKBLATTER  (ENGLISH  TRANSLATION)  304P  9/71
990001540 GNITION CHARACTERISTICS OF METALS AND ALLOYS   ARS  JOURNAL  P917-23  7P  7/61
990001530 AL  INSTITUTE  IGNITION OF METALS IN OXYGEN   DMIC-REPORT-224  33P PLUS  APPENDIX
990005950  DALY,J.  APCI  BURNING OF METALS IN OXYGEN  ATMOSPHERES  (80 TO  100-PERCENT)   APCI-TM-186  44P  3/72
990001520   INSTITUTE  REACTIVITY OF METALS WITH  LIQUID AND  GASEOUS OXYGEN   AD297124   DMIC-MEMO-163
990005230                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- MUNTZ-METAL  60-40-TYPE  COMPOSITI
990005240                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALPHA BRASS-TYPE TCL-100 OR DTD-50
990004920                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- RED-BRASS-PIPE ASTM-B43   APCI-IA6
990004900                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-PIPE ASTM-B42   APCI-IA6A-0
990004930                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B211-2024-T4   APCI-
990004870                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS-  TARSET PITTSBURGH CHEMICAL  CO
990004880                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SEALFAS-MASTIC-31-97 BENJAMIN  FOS
990004910                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-TUBE ASTM-B75   APCI-IA6A-0
990004890                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- PLASITE-NO-7122H WISCONSIN  PROTEC
990004950                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B209-5083-0   APCI-I
990005190                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- CARBON STEEL- NON-OXYGEN SERVICE W
990005030                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL-TYPE-304 UNIDENTIF
990005110                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BERYLLIUM COPPER   APCI-IA6A-25  2
990005070                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A182-F-304 AN
990004990                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM B361-WP6061-T6   APCI-IA6
990005020                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A240-304   AP
990005090                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-SILICON ASTM-B98GRB   APCI-
990005120                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A269-304   AP
990004980                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B247-6061-T6   APCI-
990005200                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SHPEROIDAL-GRAPHITE IRON CONTINENT
990005050                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A194-8T321
990005030                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A403-WP304 AN
990005000                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- CARBON STEEL  (OXYGEN SERVICE)   A
990005100                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- FREE-MACHING BRASS   APCI-IA6A-24
990005150                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- MONEL ASTM-B164   APCI-IA6A-29  2P
990005010                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A312-TP304
990005130                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BRONZE ASTM-B61 OR  B62   APCI-IA6
990005210                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SILVER   APCI-IA6A-35  1P  2/21/72
990004960                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B210-6061-T6   APCI-
990005060                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEELS-TYPE-416-CADMIUM-
990005040                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A320-88304
990004970                       APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B241-6061-T6   APCI-
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990005160                          APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A351-GR-CF8
990005170                          APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS 9-PERCENT NICKEL STEEL
990005220                          APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- NOVONOX STAINLESS STEEL ALLOY TO
990005140                          APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BRASS-SHEET OR PLATE ASTM-B36  A
990005300 CALS, SOLVENTS, AND  MISC- METHYLENE-CHLORIDE   APCI-IA7A-06  1P  2/21/72
990000650 ETHOD, APL PIPING-RESIDUE, METHYLENE-CHLORIDE   APCI-MAR-87-0-8821  1P  1/62
990001070 TION FILTER DEFROST AND OF METHYLENE-CHLORIDE   APCI-MEMO-61  12/11/61  2P
990001360  OF STANDARD IGNITION TEST METHYLENE-CHLORIDE- DICHLOROETHANE- TRICHLOROETHANE- TRICHLORETHYLENE- CARBON-TETRA
990001890 ID OXYGEN METHYL-CHLORIDE, METHYLENE-CHLORIDE, CHLOROFORM, ETHYL-CHLORIDE, DICHLOROETHANE, DICHLOROETHANE, TRI
990001890 TERIALS WITH LIQUID OXYGEN METHYL-CHLORIDE, METHYLENE-CHLORIDE, CHLOROFORM, ETHYL-CHLORIDE, DICHLOROETHANE, DI
990001890 ROETHYLENE, ETHYL-ALCOHOL, METHYL-ETHYL-KETONE, KEROSENE, GLYCERINE, POLYETHYLENE-LOW-DENSITY, POLYETHYLENE-IR
990004940                          APCI  METLAS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM, ASTM-B-210-3003   APCI-I
990005180                          APCI  METLAS, ALLOYS, SOLDERS, AND SURGACE TREATMENTS- COPPER-TUBE  ASTM-B88   APCI-IA6A-
990004640 ICAL  INSULATIONS- MILFOAM MILFOAM CORP   APCI-IA3A-06  1P  2/21/72
990004640 D ELECTRICAL  INSULATIONS- MILFOAM MILFOAM CORP   APCI-IA3A-06  1P  2/21/72
990002930 ULATION MATERIALS VASCOCEL MILFOAM NATIONAL-GYPSUM (GREEN) FOAM-GLAS (CORNING)   APCI-IWO-NO-LA-0333   APCI-
990002920 ALS FOR CRYOGENIC  SYSTEMS MILFOAM URETHANE INSULATION NATIONAL-GYPSUM-BLUE LOX-SYSTEMS FOAM-GLASS LIQUID-HYDR
990000400 NTING- COLD-INSULATION AND MINERAL FIBER GRANULATED   APCI-DES-ENG-STD-581.2  2P  6/26/69
990003800          PEGRAM,J.W.  APL  MINERAL WOOL   APL-ENGR-SPEC-N.02  3P  1/2/70
990001310 H  ACCEPTANCE OF FIBERIZED MINERAL WOOL INSULATION   APCI-QUAL-CONT-LAYOUT-103L  2P  7/1/71
990004620 D ELECTRICAL  INSULATIONS- MINERAL-WOOL   APCI-IA3A-04  1P  2/21/72
990003530 ND OTHER  GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS ODORIZATION OF  GAS   FEDERAL  REGISTER  VOL-35  N
990003570 ND OTHER  GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS EXTENSION OF  TIME FOR CONFIRMATION OR  REVISION O
990003550 FICE OF  PIPELINE  SAFETY  MINIMUM FEDERAL SAFETY-STANDARDS FOR GAS PIPELINES CORROSION-PITTING- NOTICE OF PUB
990003520 ND OTHER  GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS FILING OF INSPECTION AND MAINTENANCE  PLANS  FEDE
990003560 ND OTHER  GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS REQUIREMENTS FOR CORROSION  CONTROL  FEDERAL  REG
990003540 ND OTHER  GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS  MISC  AMENDMENTS  FEDERAL  REGISTER  V-35  N-223
990003510 ND OTHER  GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS ESTABLISHMENT OF  MINIMUM  STANDARDS   FEDERAL  RE
990004330 BRICANTS- KEL-F-90-GREASE, MINNESOTA  MINING   MANUFACTURING  CO   APCI-IA1A-05  1P  2/21/72
990001080 LIQUID OXYGEN CONTAMINANTS MISSILE-PROGRAM  10P  1/6/58
990002500 YER,W.W.  BALL,W.L.  APCI  MISTY  PROBLEM VAPOR-CLOUDS FROM DEFROST OPERATIONS ALLEGEDLY CAUSED HIGHWAY ACCIDE
990001400   INDOPOL-H-300-POLYBUTENE, MOBILE-DTE-105-HYDROCARBON   APCI-TM-040  7P  9/18/59
990003110   OF VARIOUS TYPES OF OILS- MOBIL-DTE-105 TEXACO-CAPPELLA-AA CELLULUBE-550 FLUOROLUBE SEARS-THREAD-CUTTING-OIL
990001230           BROPHY,M.  APCI  MOLLY-99 COMPATIBILITY TESTS WITH HIGH-PRESSURE OXYGEN   APCI-R+D-NOTEBOOK-130  P3
990004410 BRICANTS- MOLY-LUBE-NO-99, MOLY  LUBE PRODUCTS  GLEN/COVE/NY   APCI-IA1A-13  1P  2/21/72
990001890 D, POLYESTER-GLASS, NYLON, MOLYBDENUM-DISULFIDE, GRAPHITE, ELECTROFILM-SPRAYABLE-A, DRILUBE-1, TEFLON DISPERSI
990001170 YGEN COMPATIBILITY TEST ON MOLY-LUBE-NO-99   APCI-MEMO-63  06/11/63  1P
990004410           APCI  LUBRICANTS- MOLY-LUBE-NO-99, MOLY  LUBE PRODUCTS  GLEN/COVE/NY   APCI-IA1A-13  1P  2/21/72
990000680 AND STYROFOAM, LUBRICANTS, MOLY-SPRAY-KOTE, AND DRI-LUBE   APCI-MAR-87-0-8821  1P  4/62
990000710 UGE TWF WOOL, SPINTEX-305, MOLYKOTE-TYPE-Z AND  TYPE-X-15   APCI-MAR-87-0-8822  1P  3/63
990000730 - HALOCARBON, MOLYLUBE-99, MOLYKOTE-TYPES-Z AND  X-15, CABOSIL-M-5 FORMICA-LAMINATE  BONDED WITH A PHENOLIC RE
990000730 OSION HAZARDS- HALOCARBON, MOLYLUBE-99, MOLYKOTE-TYPES-Z AND  X-15, CABOSIL-M-5 FORMICA-LAMINATE  BONDED WITH
990001200 YGEN COMPATABILITY  TESTS- MOLYLUBE-KOTE-AR AND MOLYLUBE-N   APCI-R+D-NOTEBOOK-130  P16-7  2P  2/11/63
990001190   REGULATOR THREAD SEALANT MOLYLUBE-N   APCI-MEMO-63  10/4/63  1P
990001200 ESTS- MOLYLUBE-KOTE-AR AND MOLYLUBE-N   APCI-R+D-NOTEBOOK-130  P16-7  2P  2/11/63
990004510 S AND THREADING COMPOUNDS- MOLYLUBE-N BEL-RAY  CO  FARMINGDALE/NJ   APCI-IA2A-05  1P  2/21/72
990004400           APCI  LUBRICANTS- MOLYLUBE-N BEL-RAY  CO  FARMINGDALE/NJ   APCI-IA1A-12  1P  2/21/72
990005150 S, AND SURFACE TREATMENTS- MONEL ASTM-B164   APCI-IA6A-29  2P  2/21/72
990001400 A-CORP-MOLYKOTE-MICROSIZE, MONSANTO-PYDRAUL, GULF-MECHANISM-HYDROCARBON, HAVOLINE-HD-HYDROCARBON, SHELL-2-1176
990004460   LUBRICANTS- FORMBLIN-Y04 MONTECATINI-EDISON   APCI-IA1A-18  1P  2/21/72
990001400  FAIRBANKS-SILICONE-DC-44, MORSE GREASE, ALPHA-CORP-MOLYKOTE-MICROSIZE, MONSANTO-PYDRAUL, GULF-MECHANISM-HYDRO
990005230 S, AND SURFACE TREATMENTS- MUNTZ-METAL  60-40-TYPE  COMPOSITION  CU-58  1-PERCENT ZN38.5-42-PERCENT PB0.35-.9-
990001890 OLYETHYLENE-TEREPHTHALATE, MYLAR, POLYTETRAFLUOROETHYLENE, TEFLON, POLYTRICHLOROVINYLCHLORIDE, KEL-F, POLYHEX

990005400      SCHMOYER,W.W.  APCI  NASA OXYGEN STUDY PROJECT  00-1-2495.07   APCI-MEMO-71  12/10/71  1P
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990002760 KITSON,F.K. APCI NASH VACUUM PUMPS APCI-MEMO-71 01/19/71 2P
990002120 SSURE VESSEL INSPECTORS NATIONAL BOARD INSPECTION CODE- A MANUAL FOR BOILER AND PRESSURE VESSEL INSPEC
990004500 DING COMPOUNDS- PUTTI-ROPE NATIONAL GREENHOUSE CO APCI-IA2A-04 1P 2/21/72
990004650 IONS- NATIONAL-GYPSUM-BLUE NATIONAL-GYPSUM CORP APCI-IA3A-07 1P 2/21/72
990002930 MATERIALS VASCOCEL MILFOAM NATIONAL-GYPSUM (GREEN) FOAM-GLAS (CORNING) APCI-IWO-NO-LA-0333 APCI-MEMO-68
990002920 ILFOAM URETHANE INSULATION NATIONAL-GYPSUM-BLUE LOX-SYSTEMS FOAM-GLASS LIQUID-HYDROGEN-PIPING-SYSTEMS LNG-SYST
990004650 D ELECTRICAL INSULATIONS- NATIONAL-GYPSUM-BLUE NATIONAL-GYPSUM CORP APCI-IA3A-07 1P 2/21/72
990004840 ESTOS AND CEMENT BOARDS. NATURAL-UNTREATED-FINISH TURNERS ASBESTOS CEMENT CO LTD/UK APCI-IA5A-12 1P
990002200 BALL,W.L. APCI LOX-SPILL NCG CONSHOHOCKEN APCI-MEMO-68 05/23/68 2P
990002790 MASTER,H.H. APCI NEAR-MISS ACCIDENT- BURNS/HARBOR APCI-MEMO-71 02/8/71 2P
990002810 HUBBS,M.H. APCI NEAR-MISS ACCIDENT- CREIGHTON APCI-MEMO-68 06/4/68 2P
990002780 HUBBS,M.K. APCI NEAR-MISS ACCIDENT- GRANITE/CITY FACILITY APCI-MEMO-67 12/15/67 1P
990004700 ELASTOMERS, AND ADHESIVES- NEOPRENE APCI-IA4A-05 1P 2/21/72
990001890 OLYSULFIDE-SEALER, BUNA-N, NEOPRENE, EPOXY-ADHESIVE, PHENOLIC-MOLDED, MELAMINE-MOLDED, POLYESTER-GLASS, NYLON,
990004020 R INTERNAL CLEANING OF 9% NICKEL AND HI-PROOF STAINLESS STATIC-TANKS FOR OXYGEN SERVICE APL-QCP-Q13 REV.0
990005170 ENTS- STAINLESS 9-PERCENT NICKEL STEEL ASTM-A353GB APCI-IA6A-31 2P 2/21/72
990004810 -ASBESTOS GASKET MATERIAL NICOLET INDUSTRIES APCI-IA5A-09 1P 2/21/72
990004780 ASBESTOS GASKET MATERIAL NICOLET INDUSTRIES INC APCI-IA5A-06 1P 2/21/72
990003250 TRIAL-SAFETY- OCCUPATIONAL NOISE APCI-SAFETY-STD-625.0.1.2 3P 4/9/71
990003230 VE-EQUIPMENT- OCCUPATIONAL NOISE PROTECTIV
990005190 TREATMENTS- CARBON STEEL- NON-OXYGEN SERVICE WITH POSSIBLE EXPOSURE TO OXYGEN APCI-IA6A-33 3P 2/21/72
990001290 NASA-HOUSTON NONMETALLIC MATERIALS DESIGN GUIDELINES AND TEST DATA-HANDBOOK MSC-02681 380P 5
990005380 AL-MATERIALS-COMPATIBILITY NOTCH-SENSITIVITY OF MATERIALS APCI-IB2C-1 1P 9/2/71
990004220 EVERSON,I. APL NOTES FOR GUIDANCE OF CUSTOMERS HAVING AIR PRODUCTS LTD OXYGEN EQUIPMENT AP
990003020 ULATIONS 3P 9/13/71 PLUS NOTES ON VISIT TO HMS ARK-ROYAL ON 11/8/71 TO DISCUSS SAFETY OF SHIPBOARD LOX-PL
990001080 HIMMELBERGER,F. APCI NOTES ON LIQUID OXYGEN CONTAMINANTS MISSILE-PROGRAM 10P 1/6/58
990003550 PELINES CORROSION-PITTING- NOTICE OF PUBLIC HEARING FEDERAL REGISTER VOL-36 NO-126 6/30/71
990005220 S, AND SURFACE TREATMENTS- NOVONOX STAINLESS STEEL ALLOY TO DIN GERMAN NATIONAL STANDARDS COMPOSITION 5-P
990004690 ELASTOMERS, AND ADHESIVES- NYLON APCI-IA4A-04 1P 2/21/72
990001320 SURE OXYGEN COMPATIBILITY- NYLON APCI-MEMO-63 05/17/63 1P
990004720 ELASTOMERS, AND ADHESIVES- NYLON-66 ICI LTD/UK APCI-IA4A-07 1P 2/21/72
990001330 YODER,L. APCI NYLON-SEAT USED IN K-G REGULATOR- IGNITION-TEMPERATURE IN 100-PERCENT OXYGEN ATM
990000720 ON HAZARDS- KEL-F-POLYMER, NYLON, CUTTING-OILS APCI-MAR-87-0-8822 1P 5/63
990001890 E-MOLDED, POLYESTER-GLASS, NYLON, MOLYBDENUM-DISULFIDE, GRAPHITE, ELECTROFILM-SPRAYABLE-A, DRILUBE-1, TEFLON D

990003250 APCI INDUSTRIAL-SAFETY- OCCUPATIONAL NOISE APCI-SAFETY-STD-625.0.1.2 3P 4/9/71
990003230 NNEL-PROTECTIVE-EQUIPMENT- OCCUPATIONAL NOISE PROTECTIV
990003880 WHEN AN EXPLOSION AND FIRE OCCURRED IN BURCKHARDT CENTRIFUGAL LOX-PUMP-TYPE-GB114-NO-29224 APL-SAFETY-DEPT-R
990005690 ND FAILURE INCIDENTS WHICH OCCURRED WITH OTHER OXYGEN-EQUIPMENT APCI-IIF3-6 2P 2/3/72
990003530 M FEDERAL SAFETY-STANDARDS ODORIZATION OF GAS FEDERAL REGISTER VOL-35 NO-220 11/11/70
990001120 PUTTI-ROPE ANALYSIS FOR OIL CONTENT AND FLAMMABILITY TEMPERATURE APCI-MEMO-59 12/11/59 1P
990001070 APCI DETONATION TESTS OF OIL FROM ALIQUIPPA PUMP-SUCTION FILTER DEFROST AND OF METHYLENE-CHLORIDE APCI-MEM
990001430 ALITATIVE AND QUANTITATIVE OIL ANALYSIS APCI-ANAL-REP-63-1662 AND 1663 APCI-IWO-NO-69-1034 1P 11/6/63
990004280 APL LIMITING VALUES OF OIL-CONTAMINATION OF STAINLESS-STEEL SURFACES EXPOSED TO GASEOUS OXYGEN APL-SA
990002010 MICAL STRUCTURE OF CUTTING OILS TO THEIR OXYGEN-COMPATIBILITY AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMM
990005110 SCENCE OF VARIOUS TYPES OF OILS- MOBIL-DTE-105 TEXACO-CAPPELLA-AA CELLULUBE-550 FLUOROLUBE SEARS-THREAD-CUTTIN
990002350 RESSED GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS CGA-PAMPHLET-V-1 57P 1965
990002370 RESSED GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS CSA-B96 57P 1965
990002360 RESSED GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS ASA-B57.1 57P 1965
990004180 DAVIES,G. APL OVERHAUL PROCEDURE APL-C-155/9.5 33P 1971
990005410 APCI OPERATIONAL-HAZARDS- OVERPRESSURE APCI-IIA-1 2P 2/18/72
990005420 APCI OPERATIONAL-HAZARDS- OVERPRESSURE INTEGRITY OF INSULATION SHOP FABRICATED OX STORAGE TANKS APCI-II
990005430 APCI OPERATIONAL-HAZARDS- OVERPRESSURE INTEGRITY OF INSULATION FIELD FABRICATED FLAT-BOTTOM LOX STORAGE T
990004560 S AND THREADING COMPOUNDS- OXOMAT APCI-IA2A-10 1P 2/21/72
990001210 APCI SAFETY-VALVE-SEAT OXOMAT FLAMMABILITY IN 100-PERCENT GASEOUS OXYGEN APCI-ANAL-REP-61-435 APCI-I

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990001520 WITH  LIQUID AND  GASEOUS OXYGEN   AD297124   DMIC-MEMO-163
990005960 F MATERIALS WITH  7500-PSI OXYGEN   AD608260  71P  10/64
990001210 Y IN  100-PERCENT  GASEOUS OXYGEN   APCI-ANAL-REP-61-435   APCI-IWO-NO-10-0858  1P  6/6/61
990001220 Y TESTS WITH HIGH-PRESSURE OXYGEN   APCI-R+D-NOTEBOOK-111  P152  1P  1/63
990001230 Y TESTS WITH HIGH-PRESSURE OXYGEN   APCI-R+D-NOTEBOOK-130  P3  1P  6/63
990000170 CHMOYER,W.W.  APCI  LIQUID OXYGEN   APCI-SAFETY-GRAM-NO-54C  6P  1/31/67  P6  REVISED  1/31/68
990000070 HMOYER,W.W.  APCI  GASEOUS OXYGEN   APCI-SAFETY-GRAM-NO-23C  6P  1/10/63
990001530 UTE  IGNITION OF METALS IN OXYGEN   DMIC-REPORT-224  33P PLUS  APPENDIX
990001280 Y OF MATERIALS WITH LIQUID OXYGEN   MTP-P+VE-M-63-14  94P  12/4/63
990001240 Y OF MATERIALS WITH LIQUID OXYGEN   NASA-TMX-53052  34P  5/26/64
990001270 Y OF MATERIALS WITH LIQUID OXYGEN   NASA-TMX-985  72P  8/64
990002190 E-FLUIDS AND HIGH-PRESSURE OXYGEN   NATIONAL  SAFETY  CONGRESS  CHICAGO  7P PLUS  9P FIGURES PRESENTED BY W L
990003030 INING  LIQUID AND  GASEOUS OXYGEN   USAF-CONTRACT-AF33(616)6730  14P   CRYOGENIC  ENGINEERING  CONFERENCE  ANN
990001410 WITH  OXYGEN COMBUSTION IN OXYGEN AND SOXHLET ETHER-EXTRACTION MELRATH GARLOCK-900   APCI-ANAL-REP-70-026   AP
990001330 EMPERATURE IN  100-PERCENT OXYGEN ATM   APCI-ANAL-REP-60-496   APCI-IWO-NO-81-0017  1P  1/6/61
990002520 NNEDY  FIRE INCIDENT IN AN OXYGEN CLOUD   FIRE  JOURNAL  PP76-8 AND  81  4P  1/71
990001200            BROPHY,M.  APCI  OXYGEN COMPATABILITY  TESTS- MOLYLUBE-KOTE-AR AND MOLYLUBE-N   APCI-R+D-NOTEBOOK-13
990001370 HY,M.  APCI  HIGH-PRESSURE OXYGEN COMPATABILITY TESTS WITH SILICONE-RUBBER GASKET COMPOUND- RTV-60-NP-134372-M
990001130  WALDE,R.A.  APCI  GASEOUS OXYGEN COMPATIBILITY OF CROSSLITE FLUOROCARBON TAPE THREE-M-FLUOROCARBON-TAPE, PERM
990001170  WALDE,R.A.  APCI  GASEOUS OXYGEN COMPATIBILITY TEST ON MOLY-LUBE-NO-99   APCI-MEMO-63  06/11/63  1P
990001110            DINAN,E.  APCI  OXYGEN COMPATIBILITY TESTS FOR  VARIOUS MATERIALS- ABMA THREAD LUBRICANT AND SEALAN
990001320  APCI  KEL-F HIGH-PRESSURE OXYGEN COMPATIBILITY- NYLON   APCI-MEMO-63  05/17/63  1P
990000510 OMPATIBILITY OF MATERIALS- OXYGEN COMPATIBLE MATERIALS   APCI-SAFETY-STD-609.1  8P  6/65
990003380 ON AND EQUIPMENT  ERECTION OXYGEN COMPRESSION  SYSTEM EL/SEGUNDO/CALIF   APCI-CONSTR-SPEC-200.0 TO  200.20  20
990002600            BALL,W.L.  APCI  OXYGEN COMPRESSOR FIRE   APCI-SAFETY-GRAM-NO-03  2P  7/7/61
990003860 ANBA,J.S.  APL  BURCKHARDT OXYGEN COMPRESSOR FIRE AT SSPC ROGNAC  PLANT  3/2/71   APL-SAFETY-BULL-107  3P  4/1
990004100            APL  CENTRIFUGAL OXYGEN COMPRESSOR  MANUAL HATTINGEN  PLANT  15P  APPENDIX I II III  8P
990002910 G OF SCREENS TO BE USED IN OXYGEN COMPRESSOR  SUCTION   APCI-MEMO-71  07/26/71  2P
990002560            APCI  PIPING- OXYGEN COMPRESSOR  SYSTEM  APCI  OPERATED   APCI-DES-ENG-STD-570.7  32P  7/19/71
990000290            APCI  PIPING- OXYGEN COMPRESSOR LOCATION   APCI-DES-ENG-STD-570.6  2P  1/15/71
990003050   DEMAG  KA-27-IV/KA-4-IV OXYGEN COMPRESSOR VITON-A  (BLACK) VITON-E60  (GREEN)   DEMAG-LETTER TO  APCI  1P
990000270 LD TESTING AND CENTRIFUGAL OXYGEN COMPRESSORS   APCI-DES-ENG-STD-551.2.8.1  18P  2/3/71
990000260  TESTING AND RECIPROCATING OXYGEN COMPRESSORS   APCI-DES-ENG-STD-551.1.9.1  14P  2/3/71
990001080  F.  APCI  NOTES ON LIQUID OXYGEN CONTAMINANTS MISSILE-PROGRAM  10P  1/6/58
990002430                   APCI  OXYGEN CONTROL-PANEL   APCI-DES-ENG-STD-534.1  (TO BE PUBLISHED)
990000050       SCHMOYER,W.W.  APCI  OXYGEN CYLINDER FAILURE   APCI-SAFETY-GRAM-NO-13  2P  6/1/62
990002620 AGRICULTURAL CHEMICAL  CO  OXYGEN FIRES   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS  V-8  PP1
990002730        MASTER,H.H.  APCI  OXYGEN FLOW-METER RING SEAL-FLUID   APCI-MEMO-70  02/27/70  1P
990001250 Y OF MATERIALS WITH LIQUID OXYGEN III   NASA-TMX-53533  54P  11/3/66
990001260 Y OF MATERIALS WITH LIQUID OXYGEN IV   NASA-TMX-53773  50P  8/23/68
990005950 APCI  BURNING OF METALS IN OXYGEN  ATMOSPHERES  (80 TO  100-PERCENT)   APCI-TM-186  44P  3/72
990003120  L.G.  LATSHAW,D.R.  APCI  OXYGEN  COMPATABILITY WITH TWO-PART EPOXY-COMPOUND  (7343-RESIN-  7139-CATALYST) FR
990005990 PIN,A.  FOSTER,R.H.  APCI  OXYGEN  DIFFUSION IN THE  ATMOSPHERE FROM LIQUID  OXYGEN  POOLS   ADVANCES IN  CRYC
990006000 PIN,A.  FOSTER,R.H.  APCI  OXYGEN  DIFFUSION IN THE  ATMOSPHERE FROM LIQUID  OXYGEN  POOLS   CGA  AIR-SEPARATI
990003060  L.G.  LATSHAW,D.R.  APCI  OXYGEN  INDEX  RATING SILICONE-O-RING  (1/8-INCH  DIA)   APCI-IWO-NO-XO-0128   APCI
990003040  L.G.  LATSHAW,D.R.  APCI  OXYGEN  INDEX  RATING VITON-O-RING MATERIAL- VITON-E-60  (GREEN) VITON-A  (BLACK) G
990003350 IFICATION FOR CLEANING FOR OXYGEN  SERVICE   APCI-550-SD-27A  5P  12/10/59
990000320            APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  500-PSIG-MAX-DWG  CARBON-STEEL   APCI-DES-ENG-STD-5
990000310            APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  275-PSIG-MAX  CARBON-STEEL   APCI-DES-ENG-STD-578.6
990000330            APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  720-PSIG-MAX  CARBON-STEEL   APCI-DES-ENG-STD-578.6
990000300            APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  150-PSIG-MAX  CARBON-STEEL   APCI-DES-ENG-STD-578.6
990001860  STEEL PIPES IN A  FLOWING OXYGEN  STREAM   APCI-MEMO-61  04/17/61  3P PLUS  7P ATTACHMENTS
990002000 EL OF HYDROCARBON FILMS IN OXYGEN  SYSTEMS   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS  V-4
990003280 NEL-PROTECTIVE SHIELDS FOR OXYGEN  SYSTEMS   APCI-TB-42  3P  9/30/71  APPLICABLE TO  APCI-DES-ENG-STD-546.1
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990005970  COMPATIBILITY FOR GASEOUS OXYGEN  SYSTEMS   MAB-3268-69  9P  11/5/69
990001900 SSOC  INSTALLATION OF BULK OXYGEN  SYSTEMS AT  CONSUMER  SITES-1965   NFPA-NO-566  10P  1965
990001910 SSOC  INSTALLATION OF BULK OXYGEN  SYSTEMS AT  CONSUMER  SITES PROPOSED AMENDMENTS  PART II   AMENDMENTS TO  N
990000030  KITSON,F.K.  APCI  LIQUID OXYGEN LOADING   APCI-SAFETY-GRAM-NO-06  1P  11/17/61
990001890 Y OF MATERIALS WITH LIQUID OXYGEN METHYL-CHLORIDE, METHYLENE-CHLORIDE, CHLOROFORM, ETHYL-CHLORIDE, DICHLOROETH
990002640         MASTER,H.H.  APCI  OXYGEN PIPE-LINE FAILURE   APCI-MEMO-67  12/29/67  1P
990005610 ELINE  TRANSPORTATION- APL OXYGEN PIPELINE  DESIGN CONCEPTS AND CRITERIA   APCI-IIF2-2  1P  2/21/72
990004040          PEGRAM,J.W.  APL  OXYGEN PIPELINES   APL-ENGR-STD-LS.30/1  8P  7/1/70
990001030  RECONSTRUCTED ICI TONNAGE OXYGEN PLANT   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS  V-5  P1-
990002980        MATHEWS,L.G.  LINDE  OXYGEN PLANT EXPLOSION   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS
990002960         ROTZLER,R.W.  ET.AL  OXYGEN PLANT REBOILER EXPLOSION   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONI
990002970 FOUNDRIES AND  STEEL  LTD  OXYGEN PLANT VAPORIZER EXPLOSION   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMON
990003000 NERGY  RELEASE  IN A LIQUID OXYGEN PUMP   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS  V-5  PP41
990002610 BALL,W.L.  APCI  REPORT OF OXYGEN PUMP EXPLOSION AIRCO-BUTLER   APCI-MEMO-63  10/21/63  1P PLUS  6P  ATTACHMEN
990003010 RENDOS,J.J.  AIRCO  LIQUID OXYGEN PUMP FAILURES   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS
990002630 RENDOS,J.J.  AIRCO  LIQUID OXYGEN PUMP FAILURES  RE-99000301
990002340                      APCI  OXYGEN PUMP FILTER  ASSEMBLY   APCI-DRAWING-58521C  REV-B  12/18/57
990002860        APCI  BYRON-JACKSON OXYGEN PUMP WASHOUT PROCEDURE FOR  ANALYTICAL  PURPOSES   APCI-POM-SEC-1.07  5P  7/
990000140         SCHMOYER,W.W.  APCI  OXYGEN REGULATORS IN THE WELDING INDUSTRY   APCI-SAFETY-GRAM-NO-60C  5P  11/26/67
990001100 ON,F.K.  APCI  ASSEMBLY OF OXYGEN REGULATORS T-FILM   APCI-MEMO-61  11/30/61  1P
990005940  APCI  LIQUID AND  GASEOUS OXYGEN SAFETY  REVIEW DATA- ACCIDENT/INCIDENT INVESTIGATION AND REPORT-APCI  DOCUME
990002170        LATSHAW,D.R.  APCI  OXYGEN SAFETY  REVIEW  CHECK-LIST   APCI-MEMO-71  05/4/71  3P
990000940 N,F.K.  APCI  CLEANING FOR OXYGEN SERVICE   APCI-MEMO-63  08/5/63  2P PLUS  9P ATTACHMENTS
990000950 PMENT IN AIR PLANTS AND IN OXYGEN SERVICE   APCI-POM-SEC-1.08  7P PLUS  3P ATTACHMENTS  4/4/67
990000780 -TUBE TYPE GAUGES USED FOR OXYGEN SERVICE   APCI-QUAL-CONT-LAYOUT-102F  3P  7/1/71
990000540 S- DEVIATIONS CLEANING FOR OXYGEN SERVICE   APCI-SAFETY-STD-629.0.10  1P  6/19/61
990000500  INSPECTION- MATERIALS AND OXYGEN SERVICE   APCI-SAFETY-STD-608.1  7P  10/65
990003760 AND  DISCHARGING MANIFOLDS OXYGEN SERVICE   APL-ENGR-SPEC-L.12.1  2P  7/7/69
990003720 J.W.  APL  PRESSURE-GAUGE- OXYGEN SERVICE   APL-ENGR-SPEC-J.07  3P  6/18/69
990003700  AND TUBE-TYPE-COOLERS FOR OXYGEN SERVICE   APL-ENGR-SPEC-E.05  13P  6/1/71
990003730 SURE REGULATING-VALVES FOR OXYGEN SERVICE   APL-ENGR-SPEC-J.15  3P  6/18/69
990001960 SOC  EQUIPMENT CLEANED FOR OXYGEN SERVICE   CGA-PAMPHLET-G-4.1  21P  3/59
990000960 R,E.J.  APCI  CLEANING FOR OXYGEN SERVICE  17P  1/60
990003630 ASING ACCEPTANCE TESTS FOR OXYGEN SERVICE  COMPRESSORS   APL-ENGR-SPEC-K.02  3P  6/23/69
990003690 YPE-COOLER, OTHER THAN FOR OXYGEN SERVICE  (APL-PLANTS)   APL-ENGR-SPEC-E.04  12P  6/1/71
990003070 D-OXYGEN PUMPS ALUMINUM IN OXYGEN SERVICE LIQUID-CARBONIC-LIQUID-OXYGEN TRAILER- ACCIDENT VICTORY-MEMORIAL-HOS
990003670 W.  APL  SPECIFICATION FOR OXYGEN SERVICE PRESSURE-VESSEL  FABRICATION   APL-ENGR-SPEC-C.04  8P  7/26/71
990003660 W.  APL  SPECIFICATION FOR OXYGEN SERVICE VESSEL  FABRICATION   APL-ENGR-SPEC-C.03  7P  7/26/71
990000160  PRESSURE-VESSELS- GASEOUS OXYGEN STORAGE CYLINDER   APCI-DES-ENG-STD-515.1.3  3P  10/17/60
990003400  SCHMOYER,W.W.  APCI  NASA OXYGEN STUDY PROJECT  00-1-2495.07   APCI-MEMO-71  12/10/71  1P
990002990 TIONAL  CYLINDER  GAS  CO  OXYGEN TRAILER FIRE   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS  V
990005700 APCI  OPERATIONAL-HAZARDS- OXYGEN TRANSFER EQUIPMENT  MALFUNCTIONS AND  FAILURES COMPRESSORS AND PUMPS   APCI-
990003450 RACTICES USED FOR  GASEOUS OXYGEN TRANSMISSION AND DISTRIBUTION CGA-DOCKET  70-11   CGA-THIRD  DRAFT  23P  3/2
990002010 E OF CUTTING OILS TO THEIR OXYGEN-COMPATIBILITY   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS
990005640 O PIPELINE  TRANSPORTATION OXYGEN-DISPERSAL FROM  VENTS AND  LINES   APCI-IIF2C-1  1P  8/22/71
990005690  WHICH OCCURRED WITH OTHER OXYGEN-EQUIPMENT   APCI-IIF3-6  2P  2/3/72
990005920 PORTS  ACCIDENTS INVOLVING OXYGEN-EQUIPMENT AND  SYSTEMS WHICH CAUSED  INJURY TO  PERSONNEL OR  DAMAGE TO  EQU
990002420 TALLATION AND OPERATION OF OXYGEN-FUEL GAS  SYSTEMS FOR WELDING AND CUTTING   NFPA-NO-51  8P  1969 AND  CUTTIN
990000020 KITSON,F.K.  APCI  FIRE IN OXYGEN-LINE   APCI-SAFETY-GRAM-NO-05  1P  10/20/61
990003820                APL  FIRE IN OXYGEN-LINE   APL-SAFETY-BULL-028  1P  1/68
990003870  IN HIGH-PRESSURE  GASEOUS OXYGEN-LINE AT A CYLINDER FILLING DEPOT   APL-SAFETY-BULL-114  3P  7/13/71
990001870 -LIMITS OF CARBON STEEL IN OXYGEN-NITROGEN-ATMOSPHERES   APCI-IWB-NO-LB-0043   APCI-TM-112  6P  5/8/68
990000280                APCI  PIPING- OXYGEN-PIPING   APCI-DES-ENG-STD-578.60.1  14P  4/24/72
990000710 ITY AND EXPLOSION HAZARDS- OXYGEN-PRESSURE-GAUGE TWF WOOL, SPINTEX-305, MOLYKOTE-TYPE-Z AND  TYPE-X-15   APCI-
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990005900 ARICUS PROBLEMS RELATED TO OXYGEN-SAFETY   APCI-IVE-2  1P  2/21/72
990000250 NEL PROTECTIVE SHIELDS AND OXYGEN-SYSTEMS   APCI-DES-ENG-STD-546.1  9P  1/15/71
990000090 S AND THREAD COMPOUNDS FOR OXYGEN-SYSTEMS   APCI-SAFETY-GRAM-NO-27  5P  3/22/63
990005710 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER EQUIPMENT  MALFUNCTIONS AND  FAILURES GAS-PRESSURE-REGULATORS   APC
990005580 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER  SYSTEMS SYSTEMS- FIELD  FABRICATED CRYOGENIC  LIQUID STORAGE TANKS
990005590 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER  SYSTEMS SYSTEMS- APL OXYGEN-TRANSFER METHODS TYPICAL  INSTALLATION
990005720 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER MALFUNCTIONS AND  FAILURES VALVES   APCI-IIF3A(3)-1  1P  12/30/71
990005680 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER MALFUNCTION AND FAILURES APCI INCIDENTS INVOLVING OXYGEN-TRANSFER-E
990005740 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER MALFUNCTIONS AND FAILURES INSULATION  SYSTEM DUE TO VIBRATIONS  DET
990005690 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER MALFUNCTIONS AND FAILURE INCIDENTS WHICH OCCURRED WITH OTHER OXYGEN
990005730 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER MALFUNCTIONS AND FAILURES GEISERING, EXCESSIVE VIBRATIONS, SHOCK  (
990005670 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER MALFUNCTION AND FAILURES   APCI-IIF3-1  1P  11/12/71
990005590 SFER  SYSTEMS SYSTEMS- APL OXYGEN-TRANSFER METHODS TYPICAL  INSTALLATIONS, AND  OPERATIONS DEPARTMENT  OVERHAU
990005610 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER PIPELINE-TRANSPORTATION PIPELINE  TRANSPORTATION- APL OXYGEN PIPELI
990005600 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER PIPELINE-TRANSPORTATION PIPELINE  TRANSPORTATION- LIST OF STANDARDS
990005570 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER PRODUCTION, STORAGE TO SYSTEM,  STORAGE TO  TRANSPORT, TRANSPORT TO
990005560 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER PRODUCTION TO  STORAGE, STORAGE TO SYSTEM,  STORAGE TO  TRANSPORT,
990005630 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD  RAILROAD  BARGE AND  PIPELINE-TRANSPORTATION CONTAMINATION-CO
990005620 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD  RAILROAD  BARGE AND  PIPELINE-TRANSPORTATION PRESSURE-RELIEF
990005640 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD  RAILROAD  BARGE AND  PIPELINE TRANSPORTATION ROAD, RAILROAD,
990005660 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD  RAILROAD  BARGE AND  PIPELINE-TRANSPORTATION ROAD, RAILROAD,
990005650 APCI  OPERATIONAL-HAZARDS- OXYGEN-TRANSFER ROAD  RAILROAD  BARGE AND  PIPELINE-TRANSPORTATION ROAD, RAILROAD,
990005680 S APCI INCIDENTS INVOLVING OXYGEN-TRANSFER-EQUIPMENT OR INSTRUMENTATION   APCI-IIF3-2  2P  2/4/72
990001300 Y IN  100-PERCENT  GASEOUS OXYGEN  FOAMSEAL-30-45-LIQUID, FOAMSEAL-30-45-DRY, FLEXFAS-82-10-LIQUID, FLEXFAS-82
990000440 OMPONENTS- AIR-SEPARATION, OXYGEN, COMPRESSOR   APCI-SAFETY-STD-607.1.2.3  6P  12/62
990003960 RSON,I.  APL  EXPLOSION ON OXY-FUEL-BURNER  EQUIPMENT AT ALCAN-BOOTH ALUMINIUM  WORKS ROGERSTONE/NEWPORT  5/18
990003130  L.G.  LATSHAW,D.R.  APCI  OXY-TITE THREAD COMPOUND   APCI IWO-NO-XD-0134   APCI-ANAL-REP-71-336  1P  10/22/71

990004760          APCI  GASKETS AND PACKINGS- FLUOROGREEN-E-600, JOHN/DORE  CO   APCI-IA5A-04  1P  2/21/71
990004790          APCI  GASKETS AND PACKINGS- GARLOCK-900  (SHEET-ASBESTOS  GASKET MATERIAL) GARLOCK  MFG  CO   APCI-IA
990004730          APCI  GASKETS AND PACKINGS- GRAPHITE-IMPREGNATED-ASBESTOS-PACKING   APCI-IA5A-01  1P  2/21/72
990004857          APCI  GASKETS AND PACKINGS- KLINGERIT-661 RICHARD  KLINGER  LTD/UK
990004780          APCI  GASKETS AND PACKINGS- KM226-SHEET  ASBESTOS  GASKET MATERIAL NICOLET INDUSTRIES INC   APCI-IA5A
990004810          APCI  GASKETS AND PACKINGS- KM246  SHEET-ASBESTOS  GASKET MATERIAL NICOLET INDUSTRIES   APCI-IA5A-09
990004770          APCI  GASKETS AND PACKINGS- MELRATH-150  (SHEET-ASBESTOS  GASKET MATERIAL)   APCI-IA5A-05  1P  2/21/7
990004840          APCI  GASKETS AND PACKINGS- SINDANYO CS-51-ASBESTOS AND  CEMENT  BOARDS. NATURAL-UNTREATED-FINISH TUR
990004820          APCI  GASKETS AND PACKINGS- TEFLON, DUPONT   APCI-IA5A-10  2P  2/21/72
990004740          APCI  GASKETS AND PACKINGS- TFE-GF-GREEN, MELRATH  GASKETS  CO   APCI-IA5A-02  1P  2/21/72
990004860          APCI  GASKETS AND PACKINGS- TYGAFLOR  CEMENTABLE  PTFE  TAPES TYGADURE  LTD/UK   APCI-IA5A-14  1P  2/
990004750          APCI  GASKETS AND PACKINGS- VALLEGREEN, VALLEY/FORGE  GASKET  CO   APCI-IA5A-03  1P  2/21/72
990004830          APCI  GASKETS AND PACKINGS- VITON-A DUPONT   APCI-IA5A-11  1P  2/21/72
990004800          APCI  GASKETS AND PACKINGS- VULCANIZED-RED-FIBRE-GASKETS   APCI-IA5A-08  1P  2/21/72
990000880 IREMENTS FOR IPO SPECIFIED PAINT  SYSTEMS   APCI-QUAL-CONT-LAYOUT-120F  3P  7/1/71
990003390 PREPARATION  STANDARDS FOR PAINTING STEEL  SURFACES   ASTM-D2200-67  2P  1967
990000390       APCI  INSULATION AND PAINTING- COLD-BOXES THERMAL TANKS PERLITE   APCI-DES-ENG-STD-581.1  4P  5/26/61
990000410       APCI  INSULATION AND PAINTING- COLD-BOXES, THERMAL TANKS, GLASS WOOL   APCI-DES-ENG-STD-581.3  1P  10/24
990000400       APCI  INSULATION AND PAINTING- COLD-INSULATION AND MINERAL FIBER GRANULATED   APCI-DES-ENG-STD-581.2  2P
990001890 NGS, DOW-CORNING-SILICONE, PAINT-ON-GALBESTOS, DOW-CORNING-SILICONE-PAINT-XP-7-1003, GRIP-CLAD-PRIMER, SHERWIN
990003900  ACCIDENT AT T TURNER  LTD PARK/LANE  ROYTON  OLDHAM  LANCASTER  11940 AM  5/2/70   APL-SAFETY-DEPT-REP-30  (P
990002070       STOMPLER,R.D.  APCI  PAUL, CARTER, AND COSMODYNE LOX-PUMP SAFETY   APCI-MEMO-71  1/01/26/71  2P
990005230 -PERCENT ZN38.5-42-PERCENT PBO.35-.9-PERCENT   APCI-IA6A-37  1P  2/21/72
990001000 NITION TESTS OF T-FILM AND PENTON   APCI-MEMO-61  11/28/61  2P
990000630 OLYBUTENE-OIL AMOCO-H-100, PENTON, T-FILM-THREAD COMPOUND   APCI-MAR-87-0-8821  1P  11/61
990000390 - COLD-BOXES THERMAL TANKS PERLITE   APCI-DES-ENG-STD-581.1  4P  5/26/61
990004630 D ELECTRICAL  INSULATIONS- PERLITE   APCI-IA3A-05  1P  2/21/72
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990003790 PEGRAM,J.W.  APL  EXPANDED PERLITE   APL-ENGR-SPEC-N.01  3P  1/2/70
990000380  TAYLOR,B.W.  APCI  USE OF PERLITE IN AIR-SEPARATION COLD-BOXES   APCI-TB-39  1P  6/14/71
990004480 ING COMPOUNDS- TEFLON-TAPE PERMACEL   APCI-IA2A-02  2P  2/21/72
990001110 MICAL  CO-CHESTERTOWN-MD., PERMACEL-RIBBON-DOPE  PERMACEL-NEW/BRUNSWICK/NEW/JERSEY, WEST CONCRETE FLOOR TREATM
990001160 FRIESLAND-PLASTIC COMPANY, PERMACEL-TAPE   APCI-ANAL-REP-60-495,61-3   APCI-IWO-NO-81-0018  1P  1/16/61
990001130 THREE-M-FLUOROCARBON-TAPE, PERMACEL-TAPE   APCI-MEMO-63  07/30/63  1P
990001220          BROPHY,M.+ APCI  PERMATEX SEALANT-1516- COMPATABILITY TESTS WITH HIGH-PRESSURE OXYGEN   APCI-R+D-NOT
990004470 S AND THREADING COMPOUNDS- PERMATEX-1516   APCI-IA2A-01  1P  2/21/72
990001040                     APCI  PERSONAL PROTECTION-EQUIPMENT MAINTENANCE   APCI-POM-1.12  7P  4/21/67
990005870 TEM-EMERGENCIES PROTECTION PERSONNEL   APCI-IVC1-1  6P  1/13/72
990000250   APCI  CIVIL-STRUCTURAL- PERSONNEL PROTECTIVE SHIELDS AND OXYGEN-SYSTEMS   APCI-DES-ENG-STD-546.1  9P  1/15/
990003280                     APCI  PERSONNEL-PROTECTIVE SHIELDS FOR OXYGEN  SYSTEMS   APCI-TB-42  3P  9/30/71  APPLICA
990003200                     APCI  PERSONNEL-PROTECTIVE-EQUIPMENT- WEARING  APPAREL HARD  HATS   APCI-SAFETY-STD-627.4
990003160          SMITH,H.W.  APCI  PERSONNEL-PROTECTIVE-EQUIPMENT- EYE  PROTECTION   APCI-SAFETY-STD-627.4.2  5P  10/6
990003340                     APCI  PERSONNEL-PROTECTIVE-EQUIPMENT TONNAGE AIR-SEPARATION  PLANT   APCI-SAFETY-STD-627.
990003220          SMITH,H.W.  APCI  PERSONNEL-PROTECTIVE-EQUIPMENT- RESPIRATORY  PROTECTIVE  EQUIPMENT   APCI-SAFETY-ST
990003330                     APCI  PERSONNEL-PROTECTIVE-EQUIPMENT ALUMINIZED HEAT  PROTECTIVE CLOTHING   APCI-SAFETY-S
990003230                     APCI  PERSONNEL-PROTECTIVE-EQUIPMENT- OCCUPATIONAL NOISE  PROTECTIV
990003470 OF  MECHANICAL  ENGINEERS  PETROLEUM REFINERY PIPING   ANSI-B31.3  104P  1966
990000730 CA-LAMINATE  BONDED WITH A PHENOLIC RESIN, CUTTING-OILS, HEXADECANE, HYDROCARBON TYPE CUTTING-OILS, KNOWN AS T
990001890  NEOPRENE, EPOXY-ADHESIVE, PHENOLIC-MOLDED, MELAMINE-MOLDED, POLYESTER-GLASS, NYLON, MOLYBDENUM-DISULFIDE, GRA
990001020 NTAMINATED COMPONENTS, AND PICKLING OF  CARBON-STEEL  PIPE AND  FITTINGS   APCI-CONSTR-SPEC-200.16.1.7 TO  200
990003390          ASTM  STANDARD PICTORIAL SURFACE PREPARATION  STANDARDS FOR PAINTING STEEL  SURFACES    ASTM-D2200-
990000620 DS, AND EXPLOSION TESTING- PINE AND MAPLE WOOD, ACTIVATED CARBON   APCI-MAR-87-0-8821  1P  10/61
990001020  CLEANING OF CARBON STEEL PIPE AND FITTINGS, CLEANING ALUMINUM-PIPE  FITTINGS  PARTS AND FABRICATIONS, CLEANI
990001480          BROPHY,M.  APCI  PIPE BURNING TESTS   APCI-R+D-NOTEBOOK-111  P26-9  4P  4/17/61
990001180 F.  APCI  PIPING- APPROVED PIPE THREAD SEALANTS   APCI-DES-ENG-STD-570.5.1  1P  11/11/60
990001490   BROPHY,M.  APCI  TARSET PIPE-COATING THE PLASITE TESTS  MANUFACTURED BY PITTSBURGH  CHEMICAL  CO    APCI-R+D
990000610  BOMB TEST, LED-PLATE-251, PIPE-DOPE   APCI-MAR-87-0-8820  1P  9/61
990002640  MASTER,H.H.  APCI  OXYGEN PIPE-LINE FAILURE   APCI-MEMO-67  12/29/67  1P
990005610 TRANSPORTATION- APL OXYGEN PIPELINE  DESIGN CONCEPTS AND CRITERIA   APCI-IIF2-2  1P  2/21/72
990005650  ROAD, RAILROAD, BARGE AND PIPELINE  TRANSPORTATION  VEHICLE ACCIDENT PROCEDURES   APCI-IIF2D-1  1P  8/22/71
990005640  ROAD, RAILROAD, BARGE AND PIPELINE  TRANSPORTATION OXYGEN-DISPERSAL FROM  VENTS AND  LINES   APCI-IIF2C-1  1P
990005660  ROAD, RAILROAD, BARGE AND PIPELINE  TRANSPORTATION VIBRATION AND  CONTROLLED  SLOSHING   APCI-IIF2E-1  1P  9/
990005600 ER PIPELINE-TRANSPORTATION PIPELINE  TRANSPORTATION- LIST OF STANDARDS   APCI-IIF2-1  2P  2/18/72
990005610 ER PIPELINE-TRANSPORTATION PIPELINE  TRANSPORTATION- APL OXYGEN PIPELINE  DESIGN CONCEPTS AND CRITERIA   APCI-
990003510  NATURAL AND OTHER  GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS ESTABLISHMENT OF  MINIMUM  STANDARDS   F
990003520  NATURAL AND OTHER  GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS FILING OF INSPECTION AND MAINTENANCE  PL
990003560  NATURAL AND OTHER  GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS REQUIREMENTS FOR CORROSION  CONTROL   FE
990003540  NATURAL AND OTHER  GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS  MISC  AMENDMENTS   FEDERAL  REGISTER  V
990003570  NATURAL AND OTHER  GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS EXTENSION OF  TIME FOR CONFIRMATION OR
990003530  NATURAL AND OTHER  GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS ODORIZATION OF  GAS   FEDERAL  REGISTER
990005610 L-HAZARDS- OXYGEN-TRANSFER PIPELINE-TRANSPORTATION PIPELINE  TRANSPORTATION- APL OXYGEN PIPELINE  DESIGN CONCE
990005600 L-HAZARDS- OXYGEN-TRANSFER PIPELINE-TRANSPORTATION PIPELINE  TRANSPORTATION- LIST OF STANDARDS   APCI-IIF2-1
990003810 ELLULAR  GLASS SECTION FOR PIPELINES   APL-ENGR-SPEC-N.05  5P  10/1/70
990004040   PEGRAM,J.W.  APL  OXYGEN PIPELINES   APL-ENGR-STD-LS.30/1  8P  7/1/70
990003550 L SAFETY-STANDARDS FOR GAS PIPELINES CORROSION-PITTING- NOTICE OF PUBLIC  HEARING   FEDERAL  REGISTER  VOL-36
990001860 E.  APCI  BURNING OF STEEL PIPES IN A  FLOWING OXYGEN  STREAM   APCI-MEMO-61  04/17/61  3P PLUS  7P ATTACHMENT
990004000 ROCEDURE FOR DEGREASING OF PIPEWORK   APL-QCP-Q11  REV.0  2P
990003470 INEERS  PETROLEUM REFINERY PIPING   ANSI-B31.3  104P  1966
990003480   ENGINEERS  REFRIGERATION PIPING   ANSI-B31.5  60P  1966
990005470 SES CLEANLINESS OF  OXYGEN PIPING   APCI-IIB1-2  1P  2/19/72
990003650 RUCTION  SPECIFICATION FOR PIPING ERECTION, TESTING AND CLEANING   APL-ENGR-SPEC-M.02  9P PLUS  APPENDIX I II
990003970 RUCTION  SPECIFICATION FOR PIPING  ERECTION, TESTING AND CLEANING   APL-ENGR-SPEC-M.02  8P  APPENDIX I II III
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990003500 SMISSION AND  DISTRIBUTION PIPING  SYSTEMS   ANSI-B31.8  108P  1968
990003980    APL  SOLVENT WASHING OF PIPING  SYSTEMS   APL-IGD-ENGR-MAN-56-06  4P  7/3/71
990003490 ES IN PRESSURE-VESSELS AND PIPING REINHOLD  PUBLISHING CORP  427P  1965
990004090                        APL  PIPING SELECTION SHEET-CARBON STEEL-WARM  OXYGEN SERVICE  720PSIG  (CS07.2)   APL-E
990004060                        APL  PIPING SELECTION SHEET-CARBON STEEL-WARM  OXYGEN SERVICE  150PSIG  (CSC.1.5)   APL-
990004080                        APL  PIPING SELECTION SHEET-CARBON STEEL-WARM  OXYGEN SERVICE  500PSIG  (CS05.0)   APL-E
990004070           PEGRAM,J.W.  APL  PIPING SELECTION SHEET-CARBON STEEL-WARM  OXYGEN SERVICE  275PSIG  (CSC2.7)   APL-E
990001180     HIMMELBERGER,F.   APCI  PIPING- APPROVED PIPE THREAD SEALANTS   APCI-DES-ENG-STD-570.5.1  1P  11/11/60
990000320                       APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  500-PSIG-MAX-OWG  CARBON-STEEL  APCI-O
990000300                       APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  150-PSIG-MAX  CARBON-STEEL  APCI-DES-E
990000310                       APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  275-PSIG-MAX  CARBON-STEEL  APCI-DES-E
990000330                       APCI  PIPING- DRY OXYGEN  SERVICE  -20F TO  100F  720-PSIG-MAX  CARBON-STEEL  APCI-DES-E
990000350                       APCI  PIPING- EXTENDED BONNET VALVE  CODE   APCI-DES-ENG-STD-579.4  3P  4/63
990001830                       APCI  PIPING- INTRODUCTION HAND VALVE-CODE   APCI-DES-ENG-STD-579.3  12P  1/63
990002560                       APCI  PIPING- OXYGEN COMPRESSOR  SYSTEM  APCI  OPERATED   APCI-DES-ENG-STD-570.7  32P  7/
990000290                       APCI  PIPING- OXYGEN COMPRESSOR LOCATION   APCI-DES-ENG-STD-570.6  2P  1/15/71
990000280                       APCI  PIPING- OXYGEN-PIPING   APCI-DES-ENG-STD-578.60.1  14P  4/24/72
990001510                       APCI  PIPING- PRESSURE  RATING  TABLES- PLAIN-AND-THREADED-ENDS- RED BRASS-PIPE   APCI-DE
990001680                       APCI  PIPING- PRESSURE  RATING  TABLES- PLAIN-AND-THREADED-ENDS- CARBON STEEL-PIPE   APCI
990001740                       APCI  PIPING- PRESSURE  RATING  TABLES- PLAIN-AND-THREADED-ENDS- STAINLESS STEEL-PIPE   A
990001550                       APCI  PIPING- PRESSURE  RATING  TABLES- PLAIN-AND-THREADED-ENDS ALUMINUM-PIPE   APCI-DES-
990001610                       APCI  PIPING- PRESSURE  RATING  TABLES- PLAIN-ENDS COPPER-TUBE   APCI-DES-ENG-STD-574.1
990000340                       APCI  PIPING- STAINLESS-STEEL VALVES AND MATERIAL REQUIREMENTS   APCI-DES-ENG-STD-579.3.1
990000370                       APCI  PIPING- TRANSITION-JOINTS AND ALUMINUM TO STAINLESS-STEEL   APCI-DES-ENG-STD-579.15
990000360                       APCI  PIPING- VALVE  PROCUREMENT AND CLEANING PROCEDURE   APCI-DES-ENG-STD-579.5  3P  8/1
990001570                       APCI  PIPING-AA1.5- COLD-BOX-SERVICE  100F AND BELOW  150-PSIG-MAX-OWG ALUMINUM   APCI-DE
990001580                       APCI  PIPING-AA3- COLD-BOX-SERVICE  100F AND BELOW  300-PSIG-MAX-OWG ALUMINUM   APCI-DES-
990001560                       APCI  PIPING-AA.3- COLD-BOX-SERVICE  150F AND BELOW  30PSIG-MAX-OWG ALUMINUM   APCI-DES-E
990001710                       APCI  PIPING-CS14- GENERAL-SERVICE  -20F TO  100F  1440-PSIG-MAX-OWG CARBON STEEL-PIPE
990001840                       APCI  PIPING-CS1.5- GENERAL-SERVICE  -20F TO  100F  150-PSIG-MAX-OWG CARBON STEEL-PIPE
990001720                       APCI  PIPING-CS20- GENERAL-SERVICE  -20F TO  100F  2000-PSIG-MAX-OWG CARBON STEEL-PIPE
990001690                       APCI  PIPING-CS2.7- GENERAL-SERVICE  -20F TO  100F  275-PSIG-MAX-OWG CARBON STEEL   APCI-
990001730                       APCI  PIPING-CS36- GENERAL-SERVICE  -20F TO  100F  3600-PSIG-MAX-OWG CARBON STEEL   APCI-
990001700                       APCI  PIPING-CS7.2- GENERAL-SERVICE  -20F TO  100F  720-PSIG-MAX-OWG CARBON STEEL-PIPE
990001620                       APCI  PIPING-CT2- COLD-BOX-SERVICE  100F AND BELOW  200-PSIG-MAX-OWG  COPPER-TUBE   APCI-
990001630                       APCI  PIPING-CT4- COLD-BOX-SERVICE  100F AND BELOW  400-PSIG-MAX-OWG  COPPER-TUBE   APCI-
990003460 RELIEF VALVES LOCATION AND PIPING-DESIGN CONSIDERATIONS   APCI  PIPING  GROUP  MEMO-19  10P  11/3/66
990001590                       APCI  PIPING-IAA4- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING  100F AND BELOW  400-PSIG-M
990001600                       APCI  PIPING-IAA9- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING  100F AND BELOW  900-PSIG-M
990001660                       APCI  PIPING-ICT10- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING  100F AND BELOW  -1000-PSI
990001670                       APCI  PIPING-ICT23- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING  100F AND BELOW  2300-PSIG
990001640                       APCI  PIPING-ICT4- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING  100F AND BELOW  400-PSIG-M
990001650                       APCI  PIPING-ICT9- COLD-BOX-SERVICE-PROCESS-INSTRUMENT-PIPING  100F AND BELOW  900-PSIG-M
990000650  IGNITION TEST METHOD, APL PIPING-RESIDUE, METHYLENE-CHLORIDE   APCI-MAR-87-0-8821  1P  1/62
990001770                       APCI  PIPING-SS12- COLD-BOX-SERVICE  100F AND BELOW  1235-PSIG-MAX-OWG STAINLESS STEEL-PI
990001780                       APCI  PIPING-SS17-COLD-BOX-SERVICE  100F AND BELOW  1715-PSIG-MAX-OWG STAINLESS STEEL-PIP
990001750                       APCI  PIPING-SS2.7- COLD-BOX-SERVICE  100F AND BELOW  275-PSIG-MAX-OWG STAINLESS STEEL-PI
990001790                       APCI  PIPING-SS30- COLD-BOX-SERVICE  100F AND BELOW  3000-PSIG-MAX-OWG STAINLESS STEEL-PI
990001800                       APCI  PIPING-SS36- COLD-BOX-SERVICE  100F AND BELOW  3600-PSIG-MAX-OWG STAINLESS STEEL-PI
990001760                       APCI  PIPING-SS6- COLD-BOX-SERVICE  100F AND BELOW  615-PSIG-MAX-OWG STAINLESS STEEL-PIPE
990001810                       APCI  PIPING-SS7.2- COLD-BOX-SERVICE  100F AND BELOW  720-PSIG-MAX-OWG STAINLESS STEEL-PI
990001820                       APCI  PIPING-SSL1.5- LUBE-OIL-SERVICE  -20F TO  150F  150-PSIG-MAX STAINLESS STEEL-PIPE
990000060 N,F.K.  APCI  ISOLATION OF PIPING-SYSTEMS   APCI-SAFETY-GRAM-NO-21  1P  10/29/62
990000460 NTS- AIR-SEPARATION PLANT, PIPING, VALVES AND SAFETY-RELIEF DEVICES   APCI-SAFETY-STD-607.1.12  14P  10/62
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990004870 URFACE TREATMENTS-  TARSET PITTSBURGH CHEMICAL  CO   APCI-IA6A-01  1P  2/21/72
990001490 ITE TESTS  MANUFACTURED BY PITTSBURGH  CHEMICAL  CO    APCI-R+D-NOTEBOOK-111  P129-32  4P  7/62
990004590 LLULAR-GLASS)  INSULATION, PITTSBURGH-CORNING CORP   APCI-IA3A-01  1P  2/21/72
990001300  SEALFAS-MASTIC-31-97-DRY, PITTSEAL-III-LIQUID, PORCUS-INSULATING-MATERIAL FOAM GLASS   APCI-ANAL-REP-61-034 T
990001550  PRESSURE  RATING  TABLES- PLAIN-AND-THREADED-ENDS ALUMINUM-PIPE   APCI-DES-ENG-STD-571.1  5P  10/65
990001680  PRESSURE  RATING  TABLES- PLAIN-AND-THREADED-ENDS- CARBON STEEL-PIPE   APCI-DES-ENG-STD-578.10.1  6P  10/65
990001510  PRESSURE  RATING  TABLES- PLAIN-AND-THREADED-ENDS- RED BRASS-PIPE   APCI-DES-ENG-STD-572.1  5P  5/62
990001740  PRESSURE  RATING  TABLES- PLAIN-AND-THREADED-ENDS- STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.1  7P  5/62
990001610  PRESSURE  RATING  TABLES- PLAIN-ENDS COPPER-TUBE   APCI-DES-ENG-STD-574.1  5P  5/62
990001030 TRUCTED ICI TONNAGE OXYGEN PLANT   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS  V-5  P1-15  15P
990000440           KITSON,F.K.  APCI  PLANT COMPONENTS- AIR-SEPARATION, OXYGEN, COMPRESSOR   APCI-SAFETY-STD-607.1.2.3  6
990000460             KITSON,F.  APCI  PLANT COMPONENTS- AIR-SEPARATION PLANT, PIPING, VALVES AND SAFETY-RELIEF DEVICES
990000470              SMITH,H.  APCI  PLANT COMPONENTS- AIR-SEPARATION PLANT, CRYOGENIC-LIQUID, AND DISPOSAL   APCI-SAFET
990000450             WILSON,H.  APCI  PLANT COMPONENTS- COLD-BOXES   APCI-SAFETY-STD-607.1.5  7P  1/63
990000480             BALL,W.L.  APCI  PLANT COMPONENTS- STORAGE, CONVERTER-SYSTEM, AND CRYOGENIC-LIQUIDS   APCI-SAFETY-ST
990000490         SCHMOYER,W.W.  APCI  PLANT COMPONENTS- STORAGE, VACUUM-SYSTEMS, AND COMPRESSED-GASES   APCI-SAFETY-STD-6
990002980 ATHEWS,L.G.  LINDE  OXYGEN PLANT EXPLOSION   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS  V-3
990002940  LINDE  AIR-FRACTIONATION PLANT EXPLOSION   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS  V-4
990000970 LING, AND  ANALYSIS   APCI PLANT  MANAGERS  SAFETY  MEETING-CREIGHTON/PENNSYLVANIA  19P  2/28/68 AND  3/20/68
990002320         MASTER,H.H.  APCI  PLANT PREVENTIVE MAINTENANCE-CONTROL  9P PLUS  EXHIBIT-A-1,  A-2,  A-3,  A-4,  A-5
990002960 GTZLER,R.W.  ET.AL  OXYGEN PLANT REBOILER EXPLOSION   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLAN
990000930                      APCI  PLANT SOLVENT WASHOUT-GENERAL   APCI-POM-SEC-1.05  12P  2/20/67
990002970 ES AND  STEEL  LTD  OXYGEN PLANT VAPORIZER EXPLOSION   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLA
990000730 S, KNOWN AS TYPE-GROUP-II, PLANT WASH-OUT STUDIES, CELLULUBE-300, CELLULUBE-220   APCI-MAR-87-0-8822  2P  6/63
990000430   CRITERIA9 AIR-SEPARATION PLANT-LAYOUT   APCI-SAFETY-STD-605.1.3  6P  1/6/61
990000520 CHECK-LIST- AIR-SEPARATION PLANT-SITE   APCI-SAFETY-STD-610.1.1  5P  11/28/60
990000420             BALL,W.L.  APCI  PLANT-SITE CRITERIA- AIR-SEPARATION   APCI-SAFETY-STD-605.1  9P  11/10/60
990000760 ITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDIES CELLULUBE-300 CELLULUBE-220   APCI-MAR-87-0-8822  1P  7/63
990000740 ITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDIES CELLULUBE-300, DTE-103, CELLULUBE-200 RECENT FIRES AT DUPONT
990000750 ITY AND EXPLOSION HAZARDS- PLANT-WASH-OUT STUDY CELLULUBE-300, DTE 103, RECENT FIRES AT DUPONT-NEW/JOHNSONVILL
990002950  SAFETY IN AIR AND AMMONIA PLANTS   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS  V-2  PP31-36
990000950 CTION FOR EQUIPMENT IN AIR PLANTS AND IN OXYGEN SERVICE   APCI-POM-SEC-1.08  7P PLUS  3P ATTACHMENTS  4/4/67
990000960             APCI  EXCHANGER, PLANT, AND  PLANT EQUIPMENT SOLVENT WASHOUT-FREQUENCIES   APCI-POM-SEC-5.07  3P  7/
990000470 COMPONENTS- AIR-SEPARATION PLANT, CRYOGENIC-LIQUID, AND DISPOSAL   APCI-SAFETY-STD-607.1.20  3P  4/62
990000460 COMPONENTS- AIR-SEPARATION PLANT, PIPING, VALVES AND SAFETY-RELIEF DEVICES   APCI-SAFETY-STD-607.1.12  14P  10
990000700 ER AS A LUBRICANT, TARSET, PLASITE   APCI-MAR-87-0-8821  1P  7/62
990001500            BROPHY,M.  APCI  PLASITE PROTECTIVE COATING   APCI-MEMO-60  06/9/60  2P
990001490 I  TARSET PIPE-COATING THE PLASITE TESTS  MANUFACTURED BY PITTSBURGH  CHEMICAL  CO    APCI-R+D-NOTEBOOK-111  P1
990000560 HOUSING, AND RUBBER-HOSES  PLASITE-NO-7122H   APCI-MAR-87-0-8820  1P  6/60
990004890 S, AND SURFACE TREATMENTS- PLASITE-NO-7122H WISCONSIN  PROTECTIVE  COATING  CO    APCI-IA6A-03  1P  2/21/72
990000690 VEG GLASS-FIBER-REINFORCED PLASTIC   APCI-MAR-87-0-8821  1P  6/62
990001110 ND GEON POLYVINYLCHLORIDE, PLASTIC LEAD SEAL-NO-2-JOHN CRANE   APCI-MEMO-59  01/28/59  2P
990004670                      APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- KEENE-BINDER   APCI-IA4A-02  1P  2/21/72
990004660                      APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- RTV-60, SILICONE-RUBBER COMPOUND WITH SS-4004-
990004720                      APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- NYLON-66 ICI  LTD/UK   APCI-IA4A-07  1P  2/21/
990004700                      APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- NEOPRENE   APCI-IA4A-05  1P  2/21/72
990004710                      APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- VITON-A DUPONT   APCI-IA4A-06  1P  2/21/72
990004680                      APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- KEL-F-81   APCI-IA4A-03  1P  2/21/72
990004690                      APCI  PLASTICS, ELASTOMERS, AND ADHESIVES- NYLON   APCI-IA4A-04  1P  2/21/72
990002070                      APCI  PNEUMATIC TESTING-GENERAL   APCI-QUAL-CONT-LAYOUT-105A  3P  7/1/71
990000680 LOSION TESTING- EPON-H-60, POLYCEL-440R, AND STYROFOAM, LUBRICANTS, MOLY-SPRAY-KOTE, AND DRI-LUBE   APCI-MAR-8
990001890 TON A VINYLIDENO FLUORIDE, POLYDIMETHYLSILOXANE, FLUORINATED-SILOXANE, LS-53, BUTYL-RUBBER, IRON-OXIDES, TALC,
990000670 US, AND EXPLOSION TESTING- POLYESTER RESIN  IMPREGNATED FIBERGLASS LAVA   APCI-MAR-87-0-8821  1P  3/62
990001890 C-MOLDED, MELAMINE-MOLDED, POLYESTER-GLASS, NYLON, MOLYBDENUM-DISULFIDE, GRAPHITE, ELECTROFILM-SPRAYABLE-A, OR
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990001890  POLYETHYLENE-LOW-DENSITY, POLYETHYLENE-IRRADIATED, POLYVINYLCHLORIDE, POLYETHYLENE-TEREPHTHALATE, MYLAR, POLY
990001890 TONE, KEROSENE, GLYCERINE, POLYETHYLENE-LOW-DENSITY, POLYETHYLENE-IRRADIATED, POLYVINYLCHLORIDE, POLYETHYLENE-
990001890 DIATED, POLYVINYLCHLORIDE, POLYETHYLENE-TEREPHTHALATE, MYLAR, POLYTETRAFLUOROETHYLENE, TEFLON, POLYTRICHLOUROV
990001890 LOUROVINYLCHLORIDE, KEL-F, POLYHEXAFLUOROPROPYLENE VITON A VINYLIDEND FLUORIDE, POLYDIMETHYLSILOXANE, FLUORINA
990001890 OROETHANE, TRICHLOROETHANE POLYMERS, POLYSULFIDE-SEALER, BUNA-N, NEOPRENE, EPOXY-ADHESIVE, PHENOLIC-MOLDED, ME
990001890  TRICHLOROETHANE POLYMERS, POLYSULFIDE-SEALER, BUNA-N, NEOPRENE, EPOXY-ADHESIVE, PHENOLIC-MOLDED, MELAMINE-MOL
990001890 LENE-TEREPHTHALATE, MYLAR, POLYTETRAFLUOROETHYLENE, TEFLON, POLYTRICHLOUROVINYLCHLORIDE, KEL-F, POLYHEXAFLUORO
990001890 TRAFLUOROETHYLENE, TEFLON, POLYTRICHLOUROVINYLCHLORIDE, KEL-F, POLYHEXAFLUOROPROPYLENE VITON A VINYLIDEND FLUO
990000600 INATED SILICON-OILS, SHELL POLYURETHANE FOAM (EPON-FOAM-H-60)   APCI-MAR-87-0-8820  1P  8/61
990000660  INSULATIONS STYROFOAM AND POLYURETHANE-FOAM-INSULATION, RAYBESTOS-MANHATTAN-PACKING, AND  IMPREGNATED ASBESTO
990001110 -OXIDE, SEAM COMPOUND GEON POLYVINYLCHLORIDE, PLASTIC LEAD SEAL-NO-2-JOHN CRANE   APCI-MEMO-59  01/28/59  2P
990001890   POLYETHYLENE-IRRADIATED, POLYVINYLCHLORIDE, POLYETHYLENE-TEREPHTHALATE, MYLAR, POLYTETRAFLUOROETHYLENE, TEFL
990001300 -DRY, PITTSEAL-III-LIQUID, POROUS-INSULATING-MATERIAL FOAM GLASS   APCI-ANAL-REP-61-034 TO  61-40 AND  61-42
990003310        APCI  MAINTENANCE OF PORTABLE FIRE-EXTINGUISHERS   APCI-POM-SEC-1.13  5P  3/30/67
990003810 RAM,J.W.  APL  INSULATION- PREFORMED CELLULAR  GLASS SECTION FOR PIPELINES   APL-ENGR-SPEC-N.05  5P  10/1/70
990003570 AXIMUM ALLOWABLE OPERATING PRESSURE    FEDERAL  REGISTER  VOL-36  NO-176  9/10/71
990000600 XPLOSION TESTING- STANDARD PRESSURE BOMBS AND SPARK-IGNITION, DOW-CORNING FLUORINATED SILICON-OILS, SHELL POLY
990000120       SCHMOYER,W.W.  APCI  PRESSURE GAUGE FAILURES   APCI-SAFETY-GRAM-NO-43  2P  5/8/64
990000220     APCI  INSTRUMENTATION- PRESSURE INDICATORS   APCI-DES-ENG-STD-531.2  5P   10/63
990001610                APCI  PIPING- PRESSURE  RATING  TABLES- PLAIN-ENDS COPPER-TUBE   APCI-DES-ENG-STD-574.1  5P  5/62
990001550                APCI  PIPING- PRESSURE  RATING  TABLES- PLAIN-AND-THREADED-ENDS ALUMINUM-PIPE   APCI-DES-ENG-STD-
990001510                APCI  PIPING- PRESSURE  RATING  TABLES- PLAIN-AND-THREADED-ENDS- RED BRASS-PIPE   APCI-DES-ENG-ST
990001680                APCI  PIPING- PRESSURE  RATING  TABLES- PLAIN-AND-THREADED-ENDS- CARBON STEEL-PIPE   APCI-DES-ENG
990001740                APCI  PIPING- PRESSURE  RATING  TABLES- PLAIN-AND-THREADED-ENDS- STAINLESS STEEL-PIPE   APCI-DES-
990002120 - A  MANUAL FOR BOILER AND PRESSURE  VESSEL  INSPECTORS  150P  1968
990002100  RULES FOR CONSTRUCTION OF PRESSURE  VESSELS  DIVISION-1   ASME  BOILER AND  PRESSURE  VESSEL  CODE SECTION VI
990003730         PEGRAM,J.W.  APL  PRESSURE REGULATING-VALVES FOR OXYGEN SERVICE   APL-ENGR-SPEC-J.15  3P  6/18/69
990005830 APCI  MAINTENANCE  PROGRAM PRESSURE TESTING   APCI-IIIC-1  3P  9/12/71
990005980        MERKBLATTER  GERMAN PRESSURE VESSEL  CODE-AD MERKBLATTER  (ENGLISH  TRANSLATION)  304P  9/71
990002740   KEHAT,E.  APCI  TESTS OF PRESSURE-GAGES SAFETY DEVICES   APCI-PROJECT-NO-87-0-8820   APCI-MEMO-61  06/28/61
990003170                   APCI  PRESSURE-GAUGE FAILURE SAFETY GLASSES SAVE ANOTHER  PAIR OF EYES   APCI-SAFETY-GRAM
990003720         PEGRAM,J.W.  APL  PRESSURE-GAUGE- OXYGEN SERVICE   APL-ENGR-SPEC-J.07  3P  6/18/69
990002750 SUMMARY OF ACTION TAKEN ON PRESSURE-GAUGES   APCI-MEMO-61  08/2/61  4P
990002820 - MODIFICATION TO EXISTING PRESSURE-GAUGES SNUBBER   APCI-DES-ENG-STD-531.10.2  2P  12/5/61
990005620 D  PIPELINE-TRANSPORTATION PRESSURE-RELIEF   APCI-IIF2A-1  1P  8/22/71
990000230 TRUMENTATION- ESTABLISHING PRESSURE-SETTINGS OF SAFETY DEVICES   APCI-DES-ENG-STD-537.1  6P  4/21/59
990003670 ICATION FOR OXYGEN SERVICE PRESSURE-VESSEL  FABRICATION   APL-ENGR-SPEC-C.04  8P  7/26/71
990002150 -LIFE  DESIGN IN CRYOGENIC PRESSURE-VESSELS   ESSO-REPORT-NO-EE.26ER.70  17P  8/24/70
990003490 D  DEFECTS AND FAILURES IN PRESSURE-VESSELS AND PIPING REINHOLD  PUBLISHING CORP  427P  1965
990000160                   APCI  PRESSURE-VESSELS- GASEOUS OXYGEN STORAGE CYLINDER   APCI-DES-ENG-STD-515.1.3  3P  1
990000210                   APCI  PRESSURE-VESSELS- HEAD-DESIGN   APCI-DES-ENG-STD-510.3  13P  8/62
990000190                   APCI  PRESSURE-VESSELS- MATERIALS OF CONSTRUCTION   APCI-DES-ENG-STD-510.1.4  4P  6/62
990000200                   APCI  PRESSURE-VESSELS- SHELL-DESIGN   APCI-DES-ENG-STD-510.2  4P  2/65
990000150                   APCI  PRESSURE-VESSELS- VAPORIZER AND CRYOGENIC LIQUID DISPOSAL   APCI-DES-ENG-STD-514.6.
990000180                   APCI  PRESSURE-VESSELS- VESSEL-DESIGN-BASIS AND GENERAL STANDARDS   APCI-DES-ENG-STD-510.
990002290     APCI  INSTRUMENTATION PREVENTIVE MAINTENANCE   APCI-POM-SEC-6.05  5P  10/30/68
990002310 PCI  OPERATIONS DEPARTMENT PREVENTIVE MAINTENANCE REPORT FEED-BACK-CARD  FORM-3610A
990002320   MASTER,H.H.  APCI  PLANT PREVENTIVE MAINTENANCE-CONTROL  9P PLUS  EXHIBIT-A-1,  A-2,  A-3,  A-4,  A-5  6/71
990003300 -20P64  88P  1964  (OUT OF PRINT)
990003320    HUBBS,M.H.  APCI  FIRE PROTECTION   CGA  AIR-SEPARATION  PLANT  SAFETY  SYMPOSIUM  PP175-184  10P  10/63
990005880   APCI  SYSTEM-EMERGENCIES PROTECTION BUILDINGS AND  ADJACENT  SYSTEMS  PROTECTION   APCI-IVC2-1  4P  1/10/72
990003240  APCI  OPERATIONS  HEARING PROTECTION  PROGRAM   APCI-MEMO-71  04/7/71  2P PLUS  1P ATTACHMENT
990005870   APCI  SYSTEM-EMERGENCIES PROTECTION PERSONNEL   APCI-IVC1-1  6P  1/13/72
990001040          APCI  PERSONAL PROTECTION-EQUIPMENT MAINTENANCE   APCI-POM-1.12  7P  4/21/67
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990001500   BROPHY,M.  APCI  PLASITE PROTECTIVE COATING   APCI-MEMO-60  06/9/60  2P
990000250 IVIL-STRUCTURAL- PERSONNEL PROTECTIVE SHIELDS AND OXYGEN-SYSTEMS   APCI-DES-ENG-STD-546.1  9P  1/15/71
990001890 IER, ZYGLO-ZP-5-DEVELOPER, PROTECTIVE-COATINGS, DOW-CORNING-SILICONE, PAINT-ON-GALBESTOS, DOW-CORNING-SILICONE
990003550 RROSION-PITTING- NOTICE OF PUBLIC  HEARING   FEDERAL  REGISTER  VOL-36  NO-126  6/30/71
990003000 RELEASE IN A LIQUID OXYGEN PUMP   AICHE-CEP-TECH-MANUAL   SAFETY IN  AIR AND  AMMONIA  PLANTS  V-5  PP41-42  19
990002610 L.  APCI  REPORT OF OXYGEN PUMP EXPLOSION AIRCO-BUTLER   APCI-MEMO-63  10/21/63  1P PLUS  6P  ATTACHMENTS
990004210 NTO BURCKHARDT CENTRIFUGAL PUMP EXPLOSION AND TANKER FIRE AT SHEEPBRIDGE  ALLOY  CASTINGS  LTD   APL-MEMO-64
990003010 J.J.  AIRCO  LIQUID OXYGEN PUMP FAILURES   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS  V-9  P5
990000110 CHMOYER,W.W.  APCI  VACUUM PUMP FAILURES   APCI-SAFETY-GRAM-NO-35  1P  10/4/63
990002630 J.J.  AIRCO  LIQUID OXYGEN PUMP FAILURES  RE-99000301
990002340              APCI  OXYGEN PUMP FILTER  ASSEMBLY   APCI-DRAWING-58521C  REV-B  12/18/57
990002660 R,H.H.  APCI  LOX TRANSFER PUMP SCREENS   APCI-MEMO-69  01/24/69  2P PLUS  3P  ATTACHMENTS
990002860 APCI  BYRON-JACKSON OXYGEN PUMP WASHOUT PROCEDURE FOR  ANALYTICAL  PURPOSES   APCI-POM-SEC-1.07  5P  7/7/70
990001070 ESTS OF OIL FROM ALIQUIPPA PUMP-SUCTION FILTER DEFROST AND OF METHYLENE-CHLORIDE   APCI-MEMO-61  12/11/61  2P
990000640 CARBON-DISULFIDE ALIQUIPPA PUMP-SUCTION-FILTER-DEFROST CYL-SEAL SEALING COMPOUND   APCI-MAR-87-0-8821  1P  12/
990003890 MERS  STEEL  WORKS/SHOTTON PUMP-TYPE-GB114-SERIAL-NO-79   APL-SAFETY-DEPT-REP-26  6P  1/15/70
990005590 HAUL PROCEDURES FOR LIQUID PUMPS   APCI-IIF1-4  1P  2/21/72
990005700   FAILURES COMPRESSORS AND PUMPS   APCI-IIF3-4  15P  1/23/72
990002650 R,H.H.  APCI  LOX TRANSFER PUMPS   APCI-MEMO-68  12/30/68  2P PLUS  2P  ATTACHMENTS
990002760 ON,F.K.  APCI  NASH VACUUM PUMPS   APCI-MEMO-71  01/19/71  2P
990003710 APL  CENTRIFUGAL CRYOGENIC PUMPS   APL-ENGR-SPEC-G.03  14P  4/1/71
990003070   5/11-12/71 LIQUID-OXYGEN PUMPS ALUMINUM IN OXYGEN SERVICE LIQUID-CARBONIC-LIQUID-OXYGEN TRAILER- ACCIDENT VI
990002690  FIRE TESTS ON CENTRIFUGAL PUMPS FOR LIQUID-OXYGEN   CRYOGENICS  V-10  PP241-248  8P  6/70
990004150           CHAMBERS,J.  APL  PURGE PROCEDURE FOR CRYOGENIC  LIQUID CONTAINER   APL-IGD-ENGR-MAN-52-02  7P  6/3/7
990001120              ENT,W.L.  APCI  PUTTI-ROPE  ANALYSIS FOR OIL CONTENT AND FLAMMABILITY  TEMPERATURE   APCI-MEMO-59
990004500 S AND THREADING COMPOUNDS- PUTTI-ROPE NATIONAL  GREENHOUSE  CO   APCI-IA2A-04  1P  2/21/72
990001400 E-F-50, SF81(40)-SILICONE, PYDRAUL-F-9, DOW-CORNING-4 COMPOUND SILICONE, DOW-CORNING-4X COMPOUND-SILICONE, FAI

990002110 OF  MECHANICAL  ENGINEERS  QUALIFICATION  STANDARD FOR WELDING AND BRAZING PROCEDURES,  WELDERS,  BRAZERS, AND

990005650 ELINE-TRANSPORTATION ROAD, RAILROAD, BARGE AND PIPELINE  TRANSPORTATION  VEHICLE ACCIDENT PROCEDURES   APCI-II
990005660 ELINE-TRANSPORTATION ROAD, RAILROAD, BARGE AND PIPELINE  TRANSPORTATION VIBRATION AND  CONTROLLED  SLOSHING
990005640 ELINE TRANSPORTATION ROAD, RAILROAD, BARGE AND PIPELINE  TRANSPORTATION OXYGEN-DISPERSAL FROM  VENTS AND  LINE
990000660 YURETHANE-FOAM-INSULATION, RAYBESTOS-MANHATTAN-PACKING, AND  IMPREGNATED ASBESTOS-ROPE MATERIAL   APCI-MAR-87-
990001520 ELLE  MEMORIAL  INSTITUTE  REACTIVITY OF METALS WITH  LIQUID AND  GASEOUS OXYGEN   AD297124   DMIC-MEMO-163
990002960  R.W.  ET.AL  OXYGEN PLANT REBOILER EXPLOSION   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS  V-
990003370  GENERAL SPECIFICATION FOR RECIPROCATING COMPRESSORS   APCI-550-SD-01A  37P  3/9/64
990000260 CHINERY- FIELD TESTING AND RECIPROCATING OXYGEN COMPRESSORS   APCI-DES-ENG-STD-551.1.9.1  14P  2/3/71
990001510 - PLAIN-AND-THREADED-ENDS- RED BRASS-PIPE   APCI-DES-ENG-STD-572.1  5P  5/62
990002890 TRUCTIONS FOR AIR-PRODUCTS REDI-SET WELDING AND CUTTING  OUTFITS   APCI-BROCHURE  11P  9/25/69
990004920 S, AND SURFACE TREATMENTS- RED-BRASS-PIPE ASTM-B43   APCI-IA6A-06  1P  2/21/72
990000100 IFF THOSE CYLINDERS BEFORE REFILLING   APCI-SAFETY-GRAM-NO-31  2P  8/21/63
990003470 ICAL  ENGINEERS  PETROLEUM REFINERY PIPING   ANSI-B31.3  104P  1966
990003480 OF  MECHANICAL  ENGINEERS  REFRIGERATION PIPING   ANSI-B31.5  60P  1966
990003490 RESSURE-VESSELS AND PIPING REINHOLD  PUBLISHING CORP  427P  1965
990001960 RESSED  GAS  ASSOC  SAFETY RELIEF DEVICE  STANDARDS  PART-1- CYLINDERS FOR COMPRESSED  GASES   CGA-PAMPHLET-S-
990000240 AL REQUIREMENTS SAFETY AND RELIEF VALVES   APCI-DES-ENG-STD-537.9  4P  7/65
990003460              APCI  SAFETY RELIEF VALVES LOCATION AND PIPING-DESIGN CONSIDERATIONS   APCI  PIPING  GROUP  MEMO
990003740         PEGRAM,J.W.  APL  RELIEF VALVES, WARM  GAS SERVICE  -20F TO  100F   APL-ENGR-SPEC-J.18  4P  6/18/69
990002040          APCI  CODED VESSEL REPAIRS   APCI-POM-SEC-6.09  4P  11/29/68 FOR  ATTCHMTS SEE  205  206  207
990002280          APCI  CODED VESSEL REPAIRS   APCI-POM-SEC-6.09  4P  15P OF  ATTCHMTS  11/29/68
990000670 PLOSION TESTING- POLYESTER RESIN  IMPREGNATED FIBERGLASS LAVA   APCI-MAR-87-0-8821  1P  3/62
990000730 TE  BONDED WITH A PHENOLIC RESIN, CUTTING-OILS, HEXADECANE, HYDROCARBON TYPE CUTTING-OILS, KNOWN AS TYPE-GROUP
990003220 NNEL-PROTECTIVE-EQUIPMENT- RESPIRATORY  PROTECTIVE  EQUIPMENT   APCI-SAFETY-STD-627.3  14P  1/64
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990004857 NO PACKINGS- KLINGERIT-661 RICHARD  KLINGER  LTD/UK
990002730    APCI  OXYGEN FLOW-METER RING SEAL-FLUID   APCI-MEMO-70  02/27/70  1P
990004250 ROUGH HANTS  ENGLAND  FIRE RISKS TO  MAN OF  OXYGEN RICH  GAS  ENVIRONMENTS   FPRC/MEMO-223  12P  7/65
990005630 L-HAZARDS- OXYGEN-TRANSFER ROAD  RAILROAD  BARGE AND  PIPELINE-TRANSPORTATION CONTAMINATION-CONTROL   APCI-IIF
990005660 L-HAZARDS- OXYGEN-TRANSFER ROAD  RAILROAD  BARGE AND  PIPELINE-TRANSPORTATION ROAD, RAILROAD, BARGE AND PIPELI
990005650 L-HAZARDS- OXYGEN-TRANSFER ROAD  RAILROAD  BARGE AND  PIPELINE-TRANSPORTATION ROAD, RAILROAD, BARGE AND PIPELI
990005640 L-HAZARDS- OXYGEN-TRANSFER ROAD  RAILROAD  BARGE AND  PIPELINE TRANSPORTATION ROAD, RAILROAD, BARGE AND PIPELI
990005620 L-HAZARDS- OXYGEN-TRANSFER ROAD  RAILROAD  BARGE AND  PIPELINE-TRANSPORTATION PRESSURE-RELIEF   APCI-IIF24-1
990003990 INATION OF STATIC-TANK AND ROAD-VEHICLE-ASSEMBLIES FOR  OXYGEN SERVICE   APL-QCP-Q10  REV.0  2P
990005650 D  PIPELINE-TRANSPORTATION ROAD, RAILROAD, BARGE AND PIPELINE  TRANSPORTATION  VEHICLE ACCIDENT PROCEDURES   A
990005660 D  PIPELINE-TRANSPORTATION ROAD, RAILROAD, BARGE AND PIPELINE  TRANSPORTATION VIBRATION AND  CONTROLLED  SLOSH
990005640 D  PIPELINE TRANSPORTATION ROAD, RAILROAD, BARGE AND PIPELINE  TRANSPORTATION OXYGEN-DISPERSAL FROM  VENTS AND
990001450  APCI  QUALITY  CONTROL OF ROCK WOOL   APCI-MEMO  2  HIMMELBERGER,F.  APCI  QUALITY  CONTROL OF ROCK WOOL   AP
990001450  APCI  QUALITY  CONTROL OF ROCK WOOL   APCI-MEMO-59  11/6/59  2P
990001470 ER,E.  APCI  PRODUCTION OF ROCK WOOL BETHLEHEM-STEEL-CO   APCI-MEMO-59  11/12/59  2P
990000010 _T  TURN A CYLINDER INTO A ROCKET   APCI-SAFETY-GRAM-NO-04C  1P  8/7/61
990003960 CAN-BOOTH ALUMINIUM  WORKS ROGERSTONE/NEWPORT  5/18/71   APL-SAFETY-DEPT-REP-37  7P  6/2/71
990003860 EN COMPRESSOR FIRE AT SSPC ROGNAC  PLANT  3/2/71   APL-SAFETY-BULL-107  3P  4/14/71
990001370 NE-RUBBER GASKET COMPOUND- RTV-60-NP-134372-M235   APCI-R+D-NOTEBOOK-111  P149  1P  1/63
990004660 ELASTOMERS, AND ADHESIVES- RTV-60, SILICONE-RUBBER COMPOUND WITH SS-4004-SILICONE-PRIMER GE THERMOLITE-12-CURI
990000580 AINLESS-STEEL-HOUSING, AND RUBBER-HOSES  PLASITE-NO-7122H   APCI-MAR-87-0-8820  1P  6/60
990003140           KITSON,F.K.  APCI  RUPTURE  DISCS  MANUFACTURED LOX TANKERS BY AMETEK   APCI-MEMO-71  06/22/71  1P
990002300    APCI  SAFETY-VALVES AND RUPTURE-DISCS   APCI-POM-SEC-6.02  19P INCLUDING  EXHIBITS  ABCDE  12/8/64
990001110 AND SEALANT, ANDEROL-L-536 RUST-PREVENTIVE LEHIGH CHEMICAL  CO-CHESTERTOWN-MD., PERMACEL-RIBBON-DOPE  PERMACEL

990005820 APCI  MAINTENANCE  PROGRAM SAFE CLEANING PROCEDURES FOR FILTERS, TRAPS, AND INSTRUMENTS   APCI-IIIB-1  2P  11/
990002710    COMPRESSED  GAS  ASSOC  SAFE HANDLING OF COMPRESSED  GASES   CGA-PAMPHLET-P-1  10P  1965
990002830                      APCI  SAFE HANDLING OF CRYOGENIC  LIQUIDS AND ASSOCIATED EQUIPMENT   APCI-POM-SEC-1.17  8
990002700        SCHMOYER,H.W.  APCI  SAFE HANDLING OF REGULATORS AND TORCHES   APCI-PAPER  17P  PLUS  2P ATTACHMENTS  7/
990002150 N OF FRACTURE-MECHANICS TO SAFE-LIFE  DESIGN IN CRYOGENIC PRESSURE-VESSELS   ESSO-REPORT-NO-EE.26ER.70  17P  8
990006010            APCI  CRYOGENIC SAFETY   APCI  CRYOGENIC  SAFETY  CONFERENCE  ALLENTOWN  145P  7/59
990002670 ER, AND COSMODYNE LOX-PUMP SAFETY   APCI-MEMO-71  1/01/26/71  2P
990002680 MPLER,R.D.  APCI  LOX-PUMP SAFETY   APCI-MEMO-71  2/19/71  1P
990000240 TION- SPECIAL REQUIREMENTS SAFETY AND RELIEF VALVES   APCI-DES-ENG-STD-537.9  4P  7/65
990001030  CHEMICAL INDUSTRIES  LTD  SAFETY ASPECTS OF RECONSTRUCTED ICI TONNAGE OXYGEN PLANT   AICHE-CEP-TECH-MANUAL  S
990000230 SHING PRESSURE-SETTINGS OF SAFETY DEVICES   APCI-DES-ENG-STD-537.1  6P  4/21/59
990002740 I  TESTS OF PRESSURE-GAGES SAFETY DEVICES   APCI-PROJECT-NO-87-0-8820   APCI-MEMO-61  06/28/61  5P
990003180          SMITH,H.W.  APCI  SAFETY EQUIPMENT NEVER  PREVENTS AN ACCIDENT- IT ONLY  PREVENTS AN INJURY   APCI-SA
990003170 CI  PRESSURE-GAUGE FAILURE SAFETY GLASSES SAVE ANOTHER  PAIR OF EYES   APCI-SAFETY-GRAM-NO-01  1P  6/1/61
990002950 IAL  CHEMICAL  INDUSTRIES  SAFETY IN AIR AND AMMONIA PLANTS   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMON
990002720 MERICAN  WELDING  SOCIETY  SAFETY IN WELDING AND CUTTING   USAS-Z49.1  49P  1967
990002860        APCI  OPERATING AND SAFETY INSTRUCTION FOR REGULATORS AND COMPRESSED  GASES   APCI-BROCHURE  4P  4/70
990002030                      APCI  SAFETY  CONTROL PROCEDURE- SAFETY WORK-PERMIT   APCI-POM-SEC-1.04  3P PLUS  EXHIBIT
990002020                      APCI  SAFETY  CONTROL PROCEDURE- TAG OUT   APCI-POM-SEC-1.03   2P PLUS  EXHIBIT-A  1P  2/
990000530                      APCI  SAFETY  CONTROL PROCEDURES- EMERGENCY PROCEDURES   APCI-SAFETY-STD-626.3.8  8P  5/6
990002080          SMITH,H.W.  APCI  SAFETY  CONTROL PROCEDURES- TAG OUT PROCEDURE   APCI-SAFETY-STD-626.3.3  2P  5/62
990002400                      APCI  SAFETY  CONTROL PROCEDURES-PURGING METHODS   APCI-SAFETY-STD-626.4.1  7P  1/70  2/7
990002090          SMITH,H.W.  APCI  SAFETY  CONTROL PROCEDURES- AIR-SEPARATION-PLANT SAFETY  WORK  PERMITS   APCI-SAFET
990002510 CI  PRODUCT VAPOR HAZARDS- SAFETY  INFORMATION RELATIVE TO LIQUID-VAPOR-CLOUDS   APCI-PAPER  7P  1971
990003300           APCI  OPERATIONS SAFETY  MANUAL   APCI-SAFETY  MANUAL-20P64  88P  1964  (OUT OF PRINT)
990003590  SAFETY  PANEL  CRYOGENICS SAFETY  MANUAL  P122  1970
990002530           APCI  INDUSTRIAL SAFETY  POLICY   APCI-POM-SEC-5.16  7P  10/30/68
990003020 1 TO DISCUSS LIQUID-OXYGEN SAFETY  REGULATIONS  3P  9/13/71 PLUS NOTES ON  VISIT TO HMS ARK-ROYAL ON  11/8/71
990003150    COMPRESSED  GAS  ASSOC  SAFETY  RELIEF DEVICE  STANDARDS  PT-3 COMPRESSED-GAS  STORAGE-CONTAINERS   CGA-PAM
990005940 LIQUID AND  GASEOUS OXYGEN SAFETY  REVIEW DATA- ACCIDENT/INCIDENT INVESTIGATION AND REPORT-APCI  DOCUMENTS LIS
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990002170 LATSHAW,D.R. APCI OXYGEN SAFETY REVIEW CHECK-LIST APCI-MEMO-71 05/4/71 3P
990004050 GRAM,J.W. APL DESIGN AND SAFETY SATNDAPDS FOR CARBON-STEEL GASEOUS OXYGEN TRANSMISSION-LINES APL-ENGR-S
990005850 APCI SYSTEM-EMERGENCIES SAFETY TRAINING AND AREA PLACARDING APCI-IVA-1 4P 11/5/71
990002050 URES- AIR-SEPARATION-PLANT SAFETY WORK PERMITS APCI-SAFETY-STD-626.3.5 3P 6/19/61
990003020 AL ON 11/8/71 TO DISCUSS SAFETY OF SHIPBOARD LOX-PLANTS 2P 9/13/71
990001960 COMPRESSED GAS ASSOC SAFETY RELIEF DEVICE STANDARDS PART-1- CYLINDERS FOR COMPRESSED GASES CGA-PAMP
990003460 APCI SAFETY RELIEF VALVES LOCATION AND PIPING-DESIGN CONSIDERATIONS APCI PIPING GROU
990002330 APCI SAFETY REPORTS AND FORMS APCI-POM-SEC-5.18 6P PLUS EXHIBITS ABCDEFGH 3/3/70
990003210 APCI WEAR SAFETY SHOES APCI-SAFETY-GRAM-NO-11 2P 5/14/62
990001350 BROPHY,M. APCI SAFETY TESTS UNDER WO-81-0095 HYLOMAR-UNIVERSAL-JOINTING COMPOUND SQ-32 AND VITON
990001850 CI COLD TEST OF 1/2-INCH SAFETY VALVE WITH CARBON STEEL SPRING APCI-IWO-NO-10-7071 APCI-PROJECT-NO-00-5-
990002030 SAFETY CONTROL PROCEDURE- SAFETY WORK-PERMIT APCI-POM-SEC-1.04 3P PLUS EXHIBIT-A 1P 2/16/67
990001970 APCI FLEET SAFETY- FIRE EXTINGUISHMENT APCI-SAFETY-STD-635.30 5P 2/68
990001940 APCI FLEET SAFETY- LOADING AND UNLOADING OPERATIONS APCI-SAFETY-STD-635.19 6P 2/68
990003270 MPLER,R.D. APCI LOX-PUMP SAFETY-BARRIERS APCI-MEMO-71 02/19/71 2P
990003290 BALL,W.L. APCI ARE SAFETY-GLASSES WORTH THE COST AND EFFORT APCI-SAFETY-GRAM-NO-30 1P 8/9/63
990002410 ALL,W.L. APCI INDUSTRIAL SAFETY-INDUSTRIAL SAFETY POLICY APCI-SAFETY-STD-625.0.1 13P 10/3/61
990000460 PLANT, PIPING, VALVES AND SAFETY-RELIEF DEVICES APCI-SAFETY-STD-607.1.12 14P 10/62
990003510 PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS ESTABLISHMENT OF MINIMUM STANDARDS FEDERAL REGISTER VOL-35
990003570 PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS EXTENSION OF TIME FOR CONFIRMATION OR REVISION OF MAXIMUM ALLOWA
990003520 PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS FILING OF INSPECTION AND MAINTENANCE PLANS FEDERAL REGISTER V
990003550 E SAFETY MINIMUM FEDERAL SAFETY-STANDARDS FOR GAS PIPELINES CORROSION-PITTING- NOTICE OF PUBLIC HEARING F
990003540 PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS MISC AMENDMENTS FEDERAL REGISTER V-35 N-223 11/17/70
990003530 PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS ODORIZATION OF GAS FEDERAL REGISTER VOL-35 NO-220 11/11/70
990003560 PIPELINE- MINIMUM FEDERAL SAFETY-STANDARDS REQUIREMENTS FOR CORROSION CONTROL FEDERAL REGISTER VOL-36 N
990001210 MOYSAN,S.R. APCI SAFETY-VALVE-SEAT OXOMAT FLAMMABILITY IN 100-PERCENT GASEOUS OXYGEN APCI-ANAL-R
990002300 APCI SAFETY-VALVES AND RUPTURE-DISCS APCI-POM-SEC-6.02 19P INCLUDING EXHIBITS ABCDE
990000660 FOSTER,R.H. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- IGNITION TEST-APPARATUS, FLORUBE-GREASES, E
990000640 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- CS2 CARBON-DISULFIDE ALIQUIPPA PUMP-SUCTION
990000690 FOSTER,R.H. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- HOUDRY FOAM INSULATION, AND HAVEG GLASS-FIB
990000630 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- SILICON-OILS DOW-CORNING-RF-1-0065, SILICON
990000650 HAT,E. FOSTER,R.H. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- STANDARD IGNITION TEST METHOD, APL PIPING-R
990000620 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- PINE AND MAPLE WOOD, ACTIVATED CARBON APC
990000610 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- SPARK-IGNITION, STANDARD BOMB TEST, LED-PLA
990000670 FOSTER,R.H. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- POLYESTER RESIN IMPREGNATED FIBERGLASS LAV
990000680 FOSTER,R.H. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- EPON-H-60, POLYCEL-440R, AND STYROFOAM, LUB
990000590 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- UCON-TYPE LUBRICANTS, STEEL-PIPES APCI-MA
990000600 KEHAT,E. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- STANDARD PRESSURE BOMBS AND SPARK-IGNITION,
990000700 FOSTER,R.H. APCI SAFETY, HAZARDS, AND EXPLOSION TESTING- TALCUM-POWDER AS A LUBRICANT, TARSET, PLASI
990000970 NT CONTAMINATION- HISTORY, SAMPLING, AND ANALYSIS APCI PLANT MANAGERS SAFETY MEETING-CREIGHTON/PENNSYLVA
990001150 ESCENCE DAMCO-TEFLON TAPE, SANDEM-INDUSTRIAL, CRANE PACKING CO APCI-ANAL-REP-70-368,70-369 1P 10/7/70
990004540 S AND THREADING COMPOUNDS- SANDEN TAPE APCI-IA2A-08 2P 2/21/72
990000900 NING LOX STORAGE TANK-NO-6 SANTA/SUSANA APCI-MEMO-64 03/11/64 1P PLUS 1P ATTACHMENT
990002660 APCI LOX TRANSFER PUMP SCREENS APCI-MEMO-69 01/24/69 2P PLUS 3P ATTACHMENTS
990002910 LAPIN,A. APCI TESTING OF SCREENS TO BE USED IN OXYGEN COMPRESSOR SUCTION APCI-MEMO-71 07/26/71 2P
990001190 W. APCI REGULATOR THREAD SEALANT MOLYLUBE-N APCI-MEMO-63 10/4/63 1P
990001220 BROPHY,M.+ APCI PERMATEX SEALANT-1516- COMPATABILITY TESTS WITH HIGH-PRESSURE OXYGEN APCI-R+D-NOTEBOOK-111
990001180 PING- APPROVED PIPE THREAD SEALANTS APCI-DES-ENG-STD-570.5.1 1P 11/11/60
990004470 APCI SEALANTS AND THREADING COMPOUNDS- PERMATEX-1516 APCI-IA2A-01 1P 2/21/72
990004520 APCI SEALANTS AND THREADING COMPOUNDS- CROSSLITE-FLUOROCARBON-TAPE APCI-IA2A-06 2P 2
990004570 APCI SEALANTS AND THREADING COMPOUNDS- THREE-M FLUOROCARBON-TAPE APCI-IA2A-11 2P 2/2
990004550 APCI SEALANTS AND THREADING COMPOUNDS- CRANE PACKING CO-TAPE APCI-IA2A-09 2P 2/21/
990004500 APCI SEALANTS AND THREADING COMPOUNDS- PUTTI-ROPE NATIONAL GREENHOUSE CO APCI-IA2A-0
990004490 APCI SEALANTS AND THREADING COMPOUNDS- T-FILM ECO MFGR CO APCI-IA2A-03 1P 2/21/72

990004530 APCI SEALANTS AND THREADING COMPOUNDS- DAMCO TAPE APCI-IA2A-07 2P 2/21/72
990004480 APCI SEALANTS AND THREADING COMPOUNDS- TEFLON-TAPE PERMACEL APCI-IA2A-02 2P 2/21/72
990004540 APCI SEALANTS AND THREADING COMPOUNDS- SANDEN TAPE APCI-IA2A-08 2P 2/21/72
990004510 APCI SEALANTS AND THREADING COMPOUNDS- MOLYLUBE-N BEL-RAY CO FARMINGDALE/NJ APCI-IA2
990004560 APCI SEALANTS AND THREADING COMPOUNDS- OXOMAT APCI-IA2A-10 1P 2/21/72
990004580 APCI SEALANTS AND THREADING COMPOUNDS- SODIUM-SILICATE AND CHINA-CLAY-PASTE APCI-IA2A-
990001110 ABMA THREAD LUBRICANT AND SEALANT, ANDEROL-L-536 RUST-PREVENTIVE LEHIGH CHEMICAL CO-CHESTERTOWN-MD., PERMACE
990001160 -SEAL THREAD LUBRICANT AND SEALER- TAPE-SEAL FROM FRIESLAND-PLASTIC COMPANY, PERMACEL-TAPE APCI-ANAL-REP-60
990004880 S, AND SURFACE TREATMENTS- SEALFAS-MASTIC-31-97 BENJAMIN FOSTER CO APCI-IA6A-02 1P 2/21/72
990001300 ALFAS-MASTIC-31-97-LIQUID, SEALFAS-MASTIC-31-97-DRY, PITTSEAL-III-LIQUID, POROUS-INSULATING-MATERIAL FOAM GLAS
990001300 LIQUID, FLEXFAS-82-10-DRY, SEALFAS-MASTIC-31-97-LIQUID, SEALFAS-MASTIC-31-97-DRY, PITTSEAL-III-LIQUID, POROUS-
990000640 ON-FILTER-DEFROST CYL-SEAL SEALING COMPOUND APCI-MAR-87-0-8821 1P 12/61
990001300 YODER,L. APCI SEALING MATERIALS- FLAMMABILITY IN 100-PERCENT GASEOUS OXYGEN FOAMSEAL-30-45-LIQ
990002730 CI OXYGEN FLOW-METER RING SEAL-FLUID APCI-MEMO-70 02/27/70 1P
990001110 INYLCHLORIDE, PLASTIC LEAD SEAL-NO-2-JOHN CRANE APCI-MEMO-59 01/28/59 2P
990001110 UCTS INC, ALUMINUM-OXIDE, SEAM COMPOUND GEON POLYVINYLCHLORIDE, PLASTIC LEAD SEAL-NO-2-JOHN CRANE APCI-MEMO
990003110 A CELLULUBE-550 FLUOROLUBE SEARS-THREAD-CUTTING-OIL APCI-ANAL-REP 1P 7/15/71
990002890 APCI SET-UP AND OPERATING INSTRUCTIONS FOR AIR-PRODUCTS REDI-SET WELDING AND CUTTING QU
990001400 KEL-F-LF3, VERSILUBE-F-50, SF81(40)-SILICONE, PYDRAUL-F-9, DOW-CORNING-4 COMPOUND SILICONE, DOW-CORNING-4X COM
990002840 ST GAUGE EQUIPMENT FAILURE SHAKOPEE APCI-MEMO-68 06/12/68 2P
990004210 PLOSION AND TANKER FIRE AT SHEEPBRIDGE ALLOY CASTINGS LTD APL-MEMO-64 02/5/64 16P
990004060 APL PIPING SELECTION SHEET-CARBON STEEL-WARM OXYGEN SERVICE 150PSIG (CS0.1.5) APL-ENGR-STD-LS.31/1
990004080 APL PIPING SELECTION SHEET-CARBON STEEL-WARM OXYGEN SERVICE 500PSIG (CS05.0) APL-ENGR-STD-LS.31.3
990004090 APL PIPING SELECTION SHEET-CARBON STEEL-WARM OXYGEN SERVICE 720PSIG (CS07.2) APL-ENGR-STD-LS.31.4
990004070 W. APL PIPING SELECTION SHEET-CARBON STEEL-WARM OXYGEN SERVICE 275PSIG (CS02.7) APL-ENGR-STD-LS.31/2
990003700 ELMORE,G. APL SHELL AND TUBE-TYPE-COOLERS FOR OXYGEN SERVICE APL-ENGR-SPEC-E.05 13P 6/1/71
990003690 ELMORE,G. APL SHELL AND TUBE-TYPE-COOLER, OTHER THAN FOR OXYGEN SERVICE (APL-PLANTS) APL-ENGR-
990000600 FLUORINATED SILICON-OILS, SHELL POLYURETHANE FOAM (EPON-FOAM-H-60) APCI-MAR-87-0-8820 1P 8/61
990001400 HAVOLINE-HD-HYDROCARBON, SHELL-2-1176-A-HYDROCARBON, INDOIL CHEMICAL INDOPOL-I-10-POLYBUTENE, INDOPOL-H-300-
990000200 APCI PRESSURE-VESSELS- SHELL-DESIGN APCI-DES-ENG-STD-510.2 4P 2/65
990001890 OCK-LEAK-DETECTOR-TYPE-OG, SHERLOCK-LEAK DETECTOR-WITH-15-PERCENT-METHANOL, SODIUM-NITRITE-SOLUTION INHIBITOR
990001890 THETIC-CORK, MASKING-TAPE, SHERLOCK-LEAK-DETECTOR-TYPE-OG, SHERLOCK-LEAK DETECTOR-WITH-15-PERCENT-METHANOL, SO
990001890 -7-1003, GRIP-CLAD-PRIMER, SHERWIN-WILLIAMS-E41A4, SUPERFLAKE-1822, SUPERIOR-GRAPHITE-CO, CALQUARTZ-SODIUM SIL
990000250 URAL- PERSONNEL PROTECTIVE SHIELDS AND OXYGEN-SYSTEMS APCI-DES-ENG-STD-546.1 9P 1/15/71
990003280 APCI PERSONNEL-PROTECTIVE SHIELDS FOR OXYGEN SYSTEMS APCI-TB-42 3P 9/30/71 APPLICABLE TO APCI-DES-ENG-
990003020 8/71 TO DISCUSS SAFETY OF SHIPBOARD LOX-PLANTS 2P 9/13/71
990005730 ING, EXCESSIVE VIBRATIONS, SHOCK (THERMAL AND PRESSURE), LINE-SURGES APCI-IIF3B-1 1P 2/18/72
990003210 APCI WEAR SAFETY SHOES APCI-SAFETY-GRAM-NO-11 2P 5/14/62
990005420 RE INTEGRITY OF INSULATION SHOP FABRICATED OX STORAGE TANKS APCI-IIA4-1 1P 12/30/71
990005200 S, AND SURFACE TREATMENTS- SHPEROIDAL-GRAPHITE IRON CONTINENTAL-STANDARD-GGG-38 APCI-IA6A-34 1P 2/21/72
990001890 PHITE-CO, CALQUARTZ-SODIUM SILICATE, 3M-DC1252-MARKER-PUTTY, DURABLE-MANUFACTURING COMPANY-GASKET MATERIAL, JO
990003060 PCI OXYGEN INDEX RATING SILICONE-O-RING (1/8-INCH DIA) APCI-IWO-NO-XO-0128 APCI-ANAL-REP-71-399 1P
990004660 RS, AND ADHESIVES- RTV-60, SILICONE-RUBBER COMPOUND WITH SS-4004-SILICONE-PRIMER GE THERMOLITE-12-CURING-CATAL
990001370 N COMPATABILITY TESTS WITH SILICONE-RUBBER GASKET COMPOUND- RTV-60-NP-134372-M235 APCI-R+D-NOTEBOOK-111 P14
990001400 -9, DOW-CORNING-4 COMPOUND SILICONE, DOW-CORNING-4X COMPOUND-SILICONE, FAIRBANKS-SILICONE-DC-44, MORSE GREASE,
990000630 DS, AND EXPLOSION TESTING- SILICON-OILS DOW-CORNING-RF-1-0065, SILICON-OILS DOW-CORNING-RF-1-0065, INDOPOL-POL
990000630 ILS DOW-CORNING-RF-1-0065, SILICON-OILS DOW-CORNING-RF-1-0065, INDOPOL-POLYBUTENE-OIL AMOCO-L-10, INDOPOL-POLY
990000600 N, DOW-CORNING FLUORINATED SILICON-OILS, SHELL POLYURETHANE FOAM (EPON-FOAM-H-60) APCI-MAR-87-0-8820 1P 8/
990005210 S, AND SURFACE TREATMENTS- SILVER APCI-IA6A-35 1P 2/21/72
990004840 PCI GASKETS AND PACKINGS- SINDANYO CS-51-ASBESTOS AND CEMENT BOARDS. NATURAL-UNTREATED-FINISH TURNERS ASBE
990000560 MOYER,W.W. APCI CAUTION- SNIFF TESTING CYLINDERS HAS ITS HAZARDS APCI-SAFETY-GRAM-NO-49 2P 3/26/65
990000100 SCHMOYER,W.W. APCI SNIFF THOSE CYLINDERS BEFORE REFILLING APCI-SAFETY-GRAM-NO-31 2P 8/21/63
990002820 O EXISTING PRESSURE-GAUGES SNUBBER APCI-DES-ENG-STD-531.10.2 2P 12/5/61
990001890 -WITH-15-PERCENT-METHANOL, SODIUM-NITRITE-SOLUTION INHIBITOR CRYOGENIC ENGINEERING CONFERENCE PROCEEDINGS

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990004580 S AND THREADING COMPOUNDS- SODIUM-SILICATE AND CHINA-CLAY-PASTE   APCI-IA2A-12  1P  2/21/72
990004930      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B211-2024-T4   APCI-IA6A-07  2P  2/2
990004960      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B210-6061-T6   APCI-IA6A-10  2P  2/2
990004990      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM B361-WP6061-T6   APCI-IA6A-13  2P  2/21/7
990004870      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS-  TARSET PITTSBURGH CHEMICAL  CO   APCI-IA6A-01  1P
990004940      APCI  METLAS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM, ASTM-B-210-3003   APCI-IA6A-08  2P  2/21
990004910      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-TUBE ASTM-B75   APCI-IA6A-05  1P  2/21/72
990004900      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-PIPE ASTM-B42   APCI-IA6A-04  1P  2/21/72
990004980      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B247-6061-T6   APCI-IA6A-12  2P  2/2
990004890      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- PLASITE-NO-7122H WISCONSIN  PROTECTIVE  COATING  C
990004950      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B209-5083-0   APCI-IA6A-09  2P  2/21
990005000      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- CARBON STEEL  (OXYGEN SERVICE)   APCI-IA6A-14  3P
990004880      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SEALFAS-MASTIC-31-97 BENJAMIN  FOSTER  CO    APCI-I
990004970      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B241-6061-T6   APCI-IA6A-11  2P  2/2
990004920      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- RED-BRASS-PIPE ASTM-B43   APCI-IA6A-06  1P  2/21/7
990005190      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- CARBON STEEL- NON-OXYGEN SERVICE WITH POSSIBLE  EX
990005140      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BRASS-SHEET OR  PLATE ASTM-B36   APCI-IA6A-28  2P
990005110      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BERYLLIUM COPPER   APCI-IA6A-25  2P  2/21/72
990005040      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A320-B8304   APCI-IA6A-18  2P
990005230      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- MUNTZ-METAL  60-40-TYPE  COMPOSITION  CU-58  1-PER
990005010      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A312-TP304   APCI-IA6A-15  2P
990005070      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A182-F-304 AND ASTM-A182-F-31
990005080      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL-TYPE-304 UNIDENTIFIED AS TO  ASTM-
990005160      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A351-GR-CF8   APCI-IA6A-30  2
990005050      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A194-8T321   APCI-IA6A-19  2P
990005030      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A403-WP304 AND  A403-WP304L
990005120      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A269-304   APCI-IA6A-26  2P
990005090      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-SILICON ASTM-B98GRB   APCI-IA6A-23  2P  2/2
990005240      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALPHA BRASS-TYPE TCL-100 OR DTD-5019 TUNGUM  CO  L
990005200      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SHPEROIDAL-GRAPHITE IRON CONTINENTAL-STANDARD-GGG-
990005170      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS  9-PERCENT NICKEL STEEL ASTM-A353GB   AP
990005150      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- MONEL ASTM-B164   APCI-IA6A-29  2P  2/21/72
990005020      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A240-304   APCI-IA6A-16  2P
990005210      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SILVER   APCI-IA6A-35  1P  2/21/72
990005130      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BRONZE ASTM-B61 OR  B62   APCI-IA6A-27  2P  2/21/7
990005100      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- FREE-MACHING BRASS   APCI-IA6A-24  2P  2/21/72
990005060      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEELS-TYPE-416-CADMIUM-PLATED   APCI-IA
990005220      APCI  METALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- NOVONOX STAINLESS STEEL  ALLOY TO DIN GERMAN  NATI
990005180      APCI  METLAS, ALLOYS, SOLDERS, AND SURGACE TREATMENTS- COPPER-TUBE ASTM-B88   APCI-IA6A-32  1P  2/21/72
990000740 ITANIUM, TITANIUM-DIOXIDE, SOLNUS-500, HYDROCARBON-OIL, TITANIUM-TETRACHLORIDE   APCI-MAR-87-0-8822  3P  8/63
990000750 ONT-NEW/JOHNSONVILLE-PLANT SOLNUS-500, TITANIUM-TETRACHLORIDE   APCI-MAR-87-0-8822  2P  9/63
990000540          SMITH,H.  APCI  SOLVENT AND CLEANERS- DEVIATIONS CLEANING FOR OXYGEN SERVICE   APCI-SAFETY-STD-629.
990003980         GILLOTT,E.  APL  SOLVENT WASHING OF PIPING  SYSTEMS   APL-IGD-ENGR-MAN-56-06  4P  7/3/71
990000980 LANT, AND  PLANT EQUIPMENT SOLVENT WASHOUT-FREQUENCIES   APCI-POM-SEC-5.07  3P  7/15/70
990000990            APCI  PLANT SOLVENT WASHOUT-GENERAL   APCI-POM-SEC-1.05  12P  2/20/67
990005280         APCI  CHEMICALS, SOLVENTS, AND  MISC- CARBON-TETRACHLORIDE   APCI-IA7A-04  1P  2/21/72
990005270         APCI  CHEMICALS, SOLVENTS, AND  MISC- CHLOROFORM   APCI-IA7A-03  1P  2/21/72
990005250         APCI  CHEMICALS, SOLVENTS, AND  MISC-  1,1 DICHLOROTHANE   APCI-IA7A-01  1P  2/21/72
990005260         APCI  CHEMICALS, SOLVENTS, AND  MISC-  1,1,1 TRICHLOROETHANE   APCI-IA7A-02  1P  2/21/72
990005300         APCI  CHEMICALS, SOLVENTS, AND  MISC- METHYLENE-CHLORIDE   APCI-IA7A-06  1P  2/21/72
990005290         APCI  CHEMICALS, SOLVENTS, AND  MISC- TRICHLOROETHYLENE   APCI-IA7A-05  1P  2/21/72
990001420  COMBUSTION IN  OXYGEN AND SOXHLET ETHER-EXTRACTION GARLOCK-900, KM-226, KM-246   APCI-ANAL-REP-70-013,70-014,
990001410 N COMBUSTION IN OXYGEN AND SOXHLET ETHER-EXTRACTION MELRATH GARLOCK-900   APCI-ANAL-REP-70-026   APCI-IWO-NO-E
990000600 TANDARD PRESSURE BOMBS AND SPARK-IGNITION, DOW-CORNING FLUORINATED SILICON-OILS, SHELL POLYURETHANE FOAM (EPON
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990000610 OS, AND EXPLOSION TESTING- SPARK-IGNITION, STANDARD BOMB TEST, LEO-PLATE-251, PIPE-DOPE   APCI-MAR-87-0-8820
990003410 KRILL,W.R.  APCI  STANDARD SPECIFICATION FOR A FIELD-FABRICATED CRYOGENIC LIQUID STORAGE-TANK  (FLAT-BOTTOM)
990003360 OEHMKE,G.R.  APCI  GENERAL SPECIFICATION FOR CENTRIFUGAL COMPRESSORS   APCI-550-SD-16A  37P  4/15/65
990003350 OEHMKE,G.R.  APCI  GENERAL SPECIFICATION FOR CLEANING FOR OXYGEN  SERVICE   APCI-550-SD-27A  5P  12/10/59
990003660          PEGRAM,J.W.  APL  SPECIFICATION FOR OXYGEN SERVICE VESSEL  FABRICATION   APL-ENGR-SPEC-C.03  7P  7/26
990003670          PEGRAM,J.W.  APL  SPECIFICATION FOR OXYGEN SERVICE PRESSURE-VESSEL  FABRICATION   APL-ENGR-SPEC-C.04
990003370  STOLZ,J.L.  APCI  GENERAL SPECIFICATION FOR RECIPROCATING COMPRESSORS   APCI-550-SD-01A  37P  3/9/64
990003420      KRILL,W.R.  APCI  JOB SPECIFICATION  310000  GALLON CAPACITY LOX/LIN STORAGE  TANK   APCI-JOB  SPECIFICAT
990003380         APCI  CONSTRUCTION SPECIFICATIONS GENERAL  CONSTRUCTION AND EQUIPMENT  ERECTION OXYGEN COMPRESSION  SY
990000880 APCI  REQUIREMENTS FOR IPD SPECIFIED PAINT  SYSTEMS   APCI-QUAL-CONT-LAYOUT-120F  3P  7/1/71
990005500 APCI  OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE   APCI-IID-1  2P  9/3/71
990005540 APCI  OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE DETECTION- QUANTITY AND RESPONSE  TIME  LIMITS   APCI-IID4-1  1P
990005510 APCI  OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE DRAINAGE AND  ULTIMATE DISPOSAL ARRANGEMENTS   APCI-IID1-1  2P
990005530 APCI  OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE ENVIRONMENTAL  WARNINGS AND ESCAPE  SYSTEMS   APCI-IID3-1  1P  8
990005520 APCI  OPERATIONAL-HAZARDS- SPILLS AND LEAKAGE SEPARATION OF INCOMPATIBLE MATERIALS AND IGNITION SOURCES IN DIS
990000710 N-PRESSURE-GAUGE TWF WOOL, SPINTEX-305, MOLYKOTE-TYPE-Z AND  TYPE-X-15   APCI-MAR-87-0-8822  1P  3/63
990001850 TY VALVE WITH CARBON STEEL SPRING   APCI-IWO-NO-10-7071   APCI-PROJECT-NO-00-5-3246-51.12.50   APCI-TM-079  3P
990001350 NIVERSAL-JOINTING COMPOUND SQ-32 AND VITON A   APCI-IWO-NO-81-0095  1P  4/27/66
990004660 ICONE-RUBBER COMPOUND WITH SS-4004-SILICONE-PRIMER GE THERMOLITE-12-CURING-CATALYST   APCI-IA4A-01  1P  2/21/7
990003920 OSTAR-GB114 LOX-PUMP ON AN SSPC  LOX-TANKER   APL-SAFETY-DEPT-REP-32  9P  7/10/70
990003860  OXYGEN COMPRESSOR FIRE AT SSPC ROGNAC  PLANT  3/2/71   APL-SAFETY-BULL-107  3P  4/14/71
990003260          KITSON,F.K.  APCI  STAFFING AND  CHECK-IN  SYSTEMS FOR  OPERATING-PLANTS   APCI-MEMO-68  06/25/68  2P
990005170 S, AND SURFACE TREATMENTS- STAINLESS  9-PERCENT NICKEL STEEL ASTM-A353GB   APCI-IA6A-31  2P  2/21/72
990004020 OF  9% NICKEL AND HI-PROOF STAINLESS STATIC-TANKS FOR  OXYGEN SERVICE   APL-QCP-413  REV.0  1P
990005070 S, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A182-F-304 AND ASTM-A182-F-316   APCI-IA6A-21  2P  2/21/72
990005050 S, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A194-8T321   APCI-IA6A-19  2P  2/21/72
990005020 S, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A240-304   APCI-IA6A-16  2P  2/21/72
990005120 S, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A269-304   APCI-IA6A-26  2P  2/21/72
990005010 S, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A312-TP304   APCI-IA6A-15  2P  2/21/72
990005040 S, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A320-B8304   APCI-IA6A-18  2P  2/21/72
990005160 S, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A351-GR-CF8   APCI-IA6A-30  2P  2/21/72
990005030 S, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A403-WP304 AND  A403-WP304L   APCI-IA6A-17  2P  2/21/72
990005220 URFACE TREATMENTS- NOVONOX STAINLESS STEEL  ALLOY TO DIN GERMAN NATIONAL  STANDARDS  COMPOSITION  5-PERCENT-C
990001820 20F TO  150F  150-PSIG-MAX STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.40.1  3P  9/69
990001790 D BELOW  3000-PSIG-MAX-OWG STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.6  3P  1/64
990001780 D BELOW  1715-PSIG-MAX-OWG STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.5  3P  1/64
990001800 D BELOW  3600-PSIG-MAX-OWG STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.8  3P  1/64
990001760 ND BELOW  615-PSIG-MAX-OWG STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.3  4P  11/67
990001740 - PLAIN-AND-THREADED-ENDS- STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.1  7P  5/62
990001810 ND BELOW  720-PSIG-MAX-OWG STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.15  4P  11/67
990001750 ND BELOW  275-PSIG-MAX-OWG STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.2  4P  11/67
990001770 D BELOW  1235-PSIG-MAX-OWG STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.4  3P  1/64
990005080 S, AND SURFACE TREATMENTS- STAINLESS STEEL-TYPE-304 UNIDENTIFIED AS TO  ASTM-SPEC   APCI-IA6A-22  2P  2/21/72
990001880 I  IGNITION-LIMITS OF SOME STAINLESS STEELS IN AN  OXYGEN-ATMOSPHERE   APCI-PROJECT-NO-00-7-3480-51.00   APCI-
990005060 S, AND SURFACE TREATMENTS- STAINLESS STEELS-TYPE-416-CADMIUM-PLATED   APCI-IA6A-20  1P  2/21/72
990000370 ION-JOINTS AND ALUMINUM TO STAINLESS-STEEL   APCI-DES-ENG-STD-579.15  2P  9/66
990001020 AND FABRICATIONS, CLEANING STAINLESS-STEEL AND COPPER-PIPE  FITTINGS  PARTS AND FABRICATIONS DESCRIPTION OF CL
990004280 ES OF OIL-CONTAMINATION OF STAINLESS-STEEL  SURFACES EXPOSED TO  GASEOUS  OXYGEN   APL-SAFETY-DEPT-INFO-SHEET-
990000340          APCI  PIPING- STAINLESS-STEEL VALVES AND MATERIAL REQUIREMENTS   APCI-DES-ENG-STD-579.3.1  2P  5/
990000580 SES,  SUPPORTED BY BRAIDED STAINLESS-STEEL-HOUSING, AND RUBBER-HOSES  PLASITE-NO-7122H   APCI-MAR-87-0-8820  1
990000610 N TESTING- SPARK-IGNITION, STANDARD BOMB TEST, LEO-PLATE-251, PIPE-DOPE   APCI-MAR-87-0-8820  1P  9/61
990002420  FIRE  PREVENTION  ASSOC  STANDARD FOR THE  INSTALLATION AND OPERATION OF OXYGEN-FUEL GAS  SYSTEMS FOR WELDIN
990001090 T,E.  APCI  DEVELOPMENT OF STANDARD IGNITION TEST   APCI-PROJECT-NO-87-0-8820/1  8P  11/17/61
990001360 T,E.  APCI  DEVELOPMENT OF STANDARD IGNITION TEST METHYLENE-CHLORIDE- DICHLOROETHANE- TRICHLOROETHANE- TRICHLO
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990000650 DS, AND EXPLOSION TESTING- STANDARD IGNITION TEST METHOD, APL PIPING-RESIDUE, METHYLENE-CHLORIDE   APCI-MAR-87
990003390                       ASTM  STANDARD PICTORIAL SURFACE PREPARATION  STANDARDS FOR PAINTING STEEL  SURFACES  AS
990000600 DS, AND EXPLOSION TESTING- STANDARD PRESSURE BOMBS AND SPARK-IGNITION, DOW-CORNING FLUORINATED SILICON-OILS, S
990003410          KRILL,W.R.  APCI  STANDARD SPECIFICATION FOR A FIELD-FABRICATED CRYOGENIC LIQUID STORAGE-TANK  (FLAT-
990000180 L-DESIGN-BASIS AND GENERAL STANDARDS   APCI-DES-ENG-STD-510.1  6P  8/62
990005600 E  TRANSPORTATION- LIST OF STANDARDS   APCI-IIF2-1  2P  2/18/72
990003990 URE FOR DECONTAMINATION OF STATIC-TANK AND ROAD-VEHICLE-ASSEMBLIES FOR  OXYGEN SERVICE   APL-QCP-Q10  REV.0  2
990004010 G OF ALUMINUM  TANKERS AND STATIC-TANKS FOR  OXYGEN SERVICE   APL-QCP-Q12  REV.0  1P
990004020 KEL AND HI-PROOF STAINLESS STATIC-TANKS FOR  OXYGEN SERVICE   APL-QCP-Q13  REV.0  1P
990001730    3600-PSIG-MAX-OWG CARBON STEEL   APCI-DES-ENG-STD-578.10.6  3P  6/62
990001690 F  275-PSIG-MAX-OWG CARBON STEEL   APCI-DES-ENG-STD-578.10.2  4P  10/69
990005070 FACE TREATMENTS- STAINLESS STEEL ASTM-A182-F-304 AND ASTM-A182-F-316   APCI-IA6A-21  2P  2/21/72
990005050 FACE TREATMENTS- STAINLESS STEEL ASTM-A194-8T321   APCI-IA6A-19  2P  2/21/72
990005020 FACE TREATMENTS- STAINLESS STEEL ASTM-A240-304   APCI-IA6A-16  2P  2/21/72
990005120 FACE TREATMENTS- STAINLESS STEEL ASTM-A269-304   APCI-IA6A-26  2P  2/21/72
990005010 FACE TREATMENTS- STAINLESS STEEL ASTM-A312-TP304   APCI-IA6A-15  2P  2/21/72
990005040 FACE TREATMENTS- STAINLESS STEEL ASTM-A320-B8304   APCI-IA6A-18  2P  2/21/72
990005160 FACE TREATMENTS- STAINLESS STEEL ASTM-A351-GR-CF8   APCI-IA6A-30  2P  2/21/72
990005170 TAINLESS  9-PERCENT NICKEL STEEL ASTM-A353GB   APCI-IA6A-31  2P  2/21/72
990005030 FACE TREATMENTS- STAINLESS STEEL ASTM-A403-WP304 AND  A403-WP304L   APCI-IA6A-17  2P  2/21/72
990001870  IGNITION-LIMITS OF CARBON STEEL IN OXYGEN-NITROGEN-ATMOSPHERES   APCI-IWO-NO-LB-0043   APCI-TM-112  6P  5/8/6
990005220 ATMENTS- NOVONOX STAINLESS STEEL  ALLOY TO DIN GERMAN  NATIONAL  STANDARDS  COMPOSITION  5-PERCENT-CR  17-PERC
990003390 ON  STANDARDS FOR PAINTING STEEL  SURFACES   ASTM-D2200-67  2P  1967
990005000 SURFACE TREATMENTS- CARBON STEEL  (OXYGEN SERVICE)   APCI-IA6A-14  3P  2/21/72
990001020   APCI  CLEANING OF CARBON STEEL PIPE AND FITTINGS, CLEANING ALUMINUM-PIPE  FITTINGS  PARTS AND FABRICATIONS,
990001860 KEHAT,E.  APCI  BURNING OF STEEL PIPES IN A  FLOWING OXYGEN  STREAM   APCI-MEMO-61  04/17/61  3P PLUS  7P ATTA
990001850 H SAFETY VALVE WITH CARBON STEEL SPRING   APCI-IWO-NO-10-7071   APCI-PROJECT-NO-00-5-3246-51.12.50   APCI-TM-0
990005190 SURFACE TREATMENTS- CARBON STEEL- NON-OXYGEN SERVICE WITH POSSIBLE  EXPOSURE TO  OXYGEN   APCI-IA6A-33  3P  2/
990001820 OF  150-PSIG-MAX STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.40.1  3P  9/69
990001740 O-THREADED-ENDS- STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.1  7P  5/62
990001720   2000-PSIG-MAX-OWG CARBON STEEL-PIPE   APCI-DES-ENG-STD-578.10.5  4P  1/64
990001700 F  720-PSIG-MAX-OWG CARBON STEEL-PIPE   APCI-DES-ENG-STD-578.10.3  3P  6/62
990001760 615-PSIG-MAX-OWG STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.3  4P  11/67
990001770 235-PSIG-MAX-OWG STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.4  3P  1/64
990001680 -AND-THREADED-ENDS- CARBON STEEL-PIPE   APCI-DES-ENG-STD-578.10.1  6P  10/65
990001800 600-PSIG-MAX-OWG STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.8  3P  1/64
990001810 720-PSIG-MAX-OWG STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.15  4P  11/67
990001710    1440-PSIG-MAX-OWG CARBON STEEL-PIPE   APCI-DES-ENG-STD-578.10.4  4P  1/64
990001750 275-PSIG-MAX-OWG STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.2  4P  11/67
990001780 715-PSIG-MAX-OWG STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.5  3P  1/64
990001790 000-PSIG-MAX-OWG STAINLESS STEEL-PIPE   APCI-DES-ENG-STD-578.30.6  3P  1/64
990001840 F  150-PSIG-MAX-OWG CARBON STEEL-PIPE   APCI-DES-ENG-STD-578.10.19  2P  6/62
990000590 ING- UCON-TYPE LUBRICANTS, STEEL-PIPES   APCI-MAR-87-0-8820  1P  4/61
990005080 FACE TREATMENTS- STAINLESS STEEL-TYPE-304 UNIDENTIFIED AS TO  ASTM-SPEC   APCI-IA6A-22  2P  2/21/72
990004060 ING SELECTION SHEET-CARBON STEEL-WARM  OXYGEN SERVICE  150PSIG  (CSO.1.5)   APL-ENGR-STD-LS.31/1  7P  6/12/70
990004090 ING SELECTION SHEET-CARBON STEEL-WARM  OXYGEN SERVICE  720PSIG  (CS07.2)   APL-ENGR-STD-LS.31.4  6P  6/12/70
990004080 ING SELECTION SHEET-CARBON STEEL-WARM  OXYGEN SERVICE  500PSIG  (CS05.0)   APL-ENGR-STD-LS.31.3  6P  6/12/70
990004070 ING SELECTION SHEET-CARBON STEEL-WARM  OXYGEN SERVICE  275PSIG  (CS02.7)   APL-ENGR-STD-LS.31/2  6P  1/29/70
990001890  ASBESTOS, ALUMINUM-CHIPS, STEEL-WOOL, MAGNESIUM-CHIPS, MAGNESIUM-SHEET, DYE-PENETRANTS, MAGNOGLO-PASTE10 IN
990001880 N-LIMITS OF SOME STAINLESS STEELS IN AN  OXYGEN-ATMOSPHERE   APCI-PROJECT-NO-00-7-3480-51.00   APCI-TM-114  5P
990000040 F.K.  APCI  APPROVED ALLOY STEELS IN CRYOGENIC SERVICE   APCI-SAFETY-GRAM-NO-10-REV-1  1P  10/25/63
990005060 FACE TREATMENTS- STAINLESS STEELS-TYPE-416-CADMIUM-PLATED   APCI-IA6A-20  1P  2/21/72
990003930 STAR LOX-PUMP EXPLOSION AT STOKE  PLANT  8/7/70   APL-SAFETY-DEPT-REP-34  14P  8/24/70
990004140 OGENIC TANKERS BY  PUMP AT STOKE-ON-TRENT   APL-IGD-ENGR-MAN-50-03  3P  5/27/71
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990000160 RE-VESSELS- GASEOUS OXYGEN STORAGE CYLINDER   APCI-DES-ENG-STD-515.1.3  3P  10/17/60
990003420 O GALLON CAPACITY LOX/LIN STORAGE  TANK   APCI-JOB  SPECIFICATION FOR  JOB-NO-00-2-2775   APCI-NO-71-2775-16.
990003430 ARGE, WELDED, LOW-PRESSURE STORAGE  TANKS   API  STANDARD-620  2/70
990000890         MASTER,H.H.  APCI  STORAGE TANK CLEANING   APCI-MEMO-63  01/24/63  1P
990000900 Y,A.L.  APCI  CLEANING LOX STORAGE TANK-NO-6 SANTA/SUSANA   APCI-MEMO-64  03/11/64  1P PLUS  1P ATTACHMENT
990005580 BRICATED CRYOGENIC  LIQUID STORAGE TANKS   APCI-IIF1-3  1P  2/3/72
990005560 ER PRODUCTION TO  STORAGE, STORAGE TO SYSTEM,  STORAGE TO  TRANSPORT, TRANSPORT TO  SYSTEM   APCI-IIF1-1  1P
990005570 XYGEN-TRANSFER PRODUCTION, STORAGE TO SYSTEM,  STORAGE TO  TRANSPORT, TRANSPORT TO  SYSTEM LOADING AND UNLOADI
990003410 ABRICATED CRYOGENIC LIQUID STORAGE-TANK  (FLAT-BUTTOM)   APCI-99820A  18P  9/15/71
990000480   APCI  PLANT COMPONENTS- STORAGE, CONVERTER-SYSTEM, AND CRYOGENIC-LIQUIDS   APCI-SAFETY-STD-607.2.1.1  3P  4
990000490   APCI  PLANT COMPONENTS- STORAGE, VACUUM-SYSTEMS, AND COMPRESSED-GASES   APCI-SAFETY-STD-607.2.2.5  P1-4  3/
990005370 LITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY   APCI-IB2A-1  2P  9/2/71
990005390 LITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY FABRICATION AND WELDING   APCI-IB2D-1  2P  10/28
990005360 LITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY   APCI-IB2-1  2P  2/10/72
990005380 LITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY NOTCH-SENSITIVITY OF MATERIALS   APCI-IB2C-1  1P
990005400 LITY, COMPATIBILITY CHECK, STRUCTURAL-MATERIALS-COMPATIBILITY MATERIALS AND PARTS SUITABILITY  CONTROLS   APCI
990005700 SPECTION WHERE WHY AND HOW STRUCTURE   APCI-IIIA1-1  1P  9/12/71
990002010 LATIONSHIP OF THE CHEMICAL STRUCTURE OF CUTTING OILS TO THEIR OXYGEN-COMPATIBILITY   AICHE-CEP-TECH-MANUAL  SA
990000660 N-F, FOAM-TYPE INSULATIONS STYROFOAM AND POLYURETHANE-FOAM-INSULATION, RAYBESTOS-MANHATTAN-PACKING, AND  IMPRE
990000680 ON-H-60, POLYCEL-440R, AND STYROFOAM, LUBRICANTS, MOLY-SPRAY-KOTE, AND DRI-LUBE   APCI-MAR-87-0-8821  1P  4/62
990000920 APCI  WASHOUT  ANALYSIS OF SUN-OIL COMPANY_S LOX-TANK VAPORIZER   APCI-MEMO-64  04/9/64  1P PLUS  1P ATTACHMEN
990001890 R, SHERWIN-WILLIAMS-E41A4, SUPERFLAKE-1822, SUPERIOR-GRAPHITE-CO, CALQUARTZ-SODIUM SILICATE, 3M-DC1252-MARKER-
990001890 MS-E41A4, SUPERFLAKE-1822, SUPERIOR-GRAPHITE-CO, CALQUARTZ-SODIUM SILICATE, 3M-DC1252-MARKER-PUTTY, DURABLE-MA
990003680  APL  BRAZED CORE EXTENDED SURFACE HEAT-EXCHANGERS   APL-ENGR-SPEC-E.02  9P  6/28/70
990003390   ASTM  STANDARD PICTORIAL SURFACE PREPARATION  STANDARDS FOR PAINTING STEEL  SURFACES   ASTM-D2200-67  2P  19
990004870 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS-  TARSET PITTSBURGH CHEMICAL  CO   APCI-IA6A-01  1P  2/21/72
990005240 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALPHA BRASS-TYPE TCL-100 OR DTD-5019 TUNGUM  CO  LTD/UK COMPOSI
990004930 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B211-2024-T4   APCI-IA6A-07  2P  2/21/72
990004990 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM B361-WP6061-T6   APCI-IA6A-13  2P  2/21/72
990004970 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B241-6061-T6   APCI-IA6A-11  2P  2/21/72
990004950 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B209-5083-0   APCI-IA6A-09  2P  2/21/72
990004980 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B247-6061-T6   APCI-IA6A-12  2P  2/21/72
990004940 TLAS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM, ASTM-B-210-3003   APCI-IA6A-08  2P  2/21/72
990004960 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- ALUMINUM ASTM-B210-6061-T6   APCI-IA6A-10  2P  2/21/72
990005110 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BERYLLIUM COPPER   APCI-IA6A-25  2P  2/21/72
990005140 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BRASS-SHEET OR  PLATE ASTM-B36   APCI-IA6A-28  2P  2/21/72
990005130 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- BRONZE ASTM-B61 OR B62   APCI-IA6A-27  2P  2/21/72
990005000 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- CARBON STEEL  (OXYGEN SERVICE)   APCI-IA6A-14  3P  2/21/72
990005190 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- CARBON STEEL- NON-OXYGEN SERVICE WITH POSSIBLE  EXPOSURE TO  OX
990004910 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-TUBE ASTM-B75   APCI-IA6A-05  1P  2/21/72
990004900 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-PIPE ASTM-B42   APCI-IA6A-04  1P  2/21/72
990005090 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- COPPER-SILICON ASTM-B98GR8   APCI-IA6A-23  2P  2/21/72
990005100 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- FREE-MACHING BRASS   APCI-IA6A-24  2P  2/21/72
990005150 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- MONEL ASTM-B164   APCI-IA6A-29  2P  2/21/72
990005230 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- MUNTZ-METAL  60-40-TYPE  COMPOSITION  CU-58  1-PERCENT ZN38.5-4
990005220 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- NOVONOX STAINLESS STEEL  ALLOY TO DIN GERMAN  NATIONAL  STANDAR
990004890 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- PLASITE-NO-7122H WISCONSIN  PROTECTIVE  COATING  CO   APCI-IA6A
990004920 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- RED-BRASS-PIPE ASTM-B43   APCI-IA6A-06  1P  2/21/72
990004880 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SEALFAS-MASTIC-31-97 BENJAMIN  FOSTER  CO   APCI-IA6A-02  1P  2
990005200 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SHPEROIDAL-GRAPHITE IRON CONTINENTAL-STANDARD-GGG-38   APCI-IA6
990005210 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- SILVER   APCI-IA6A-35  1P  2/21/72
990005010 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A312-TP304   APCI-IA6A-15  2P  2/21/72
990005020 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A240-304   APCI-IA6A-16  2P  2/21/72
990005170 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS  9-PERCENT NICKEL STEEL ASTM-A353GB   APCI-IA6A-31  2
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990005060 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL-TYPE-304 UNIDENTIFIED AS TO  ASTM-SPEC   APCI-I
990005030 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A403-WP304 AND A403-WP304L   APCI-IA6A-17
990005070 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A182-F-304 AND ASTM-A182-F-316   APCI-IA6A
990005060 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEELS-TYPE-416-CADMIUM-PLATED   APCI-IA6A-20  1P  2/
990005160 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A351-GR-CF8   APCI-IA6A-30  2P  2/21/72
990005120 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A269-304   APCI-IA6A-26  2P  2/21/72
990005040 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A320-B8304   APCI-IA6A-18  2P  2/21/72
990005050 TALS, ALLOYS, SOLDERS, AND SURFACE TREATMENTS- STAINLESS STEEL ASTM-A194-8T321   APCI-IA6A-19  2P  2/21/72
990005180 TLAS, ALLOYS, SOLDERS, AND SURGACE TREATMENTS- COPPER-TUBE  ASTM-B88   APCI-IA6A-32  1P  2/21/72
990005780 PCI  MAINTENANCE  PROGRAM- SYSTEM CHECK AND INSPECTION WHERE WHY AND HOW  SYSTEM  INSTRUMENTATION AND  CONTROL
990005800 PCI  MAINTENANCE  PROGRAM- SYSTEM CHECK AND INSPECTION WHERE WHY AND HOW GENERAL CONSIDERATIONS OF THE AGING
990005760 APCI  MAINTENANCE  PROGRAM SYSTEM CHECK AND INSPECTION WHERE WHY AND HOW STRUCTURE   APCI-IIIA1-1  1P  9/12/71
990005770 PCI  MAINTENANCE  PROGRAM- SYSTEM CHECK AND INSPECTION WHERE WHY AND HOW LEAKS   APCI-IIIA2-1  1P  9/12/71
990005790 PCI  MAINTENANCE  PROGRAM- SYSTEM CHECK AND INSPECTION WHERE WHY AND HOW INSULATION CHECK   APCI-IIIA4-1  1P
990005810 PCI  MAINTENANCE  PROGRAM- SYSTEM  CHECK AND INSPECTION WHERE WHY AND HOW  PREVENTIVE  MAINTENANCE  PROGRAM
990005840                       APCI SYSTEM-EMERGENCIES   APCI-IV-1  1P  12/23/71
990005890                       APCI SYSTEM-EMERGENCIES HAZARDS  PROTECTION GENERAL PRECAUTIONS   APCI-IVE-1  2P  11/8/7
990005900                       APCI SYSTEM-EMERGENCIES HAZARDS  PROTECTION APL-BULLETINS AND REPORTS ON  VARIOUS PROBLE
990005880                       APCI SYSTEM-EMERGENCIES PROTECTION BUILDINGS AND  ADJACENT  SYSTEMS  PROTECTION   APCI-I
990005870                       APCI SYSTEM-EMERGENCIES PROTECTION PERSONNEL   APCI-IVC1-1  6P  1/13/72
990005850                       APCI SYSTEM-EMERGENCIES SAFETY  TRAINING AND  AREA  PLACARDING   APCI-IVA-1  4P  11/5/71
990005860                       APCI SYSTEM-EMERGENCIES WARNING DEVICES   APCI-IVB-1  5P  11/12/71
990005590 - OXYGEN-TRANSFER  SYSTEMS SYSTEMS- APL OXYGEN-TRANSFER METHODS TYPICAL  INSTALLATIONS, AND  OPERATIONS DEPART
990005580 - OXYGEN-TRANSFER  SYSTEMS SYSTEMS- FIELD  FABRICATED CRYOGENIC  LIQUID STORAGE TANKS   APCI-IIF1-3  1P  2/3/7
990005560 ON TO  STORAGE, STORAGE TO SYSTEM,  STORAGE TO  TRANSPORT, TRANSPORT TO  SYSTEM   APCI-IIF1-1  1P  12/22/71
990005570 FER PRODUCTION, STORAGE TO SYSTEM,  STORAGE TO  TRANSPORT, TRANSPORT TO  SYSTEM LOADING AND UNLOADING PROCEDUR

990003900 ERSON,I.  APL  ACCIDENT AT T TURNER  LTD PARK/LANE  ROYTON  OLDHAM  LANCASTER  11940 AM  5/2/70   APL-SAFETY-D
990002020 SAFETY  CONTROL PROCEDURE- TAG OUT   APCI-POM-SEC-1.03   2P PLUS  EXHIBIT-A  1P  2/15/67
990002080 AFETY  CONTROL PROCEDURES- TAG OUT PROCEDURE   APCI-SAFETY-STD-626.3.3  2P  5/62
990000700 DS, AND EXPLOSION TESTING- TALCUM-POWDER AS A LUBRICANT, TARSET, PLASITE   APCI-MAR-87-0-8821  1P  7/62
990001890 BUTYL-RUBBER, IRON-OXIDES, TALC, ASBESTOS, ALUMINUM-CHIPS, STEEL-WOOL, MAGNESIUM-CHIPS, MAGNESIUM-SHEET, DYE-P
990004170 NSTALLATION OF A CRYOGENIC TANK   APL-IGD-ENGR-MAN-60-01  6P  5/19/71
990000890 MASTER,H.H.  APCI  STORAGE TANK CLEANING   APCI-MEMO-63  01/24/63  1P
990004120 DURE FOR FILLING CRYOGENIC TANKER BY  PUMP AT CARRINGTON   APL-IGD-ENGR-MAN-50-01  3P  5/27/71
990004210 KIFUGAL PUMP EXPLOSION AND TANKER FIRE AT SHEEPBRIDGE  ALLOY  CASTINGS  LTD   APL-MEMO-64  02/5/64  16P
990003890 N EXPLOSION OF LOX-PUMP ON TANKER-400-11  1/7/70 AT JOHN/SUMMERS  STEEL  WORKS/SHOTTON PUMP-TYPE-GB114-SERIAL-
990003940 TAR-GB.114-PUMP-NO-C.75 ON TANKER-400-11  2/17/71 AT THE CARRINGTON  PLANT   APL-SAFETY-DEPT-REP-35  7P PLUS
990003140 E  DISCS  MANUFACTURED LOX TANKERS BY AMETEK   APCI-MEMO-71  06/22/71  1P
990004130 DURE FOR FILLING CRYOGENIC TANKERS BY  PUMP AT BRACKNELL   APL-IGD-ENGR-MAN-50-02  3P  5/27/71
990004140 DURE FOR FILLING CRYOGENIC TANKERS BY  PUMP AT STOKE-ON-TRENT   APL-IGD-ENGR-MAN-50-03  3P  5/27/71
990000900 APCI  CLEANING LOX STORAGE TANK-NO-6 SANTA/SUSANA   APCI-MEMO-64  03/11/64  1P PLUS  1P ATTACHMENT
990001950 SED  GAS  ASSOC  INSULATED TANK-TRUCK  SPECIFICATION CGA-341 FOR COLD LIQUEFIED-GASES   CGA-PAMPHLET-341-TENTA
990005580  CRYOGENIC  LIQUID STORAGE TANKS   APCI-IIF1-3  1P  2/3/72
990000910      MASTER,H.H.  APCI  LOX TANKS   APCI-MEMO-70  06/26/70  1P
990000390 INTING- COLD-BOXES THERMAL TANKS PERLITE   APCI-DES-ENG-STD-581.1  4P  5/26/61
990000410 NTING- COLD-BOXES, THERMAL TANKS, GLASS WOOL   APCI-DES-ENG-STD-581.3  1P  10/24/60
990004530 THREADING COMPOUNDS- DAMCO TAPE   APCI-IA2A-07  2P  2/21/72
990004540 HREADING COMPOUNDS- SANDEN TAPE   APCI-IA2A-08  2P  2/21/72
990001150 FREDERICK,L.  APCI  TEFLON TAPE PERCENT ETHER EXTRACTABLE CONTAMINANTS AND FLUORESCENCE DAMCO-TEFLON TAPE, SAN
990001130  OF CROSSLITE FLUOROCARBON TAPE THREE-M-FLUOROCARBON-TAPE, PERMACEL-TAPE   APCI-MEMO-63  07/30/63  1P
990001160           YODER,L.  APCI TAPE-SEAL THREAD LUBRICANT AND SEALER-  TAPE-SEAL FROM FRIESLAND-PLASTIC COMPANY, P
990001150  FLUORESCENCE DAMCO-TEFLON TAPE, SANDEN-INDUSTRIAL, CRANE  PACKING  CO   APCI-ANAL-REP-70-368,70-369  1P  10/7
990001490           BROPHY,M.  APCI TARSET PIPE-COATING THE PLASITE TESTS  MANUFACTURED BY PITTSBURGH  CHEMICAL  CO  A
990004870   AND SURFACE TREATMENTS-  TARSET PITTSBURGH CHEMICAL  CO   APCI-IA6A-01  1P  2/21/72
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990000700 CUM-POWDER AS A LUBRICANT, TARSET, PLASITE   APCI-MAR-87-0-8821  1P  7/62
990005240 EATMENTS- ALPHA BRASS-TYPE TCL-100 OR DTD-5019 TUNGUM  CO  LTD/UK COMPOSITION-  COPPER-86-PERCENT  ALUM-1.20-P
990001890 LM-SPRAYABLE-A, DRILUBE-1, TEFLON DISPERSION-T-FILM, HYDROCARBON-GREASE, HYDRAULIC-OIL, CHLORINATED-BIPHENYL-A
990001440 PREGNATED ASBESTOS-PACKING TEFLON  COATED  ASBESTOS-BLUE   APCI-MEMO-60  09/30/60  2P PLUS  1P ATTACHMENT
990001150        FREDERICK,L.  APCI  TEFLON TAPE PERCENT ETHER EXTRACTABLE CONTAMINANTS AND FLUORESCENCE DAMCO-TEFLON TA
990000570 KINETICS EXPERIMENTATION- TEFLON-HOSE   APCI-MAR-87-0-8820  1P  5/60
990000580 LLED KINETICS EXPERIMENTS- TEFLON-HOSES,  SUPPORTED BY BRAIDED STAINLESS-STEEL-HOUSING, AND RUBBER-HOSES  PLAS
990004480 S AND THREADING COMPOUNDS- TEFLON-TAPE PERMACEL   APCI-IA2A-02  2P  2/21/72
990004820 PCI  GASKETS AND PACKINGS- TEFLON, DUPONT   APCI-IA5A-10  2P  2/21/72
990001890   POLYTETRAFLUOROETHYLENE, TEFLON, POLYTRICHLOUROVINYLCHLORIDE, KEL-F, POLYHEXAFLUOROPROPYLENE VITON A VINYLID
990002220          LAPIN,A.  APCI  TELEPHONE CONVERSATION WITH  MR  WILLIAM MCCORMICK REGARDING REQUIREMENTS FOR VENDO
990000660 XPLOSION TESTING- IGNITION TEST-APPARATUS, FLORUBE-GREASES, EPOXY COMPOUNDS DEVCON-2-TON AND DEVCON-F, FOAM-TY
990000610 RK-IGNITION, STANDARD BOMB TEST, LED-PLATE-251, PIPE-DOPE   APCI-MAR-87-0-8820  1P  9/61
990003110 PES OF OILS- MOBIL-DTE-105 TEXACO-CAPPELLA-AA CELLULUBE-550 FLUOROLUBE SEARS-THREAD-CUTTING-OIL   APCI-ANAL-RE
990003910 TIGATION OF VALVE FIRES AT TEXAS  INSTRUMENTS  LTD-BEDFORD   APL-SAFETY-DEPT-REP-31  5P  REV-1  2/11/71
990004740 PCI  GASKETS AND PACKINGS- TFE-GF-GREEN, MELRATH  GASKETS  CO   APCI-IA5A-02  1P  2/21/72
990004650                       APCI  THERMAL AND ELECTRICAL  INSULATIONS- NATIONAL-GYPSUM-BLUE NATIONAL-GYPSUM CORP   AP
990004630                       APCI  THERMAL AND ELECTRICAL  INSULATIONS- PERLITE   APCI-IA3A-05  1P  2/21/72
990004600                       APCI  THERMAL AND ELECTRICAL  INSULATIONS- TRANSITE, JOHNS-MANVILLE   APCI-IA3A-02  1P  2
990004620                       APCI  THERMAL AND ELECTRICAL  INSULATIONS- MINERAL-WOOL   APCI-IA3A-04  1P  2/21/72
990004640                       APCI  THERMAL AND ELECTRICAL  INSULATIONS- MILFOAM MILFOAM CORP   APCI-IA3A-06  1P  2/21/
990004610                       APCI  THERMAL AND ELECTRICAL  INSULATIONS- GLASS-WOOL   APCI-IA3A-03  1P  2/21/72
990004590                       APCI  THERMAL AND ELECTRICAL  INSULATIONS- FOAMGLAS  (CELLULAR-GLASS)  INSULATION, PITTSB
990000390 N AND PAINTING- COLD-BOXES THERMAL TANKS PERLITE   APCI-DES-ENG-STD-581.1  4P  5/26/61
990000410  AND PAINTING- COLD-BOXES, THERMAL TANKS, GLASS WOOL   APCI-DES-ENG-STD-581.3  1P  10/24/60
990004660 SS-4004-SILICONE-PRIMER GE THERMOLITE-12-CURING-CATALYST   APCI-IA4A-01  1P  2/21/72
990003130 TSHAW,D.R.  APCI  OXY-TITE THREAD COMPOUND   APCI IWO-NO-XD-0134   APCI-ANAL-REP-71-336  1P  10/22/71
990000090 W.W.  APCI  LUBRICANTS AND THREAD COMPOUNDS FOR OXYGEN-SYSTEMS   APCI-SAFETY-GRAM-NO-27  5P  3/22/63
990001140    YODER,L.  APCI  T-FILM THREAD COMPOUND, AUTOIGNITION TEST   APCI-ANAL-REP-61-683   APCI-IWO-NO-80-0068  1P
990001110 R  VARIOUS MATERIALS- ABMA THREAD LUBRICANT AND SEALANT, ANDEROL-L-536 RUST-PREVENTIVE LEHIGH CHEMICAL  CO-CHE
990001160 YODER,L.   APCI  TAPE-SEAL THREAD LUBRICANT AND SEALER-  TAPE-SEAL FROM FRIESLAND-PLASTIC COMPANY, PERMACEL-TA
990001190 DYER,W.W.  APCI  REGULATOR THREAD SEALANT MOLYLUBE-N   APCI-MEMO-63  10/4/63  1P
990001180 PCI  PIPING- APPROVED PIPE THREAD SEALANTS   APCI-DES-ENG-STD-570.5.1  1P  11/11/60
990004550         APCI  SEALANTS AND THREADING COMPOUNDS- CRANE  PACKING  CC-TAPE   APCI-IA2A-09  2P  2/21/72
990004520         APCI  SEALANTS AND THREADING COMPOUNDS- CROSSLITE-FLUOROCARBON-TAPE   APCI-IA2A-06  2P  2/21/72
990004530         APCI  SEALANTS AND THREADING COMPOUNDS- DAMCO TAPE   APCI-IA2A-07  2P  2/21/72
990004510         APCI  SEALANTS AND THREADING COMPOUNDS- MOLYLUBE-N BEL-RAY  CO  FARMINGDALE/NJ   APCI-IA2A-05  1P  2/2
990004560         APCI  SEALANTS AND THREADING COMPOUNDS- OXOMAT   APCI-IA2A-10  1P  2/21/72
990004470         APCI  SEALANTS AND THREADING COMPOUNDS- PERMATEX-1516   APCI-IA2A-01  1P  2/21/72
990004500         APCI  SEALANTS AND THREADING COMPOUNDS- PUTTI-ROPE NATIONAL  GREENHOUSE  CO   APCI-IA2A-04  1P  2/21/7
990004540         APCI  SEALANTS AND THREADING COMPOUNDS- SANDEN TAPE   APCI-IA2A-08  2P  2/21/72
990004580         APCI  SEALANTS AND THREADING COMPOUNDS- SODIUM-SILICATE AND CHINA-CLAY-PASTE   APCI-IA2A-12  1P  2/21/
990004480         APCI  SEALANTS AND THREADING COMPOUNDS- TEFLON-TAPE PERMACEL   APCI-IA2A-02  2P  2/21/72
990004570         APCI  SEALANTS AND THREADING COMPOUNDS- THREE-M FLUOROCARBON-TAPE   APCI-IA2A-11  2P  2/21/72
990004490         APCI  SEALANTS AND THREADING COMPOUNDS- T-FILM ECO  MFGR  CO   APCI-IA2A-03  1P  2/21/72
990004570 S AND THREADING COMPOUNDS- THREE-M FLUOROCARBON-TAPE   APCI-IA2A-11  2P  2/21/72
990001130 RUSSLITE FLUOROCARBON TAPE THREE-M-FLUOROCARBON-TAPE, PERMACEL-TAPE   APCI-MEMO-63  07/30/63  1P
990000740 HNSONVILLE-PLANT TITANIUM, TITANIUM-DIOXIDE, SOLNUS-500, HYDROCARBON-OIL, TITANIUM-TETRACHLORIDE   APCI-MAR-87
990000740 LNUS-500, HYDROCARBON-OIL, TITANIUM-TETRACHLORIDE   APCI-MAR-87-0-8822  3P  8/63
990000750 SONVILLE-PLANT SOLNUS-500, TITANIUM-TETRACHLORIDE   APCI-MAR-87-0-8822  2P  9/63
990000740 ONT-NEW/JOHNSONVILLE-PLANT TITANIUM, TITANIUM-DIOXIDE, SOLNUS-500, HYDROCARBON-OIL, TITANIUM-TETRACHLORIDE   A
990001100 EMBLY OF OXYGEN REGULATORS T-FILM   APCI-MEMO-61  11/30/61  1P
990001000    APCI  IGNITION TESTS OF T-FILM AND PENTON   APCI-MEMO-61  11/28/61  2P
990004490 S AND THREADING COMPOUNDS- T-FILM ECO  MFGR  CO   APCI-IA2A-03  1P  2/21/72
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990001140 YODER,L. APCI T-FILM THREAD COMPOUND, AUTOIGNITION TEST APCI-ANAL-REP-61-663 APCI-IWO-NO-80-0
990000630 E-OIL AMOCO-H-100, PENTON, T-FILM-THREAD COMPOUND APCI-MAR-87-0-8821 1P 11/61
990003340 UNNEL-PROTECTIVE-EQUIPMENT TONNAGE AIR-SEPARATION PLANT APCI-SAFETY-STD-627.5.1 4P 6/15/70
990001030 PECTS OF RECONSTRUCTED ICI TONNAGE OXYGEN PLANT AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS
990002700 HANDLING OF REGULATORS AND TORCHES APCI-PAPER 17P PLUS 2P ATTACHMENTS 7/65
990000130 SCHMOYER,W.W. APCI HUMAN TORCHES APCI-SAFETY-GRAM-NO-50C 1P 1/3/66
990002160 GROWTH-RATES AND FRACTURE TOUGHNESS STUDY OF WELDED ALUMINUM ALLOY-5083 ASME WINTER ANNUAL-MEETING NEW/Y
990002990 CYLINDER GAS CO OXYGEN TRAILER FIRE AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-4 PP4
990003070 UID-CARBONIC-LIQUID-OXYGEN TRAILER- ACCIDENT VICTORY-MEMORIAL-HOSPITAL 5/70 APCI-MEMO-71 06/3/71 17P
990005700 PERATIONAL-HAZARDS- OXYGEN TRANSFER EQUIPMENT MALFUNCTIONS AND FAILURES COMPRESSORS AND PUMPS APCI-IIF3-4
990001460 VALLEY-FORGE-GASKET-CO LOX TRANSFER FLUOROGREEN-E-600 APCI-MEMO-70 10/23/70 1P
990003750 PEGRAM,J.W. APL TRANSFER HOSE FOR CRYOGENIC LIQUIDS APL-ENGR-SPEC-L.11 3P 7/7/69
990002660 MASTER,H.H. APCI LOX TRANSFER PUMP SCREENS APCI-MEMO-69 01/24/69 2P PLUS 3P ATTACHMENTS
990002650 MASTER,H.H. APCI LOX TRANSFER PUMPS APCI-MEMO-68 12/30/68 2P PLUS 2P ATTACHMENTS
990001340 ER,E.G. APCI BEHAVIOR OF TRANSITE UNDER COMPRESSIVE-LOADS AT AMBIENT AND LIQUID-NITROGEN TEMPERATURES A
990004600 D ELECTRICAL INSULATIONS- TRANSITE, JOHNS-MANVILLE APCI-IA3A-02 1P 2/21/72
990000370 APCI PIPING- TRANSITION-JOINTS AND ALUMINUM TO STAINLESS-STEEL APCI-DES-ENG-STD-579.15 2P 9/
990001890 IDE, CIS-DICHLOROETHYLENE, TRANS-DICHLOROETHYLENE, VINYLIDENA-CHLORIDE, TRICHLOROETHYLENE, ETHYL-ALCOHOL, METH
990003450 S USED FOR GASEOUS OXYGEN TRANSMISSION AND DISTRIBUTION CGA-DOCKET 70-11 CGA-THIRD DRAFT 23P 3/22/72
990004050 BON-STEEL GASEOUS OXYGEN TRANSMISSION-LINES APL-ENGR-STD-LS.30/2 3P 1/12/70
990005560 M, STORAGE TO TRANSPORT, TRANSPORT TO SYSTEM APCI-IIF1-1 1P 12/22/71
990005570 M, STORAGE TO TRANSPORT, TRANSPORT TO SYSTEM LOADING AND UNLOADING PROCEDURES FOR LIQUID OXYGEN TRANSFER
990003560 FICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STAND
990003540 FICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STAND
990003530 FICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STAND
990003570 FICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STAND
990003510 FICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STAND
990003520 FICE OF PIPELINE SAFETY TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE- MINIMUM FEDERAL SAFETY-STAND
990005640 LROAD BARGE AND PIPELINE TRANSPORTATION ROAD, RAILROAD, BARGE AND PIPELINE TRANSPORTATION OXYGEN-DISPERSAL
990005820 NG PROCEDURES FOR FILTERS, TRAPS, AND INSTRUMENTS APCI-IIIB-1 2P 11/1/71
990001360 ROETHANE- TRICHLOROETHANE- TRICHLORETHYLENE- CARBON-TETRACHLORIDE- CHLOROFORM APCI-PROJECT-NO-87-8-8821 AP
990005260 OLVENTS, AND MISC- 1,1,1 TRICHLOROETHANE APCI-IA7A-02 1P 2/21/72
990001890 OROETHANE, DICHLOROETHANE, TRICHLOROETHANE POLYMERS, POLYSULFIDE-SEALER, BUNA-N, NEOPRENE, EPOXY-ADHESIVE, PHE
990001360 -CHLORIDE- DICHLOROETHANE- TRICHLOROETHANE- TRICHLORETHYLENE- CARBON-TETRACHLORIDE- CHLOROFORM APCI-PROJECT-
990005290 CALS, SOLVENTS, AND MISC- TRICHLOROETHYLENE APCI-IA7A-05 1P 2/21/72
990001050 WHEN VAPOUR CLEANING WITH TRICHLOROETHYLENE (T.C.E.) APL-SAFETY-DEPT-INFO-SHEET-38 2P 2/10/71
990001890 LENE, VINYLIDENA-CHLORIDE, TRICHLOROETHYLENE, ETHYL-ALCOHOL, METHYL-ETHYL-KETONE, KEROSENE, GLYCERINE, POLYETH
990003700 ELMORE,G. APL SHELL AND TUBE-TYPE-COOLERS FOR OXYGEN SERVICE APL-ENGR-SPEC-E.05 13P 6/1/71
990003690 ELMORE,G. APL SHELL AND TUBE-TYPE-COOLER, OTHER THAN FOR OXYGEN SERVICE (APL-PLANTS) APL-ENGR-SPEC-E.04
990001890 EP-2-LIQUID, TURCO-4499-1, TUCRO-4499-2, TURCO-4499-3, TURCO-4499-5, TURCO-4499-6, ZYGLO-ZLIB-OIL-BASE, ZYGLO-
990005240 S-TYPE TCL-100 OR DTD-5019 TUNGUM CO LTD/UK COMPOSITION- COPPER-86-PERCENT ALUM-1.20-PERCENT NICKEL-1.4-P
990001890 O-DYE-CHECK-STEP-2-LIQUID, TURCO-4499-1, TUCRO-4499-2, TURCO-4499-3, TURCO-4499-5, TURCO-4499-6, ZYGLO-ZLIB-OI
990001890 URCO-4499-1, TUCRO-4499-2, TURCO-4499-3, TURCO-4499-5, TURCO-4499-6, ZYGLO-ZLIB-OIL-BASE, ZYGLO-ZL-2-PENETREX,
990001890 UCRO-4499-2, TURCO-4499-3, TURCO-4499-5, TURCO-4499-6, ZYGLO-ZLIB-OIL-BASE, ZYGLO-ZL-2-PENETREX, ZYGLO-ZL-22,
990001890 URCO-4499-3, TURCO-4499-5, TURCO-4499-6, ZYGLO-ZLIB-OIL-BASE, ZYGLO-ZL-2-PENETREX, ZYGLO-ZL-22, ZYGLO-ZLX-390,
990001890 90, DYE-PROCESS-SOLUTIONS, TURCO-DYE-CHECK PROCESS, ZYGLO-ZE-2-EMULSIFIER, ZYGLO-ZP-5-DEVELOPER, PROTECTIVE-CO
990001890 OGLO-PASTE10 IN KEROSENE, TURCO-DYE-CHECK-STEP-2-LIQUID, TURCO-4499-1, TUCRO-4499-2, TURCO-4499-3, TURCO-4499
990003900 SON,I. APL ACCIDENT AT 1 TURNER LTD PARK/LANE ROYTON OLDHAM LANCASTER 1194C AM 5/2/70 APL-SAFETY-DEP
990004840 NATURAL-UNTREATED-FINISH TURNERS ASBESTOS CEMENT CO LTD/UK APCI-IA5A-12 1P 2/21/72
990000710 RDS- OXYGEN-PRESSURE-GAUGE TWF WOOL, SPINTEX-305, MOLYKOTE-TYPE-Z AND TYPE-X-15 APCI-MAR-87-0-8822 1P 3/6
990003120 OXYGEN COMPATABILITY WITH TWO-PART EPOXY-COMPOUND (7343-RESIN- 7139-CATALYST) FROM CREST PRODUCTS CO AP
990004860 ° CEMENTABLE PTFE TAPES TYGADURE LTD/UK APCI-IA5A-14 1P 2/21/72
990004860 PCI GASKETS AND PACKINGS- TYGAFLOR CEMENTABLE PTFE TAPES TYGADURE LTD/UK APCI-IA5A-14 1P 2/21/72
990000730 YPE CUTTING-OILS, KNOWN AS TYPE-GROUP-II, PLANT WASH-OUT STUDIES, CELLULUBE-300, CELLULUBE-220 APCI-MAR-87-0

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990001400 0, UCON-LB300, UCON-LB170, UCON-HB170, UCON-HB660, AURALUBE-FS, FLUOROLUBE-FS5, KEL-F-LF3, VERSILUBE-F-50, SF8
990001400 0, UCON-LB170, UCON-HB170, UCON-HB660, AURALUBE-FS, FLUOROLUBE-FS5, KEL-F-LF3, VERSILUBE-F-50, SF81(40)-SILICO
990001400 3, UCON-LB550, UCON-LB300, UCON-LB170, UCON-HB170, UCON-HB660, AURALUBE-FS, FLUOROLUBE-FS5, KEL-F-LF3, VERSILU
990001400 LULUBE-220, CELLULUBE-150, UCON-LB283, UCON-LB550, UCON-LB300, UCON-LB170, UCON-HB170, UCON-HB660, AURALUBE-FS
990001400 0, UCON-LB283, UCON-LB550, UCON-LB300, UCON-LB170, UCON-HB170, UCON-HB660, AURALUBE-FS, FLUOROLUBE-FS5, KEL-F-
990001400 CELLULUBE-150, UCON-LB283, UCON-LB550, UCON-LB300, UCON-LB170, UCON-HB170, UCON-HB660, AURALUBE-FS, FLUOROLUBE
990000590 US, AND EXPLOSION TESTING- UCON-TYPE LUBRICANTS, STEEL-PIPES   APCI-MAR-87-0-8820  1P  4/61
990002920  DEW-POINT OF  AIR-SYSTEMS UNARCO   APCI-MEMO-63  11/1/63  3P
990003440 E OF  BUILDING  OFFICIALS  UNIFORM BUILDING  CODE  VOL-1  1970
990001940  FLEET SAFETY- LOADING AND UNLOADING OPERATIONS   APCI-SAFETY-STD-635.19  6P  2/68
990005570 ORT TO  SYSTEM LOADING AND UNLOADING PROCEDURES FOR  LIQUID  OXYGEN  TRANSFER   APCI-IIF1-2  1P  8/22/71
990003770          PEGRAM,J.W.  APL  UNSINTERED  P.T.F.E.  TAPE   APL-ENGR-SPEC-L.14  2P  7/8/69
990002920 CRYOGENIC  SYSTEMS MILFOAM URETHANE INSULATION NATIONAL-GYPSUM-BLUE LOX-SYSTEMS FOAM-GLASS LIQUID-HYDROGEN-PIP

990000110       SCHMOYER,W.W.  APCI  VACUUM PUMP FAILURES   APCI-SAFETY-GRAM-NO-35  1P  10/4/63
990002760     KITSON,F.K.  APCI  NASH VACUUM PUMPS   APCI-MEMO-71  01/19/71  2P
990000490 PLANT COMPONENTS- STORAGE, VACUUM-SYSTEMS, AND COMPRESSED-GASES   APCI-SAFETY-STD-607.2.2.5  P1-4  3/65  P5-6
990004750 PCI  GASKETS AND PACKINGS- VALLEGREEN, VALLEY/FORGE  GASKET  CO   APCI-IA5A-03  1P  2/21/72
990001460 ORE-CO, MELRATH-GASKET-CO, VALLEY-FORGE-GASKET-CO LOX TRANSFER FLUOROGREEN-E-600   APCI-MEMO-70  10/23/70  1P
990004750  AND PACKINGS- VALLEGREEN, VALLEY/FORGE  GASKET  CO   APCI-IA5A-03  1P  2/21/72
990003910  I.  APL  INVESTIGATION OF VALVE FIRES AT TEXAS  INSTRUMENTS  LTD-BEDFORD   APL-SAFETY-DEPT-REP-31  5P  REV-1
990000350 I  PIPING- EXTENDED BONNET VALVE  CODE   APCI-DES-ENG-STD-579.4  3P  4/63
990000360            APCI  PIPING- VALVE  PROCUREMENT AND CLEANING PROCEDURE   APCI-DES-ENG-STD-579.5  3P  8/12/60
990002350   COMPRESSED  GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS   CGA-PAMPHLET-V-1  57P  1965
990002370   COMPRESSED  GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS   CSA-B96  57P  1965
990002360   COMPRESSED  GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS   ASA-B57.1  57P  1965
990001430         MOYSAN,S.R.  APCI  VALVE WASHERS NEW AND USED QUALITATIVE AND QUANTITATIVE OIL  ANALYSIS   APCI-ANAL-R
990001850 D TEST OF  1/2-INCH SAFETY VALVE WITH CARBON STEEL SPRING   APCI-IWO-NO-10-7071   APCI-PROJECT-NO-00-5-3246-51
990001830  PIPING- INTRODUCTION HAND VALVE-CODE   APCI-DES-ENG-STD-579.3  12P  1/63
990000240 IREMENTS SAFETY AND RELIEF VALVES   APCI-DES-ENG-STD-537.9  4P  7/65
990005720 MALFUNCTIONS AND  FAILURES VALVES   APCI-IIF3A(3)-1  1P  12/30/71
990000340 I  PIPING- STAINLESS-STEEL VALVES AND MATERIAL REQUIREMENTS   APCI-DES-ENG-STD-579.3.1  2P  5/64
990000460 -SEPARATION PLANT, PIPING, VALVES AND SAFETY-RELIEF DEVICES   APCI-SAFETY-STD-607.1.12  14P  10/62
990003460         APCI  SAFETY RELIEF VALVES LOCATION AND PIPING-DESIGN CONSIDERATIONS   APCI  PIPING  GROUP  MEMO-19  10
990003640            PEGRAM,J.W.  APL  VALVES-OXYGEN SERVICE-MINIMUM DECONTAMINATION AND TEST REQUIREMENTS   APL-ENGR-SPEC
990003740   PEGRAM,J.W.  APL  RELIEF VALVES, WARM  GAS SERVICE  -20F TO  100F   APL-ENGR-SPEC-J.18  4P  6/18/69
990002470            APCI  LOX AND LIN VAPOR DISPOSAL-TANK-500-GAL   APCI-DRAWING-92483D  REV-B  9/30/68
990002510 MASTER,H.H.  APCI  PRODUCT VAPOR HAZARDS- SAFETY  INFORMATION RELATIVE TO LIQUID-VAPOR-CLOUDS   APCI-PAPER  7P
990000920 SUN-OIL COMPANY_S LOX-TANK VAPORIZER   APCI-MEMO-64  04/9/64  1P PLUS  1P ATTACHMENT
990000150     APCI  PRESSURE-VESSELS- VAPORIZER AND CRYOGENIC LIQUID DISPOSAL   APCI-DES-ENG-STD-514.6.2  4P  5/26/61
990002970   STEEL  LTD  OXYGEN PLANT VAPORIZER EXPLOSION   AICHE-CEP-TECH-MANUAL  SAFETY IN  AIR AND  AMMONIA  PLANTS  V
990002500 W.L.  APCI  MISTY  PROBLEM VAPOR-CLOUDS FROM DEFROST OPERATIONS ALLEGEDLY CAUSED HIGHWAY ACCIDENT   APCI-SAFET
990001050  I.  APL  FIRE HAZARD WHEN VAPOUR CLEANING WITH TRICHLOROETHYLENE  (T.C.E.)   APL-SAFETY-DEPT-INFO-SHEET-38  2
990002930 TS ON INSULATION MATERIALS VASCOCEL MILFOAM NATIONAL-GYPSUM  (GREEN) FOAM-GLAS  (CORNING)   APCI-IWO-NO-LA-033
990000840     APCI  REQUIREMENTS FOR VENDOR CLASS-A CLEANING   APCI-QUAL-CONT-LAYOUT-115F  2P  7/1/71
990000850     APCI  REQUIREMENTS FOR VENDOR CLASS-AA CLEANING   APCI-QUAL-CONT-LAYOUT-116F  2P  7/1/71
990000860     APCI  REQUIREMENTS FOR VENDOR CLASS-AAA CLEANING   APCI-QUAL-CONT-LAYOUT-117F  3P  7/1/71
990000830     APCI  REQUIREMENTS FOR VENDOR CLASS-B CLEANING   APCI-QUAL-CONT-LAYOUT-114F  2P  7/1/71
990002220 REGARDING REQUIREMENTS FOR VENDOR-CLASS-AA AND  CLASS-AAA CLEANING   APCI-MEMO-71  07/22/71  1P
990005450 IONAL-HAZARDS- DISPOSAL OF VENTED  GASES CLEANLINESS OF DISPOSAL  SYSTEM   APCI-II81-1  2P  2/12/72
990005470 IONAL-HAZARDS, DISPOSAL OF VENTED  GASES CLEANLINESS OF  OXYGEN PIPING   APCI-II81-2  1P  2/19/72
990005440 IONAL-HAZARDS- DISPOSAL OF VENTED  GASES COMPANY PRACTICES   APCI-II8-1  5P  11/1/71
990005480 IONAL-HAZARDS- DISPOSAL OF VENTED  GASES PROCEDURAL ARRANGEMENTS   APCI-II84-1  1P  2/19/72
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990003840 APL  ACCIDENT ARISING FROM VENTING-OXYGEN MANIFOLDS CONNECTED TO A COMMON  VENT  PIPE   APL-SAFETY-BULL-075  3
990001400 FLUOROLUBE-FS5, KEL-F-LF3, VERSILUBE-F-50, SF81(40)-SILICONE, PYDRAUL-F-9, DOW-CORNING-4 COMPOUND SILICONE, DO
990005960 RKBLATTER  GERMAN PRESSURE VESSEL  CODE-AD MERKBLATTER  (ENGLISH  TRANSLATION)  304P  9/71
990003660 ICATION FOR OXYGEN SERVICE VESSEL  FABRICATION   APL-ENGR-SPEC-C.03  7P  7/26/71
990002040               APCI  CODED VESSEL REPAIRS   APCI-POM-SEC-6.09  4P  11/29/68 FOR  ATTCHMTS SEE  205  206  207
990002280               APCI  CODED VESSEL REPAIRS   APCI-POM-SEC-6.09  4P  15P OF  ATTCHMTS  11/29/68
990000180     APCI  PRESSURE-VESSELS- VESSEL-DESIGN-BASIS AND GENERAL STANDARDS   APCI-DES-ENG-STD-510.1  6P  8/62
990005660 D PIPELINE  TRANSPORTATION VIBRATION AND  CONTROLLED  SLOSHING   APCI-IIF2E-1  1P  8/22/71
990005740  INSULATION  SYSTEM DUE TO VIBRATIONS  DETERIORATION   APCI-IIF3C-1  1P  12/30/71
990005730 LUKES GEISERING, EXCESSIVE VIBRATIONS, SHOCK  (THERMAL AND  PRESSURE), LINE-SURGES   APCI-IIF3B-1  1P  2/18/72
990003070 D-OXYGEN TRAILER- ACCIDENT VICTORY-MEMORIAL-HOSPITAL  5/70   APCI-MEMO-71  06/3/71  17P
990001890 E, TRANS-DICHLOROETHYLENE, VINYLIDENA-CHLORIDE, TRICHLOROETHYLENE, ETHYL-ALCOHOL, METHYL-ETHYL-KETONE, KEROSEN
990001890 EXAFLUOROPROPYLENE VITON A VINYLIDEND FLUORIDE, POLYDIMETHYLSILOXANE, FLUORINATED-SILOXANE, LS-53, BUTYL-RUBBE
990001890   GRAPHITE-CHLOR-BIPHENYL, VINYL-CHLORIDE, CIS-DICHLOROETHYLENE, TRANS-DICHLOROETHYLENE, VINYLIDENA-CHLORIDE,
990001350 DINTING COMPOUND SQ-32 AND VITON A   APCI-IWO-NO-81-0095  1P  4/27/66
990001890 F, POLYHEXAFLUOROPROPYLENE VITON A VINYLIDEND FLUORIDE, POLYDIMETHYLSILOXANE, FLUORINATED-SILOXANE, LS-53, BUT
990004710 ELASTOMERS, AND ADHESIVES- VITON-A DUPONT   APCI-IA4A-06  1P  2/21/72
990004830 PCI  GASKETS AND PACKINGS- VITON-A DUPONT   APCI-IA5A-11  1P  2/21/72
990003040 ERIAL- VITON-E-60  (GREEN) VITON-A  (BLACK) GARLOCK-900 JOHNS-MANVILLE  .ASBESTOS-61  SHEET   APCI-ANAL-REP-71
990003050 /KA-4-IV OXYGEN COMPRESSOR VITON-A  (BLACK) VITON-E60  (GREEN)   DEMAG-LETTER TO  APCI  1P  8/11/71
990003050 OMPRESSOR VITON-A  (BLACK) VITON-E60  (GREEN)   DEMAG-LETTER TO  APCI  1P  8/11/71
990003040 ING VITON-O-RING MATERIAL- VITON-E-60  (GREEN) VITON-A  (BLACK) GARLOCK-900 JOHNS-MANVILLE  .ASBESTOS-61  SHEE
990003040 PCI  OXYGEN  INDEX  RATING VITON-O-RING MATERIAL- VITON-E-60  (GREEN) VITON-A  (BLACK) GARLOCK-900 JOHNS-MANVI
990004440           APCI  LUBRICANTS- VOLTALEF-3A KINGSLEY AND  KEITH  LTD/UK   APCI-IA1A-16  1P  2/21/72
990004800 PCI  GASKETS AND PACKINGS- VULCANIZED-RED-FIBRE-GASKETS   APCI-IA5A-08  1P  2/21/72

990001890 SAFETY-WALK-TYPE-B-M-0070, WALK-SYNTHETIC-CORK, MASKING-TAPE, SHERLOCK-LEAK-DETECTOR-TYPE-CG, SHERLOCK-LEAK DE
990003740  J.W.  APL  RELIEF VALVES, WARM  GAS SERVICE  -20F TO  100F   APL-ENGR-SPEC-J.18  4P  6/18/69
990005860   APCI  SYSTEM-EMERGENCIES WARNING DEVICES   APCI-IVB-1  5P  11/12/71
990001430   MOYSAN,S.R.  APCI  VALVE WASHERS NEW AND USED QUALITATIVE AND QUANTITATIVE OIL  ANALYSIS   APCI-ANAL-REP-63-
990003960   GILLOTT,E.  APL  SOLVENT WASHING OF PIPING  SYSTEMS   APL-IGD-ENGR-MAN-56-06  4P  7/3/71
990000730 WN AS TYPE-GROUP-II, PLANT WASH-OUT STUDIES, CELLULUBE-300, CELLULUBE-220   APCI-MAR-87-0-8822  2P  6/63
990000920         KITSON,F.K.  APCI  WASHOUT  ANALYSIS OF SUN-OIL COMPANY_S LOX-TANK VAPORIZER   APCI-MEMO-64  04/9/64
990002860  BYRON-JACKSON OXYGEN PUMP WASHOUT PROCEDURE FOR  ANALYTICAL  PURPOSES   APCI-POM-SEC-1.07  5P  7/7/70
990000980 D  PLANT EQUIPMENT SOLVENT WASHOUT-FREQUENCIES   APCI-POM-SEC-5.07  3P  7/15/70
990000990       APCI  PLANT SOLVENT WASHOUT-GENERAL   APCI-POM-SEC-1.05  12P  2/20/67
990003580 IN,C.B.  APCI  ANALYSIS OF WATER-HAMMER IN CRYOGENIC  TRANSFER-LINES BIBLIOGRAPHY   APCI-REPORT  P86  2/28/64
990003210                      APCI  WEAR SAFETY SHOES   APCI-SAFETY-GRAM-NO-11  2P  5/14/62
990003200 NNEL-PROTECTIVE-EQUIPMENT- WEARING  APPAREL HARD  HATS   APCI-SAFETY-STD-627.4.1  1P  6/15/70
990002160 RACTURE TOUGHNESS STUDY OF WELDED ALUMINUM ALLOY-5083   ASME  WINTER  ANNUAL-MEETING  NEW/YORK  8P  11/29/70-1
990003430 AND CONSTRUCTION OF LARGE, WELDED, LOW-PRESSURE STORAGE  TANKS   API  STANDARD-620  2/70
990005390 PATIBILITY FABRICATION AND WELDING   APCI-IB2D-1  2P  10/28/71
990002110 UALIFICATION  STANDARD FOR WELDING AND BRAZING PROCEDURES,  WELDERS,  BRAZERS, AND  WELDING AND  BRAZING  OPER
990002420 YGEN-FUEL GAS  SYSTEMS FOR WELDING AND CUTTING   NFPA-NO-51  8P  1969 AND  CUTTING AND  WELDING PROCESSES   NF
990002720 ELDING  SOCIETY  SAFETY IN WELDING AND CUTTING   USAS-Z49.1  49P  1967
990002890  FOR AIR-PRODUCTS REDI-SET WELDING AND CUTTING  OUTFITS   APCI-BROCHURE  11P  9/25/69
990000140   OXYGEN REGULATORS IN THE WELDING INDUSTRY   APCI-SAFETY-GRAM-NO-60C  5P  11/26/67
990001110 T CONCRETE FLOOR TREATMENT WEST CHEMICAL  PRODUCTS  INC, ALUMINUM-OXIDE, SEAM COMPOUND GEON POLYVINYLCHLORIDE,
990001110 -NEW/BRUNSWICK/NEW/JERSEY, WEST CONCRETE FLOOR TREATMENT WEST CHEMICAL  PRODUCTS  INC, ALUMINUM-OXIDE, SEAM CO
990004890 EATMENTS- PLASITE-NO-7122H WISCONSIN  PROTECTIVE  COATING  CO   APCI-IA6A-03  1P  2/21/72
990000620 ON TESTING- PINE AND MAPLE WOOD, ACTIVATED CARBON   APCI-MAR-87-0-8321  1P  10/61
990000410 OXES, THERMAL TANKS, GLASS WOOL   APCI-DES-ENG-STD-581.3  1P  10/24/60
990001450   QUALITY  CONTROL OF ROCK WOOL   APCI-MEMO 2  HIMMELBERGER,F.  APCI  QUALITY  CONTROL OF ROCK WOOL   APCI-ME
990001450   QUALITY  CONTROL OF ROCK WOOL   APCI-MEMO-59  11/6/59  2P
990003800  PEGRAM,J.W.  APL  MINERAL WOOL   APL-ENGR-SPEC-N.02  3P  1/2/70
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990001470   APCI   PRODUCTION OF ROCK WOOL BETHLEHEM-STEEL-CO   APCI-MEMO-59 11/12/59 2P
990001310 TANCE OF FIBERIZED MINERAL WOOL INSULATION   APCI-QUAL-CONT-LAYOUT-103L 2P 7/1/71
990000710 OXYGEN-PRESSURE-GAUGE TWF WOOL, SPINTEX-305, MOLYKOTE-TYPE-Z AND TYPE-X-15   APCI-MAR-87-0-8822 1P 3/63
990002030 CONTROL PROCEDURE- SAFETY WORK-PERMIT   APCI-POM-SEC-1.04 3P PLUS EXHIBIT-A 1P 2/16/67
990004200 LACK OF OXYGEN KILLS TWO WORKMEN   APL-SAFETY-BULL-037 1P REPRINTED 1/68

990003880 NARY REPORT ON ACCIDENT AT ZELZATE PLANT 2/26/69 WHEN AN EXPLOSION AND FIRE OCCURRED IN BURCKHARDT CENTRIFUG
990005230 POSITION CU-58 1-PERCENT ZN38.5-42-PERCENT PBO.35-.9-PERCENT   APCI-1A6A-37 1P 2/21/72
990001890   TURCO-DYE-CHECK PROCESS, ZYGLO-ZE-2-EMULSIFIER, ZYGLO-ZP-5-DEVELOPER, PROTECTIVE-COATINGS, DOW-CORNING-SILIC
990001890 URCO-4499-5, TURCO-4499-6, ZYGLO-ZL18-OIL-BASE, ZYGLO-ZL-2-PENETREX, ZYGLO-ZL-22, ZYGLO-ZLX-390, DYE-PROCESS-S
990001890 BASE, ZYGLO-ZL-2-PENETREX, ZYGLO-ZL-22, ZYGLO-ZLX-390, DYE-PROCESS-SOLUTIONS, TURCO-DYE-CHECK PROCESS, ZYGLO-Z
990001890 99-6, ZYGLO-ZL1B-OIL-BASE, ZYGLO-ZL-2-PENETREX, ZYGLO-ZL-22, ZYGLO-ZLX-390, DYE-PROCESS-SOLUTIONS, TURCO-DYE-C
990001890 L-2-PENETREX, ZYGLO-ZL-22, ZYGLO-ZLX-390, DYE-PROCESS-SOLUTIONS, TURCO-DYE-CHECK PROCESS, ZYGLO-ZE-2-EMULSIFIE
990001890 SS, ZYGLO-ZE-2-EMULSIFIER, ZYGLO-ZP-5-DEVELOPER, PROTECTIVE-COATINGS, DOW-CORNING-SILICONE, PAINT-ON-GALBESTOS

990001520 IQUID AND GASEOUS OXYGEN	AD297124 OMIC-MEMO-163
990005960 ALS WITH 7500-PSI OXYGEN	AD608260 71P 10/64
990005950 RCP LIQUID OXYGEN POOLS	ADVANCES IN CRYOGENIC ENGINEERING V-13 P555-565 11P 1968
990001890 ERENCE PROCEEDINGS 1958	ADVANCES IN CRYOGENIC ENGINEERING V-4 P26-46 21P 1/59
990001990 QUID AND GASEOUS OXYGEN	ADVANCES IN CRYOGENIC ENGINEERING V-1 P163-169 7P 1962
990002620 HEMICAL CO OXYGEN FIRES	AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-8 PP19-20 2P 1966
99000261A PARATION PLANT EXPLOSION	AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-6 PP41-4 1964
990002940 TIONATION PLANT EXPLOSION	AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-4 PP71-80 1962
990003010 QUID OXYGEN PUMP FAILURES	AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-9 P5 1967
990002980 E OXYGEN PLANT EXPLOSION	AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-3 PP12-16 1961
990003000 E IN A LIQUID OXYGEN PUMP	AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-5 PP41-42 1963
990002990 CO OXYGEN TRAILER FIRE	AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-4 PP49-50 1962
990002960 PLANT REBOILER EXPLOSION	AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-2 PP31-36 1960
990002950 IN AIR AND AMMONIA PLANTS	AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-2 PP31-36 1960
990002970 PLANT VAPORIZER EXPLOSION	AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-3 PP9-12 1961
990002000 FILMS IN OXYGEN SYSTEMS	AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-4 P16-20 5P 1962
990002010 HEIR OXYGEN-COMPATIBILITY	AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-7 P21-3 3P 1965
990001030 ICI TONNAGE OXYGEN PLANT	AICHE-CEP-TECH-MANUAL SAFETY IN AIR AND AMMONIA PLANTS V-5 P1-15 15P 1963
990001910 POSED AMENDMENTS PART II	AMENDMENTS TO NFPA-NO-566 3P PASSED 5/71 NFPA-NO-50
990003470 PETROLEUM REFINERY PIPING	ANSI-B31.3 104P 1966
990003480 ERS REFRIGERATION PIPING	ANSI-B31.5 60P 1966
990003500 TRIBUTION PIPING SYSTEMS	ANSI-B31.8 108P 1968
990003130 OXY-TITE THREAD COMPOUND	APCI IWO-NO-XO-0134 APCI-ANAL-REP-71-336 1P 10/22/71
990006010 APCI CRYOGENIC SAFETY	APCI CRYOGENIC SAFETY CONFERENCE ALLENTOWN 145P 7/59
990003460 ING-DESIGN CONSIDERATIONS	APCI PIPING GROUP MEMO-19 10P 11/3/66
990000970 SAMPLING, AND ANALYSIS	APCI PLANT MANAGERS SAFETY MEETING-CREIGHTON/PENNSYLVANIA 19P 2/28/68 AND 3/
990001420 -REP-70-013,70-014,70-015	APCI-123 APCI-IWO-NO-XO0123 2P 1/30/70
990003370 RECIPROCATING COMPRESSORS	APCI-550-SD-01A 37P 3/9/64
990003360 R CENTRIFUGAL COMPRESSORS	APCI-550-SD-16A 37P 4/15/65
990003350 ANING FOR OXYGEN SERVICE	APCI-550-SD-27A 5P 12/10/59
990003410 ORAGE-TANK (FLAT-BOTTOM)	APCI-99820A 18P 9/15/71
990003110 SEARS-THREAD-CUTTING-OIL	APCI-ANAL-REP 1P 7/15/71
990001160 IC COMPANY, PERMACEL-TAPE	APCI-ANAL-REP-60-495,61-3 APCI-IWO-NO-81-0018 1P 1/16/61
990001330 N 100-PERCENT OXYGEN ATM	APCI-ANAL-REP-60-496 APCI-IWO-NO-81-0017 1P 1/6/61
990001300 ATING-MATERIAL FOAM GLASS	APCI-ANAL-REP-61-034 TO 61-40 AND 61-42 APCI-IWO-NO-10-0589 1P 2/3/61
990001390 -PERCENT GASEOUS OXYGEN	APCI-ANAL-REP-61-262 1P 4/11/61
990001210 O-PERCENT GASEOUS OXYGEN	APCI-ANAL-REP-61-435 APCI-IWO-NO-10-0858 1P 6/6/61
990001140 MPOUND, AUTOIGNITION TEST	APCI-ANAL-REP-61-683 APCI-IWO-NO-80-0068 1P 9/18/61
990001430 UANTITATIVE OIL ANALYSIS	APCI-ANAL-REP-63-1662 AND 1663 APCI-IWO-NO-69-1034 1P 11/6/63
990001420 RLOCK-900, KM-226, KM-246	APCI-ANAL-REP-70-013,70-014,70-015 APCI-123 APCI-IWO-NO-XO0123 2P 1/30/70
990001410 CTION MELRATH GARLOCK-900	APCI-ANAL-REP-70-026 APCI-IWO-NO-EA-7027 2P 1/30/70
990001150 TRIAL, CRANE PACKING CO	APCI-ANAL-REP-70-368,70-369 1P 10/7/70
990003090 900 APCI-IWO-NO-LB-0795	APCI-ANAL-REP-71-264 2P 5/28/71
990003130 UNO APCI IWO-NO-XO-0134	APCI-ANAL-REP-71-336 1P 10/22/71
990003040 ILLE .ASBESTOS-61 SHEET	APCI-ANAL-REP-71-344 AND APCI-ANAL-REP-71-345 2P 8/13/71
990003040 APCI-ANAL-REP-71-344 AND	APCI-ANAL-REP-71-345 2P 8/13/71
990003060 IA) APCI-IWO-NO-XO-0128	APCI-ANAL-REP-71-399 1P 8/17/71
990003120 CO APCI-IWO-NO-XO-0134	APCI-ANAL-REP-71-446 1P 10/25/71
990002890 DING AND CUTTING OUTFITS	APCI-BROCHURE 11P 9/25/69
990002880 ORS AND COMPRESSED GASES	APCI-BROCHURE 4P 4/70

990003580	SYSTEM EL/SEGUNDO/CALIF	APCI-CONSTR-SPEC-200.0 TO 200.20 20P 8/7/70
990001020	STEEL PIPE AND FITTINGS	APCI-CONSTR-SPEC-200.16.1.7 TO 200.16.3.2 P14-20 7P 2/3/67
990001010	APCI CLEANING	APCI-CONSTR-SPEC-230.15 ON P8 1P 9/16/69
990002540	APCI ACCIDENT REPORTING	APCI-CORP-ADMIN-PROC N-1.5 3P 4/1/68
990000180	SIS AND GENERAL STANDARDS	APCI-DES-ENG-STD-510.1 6P 8/62
990000190	MATERIALS OF CONSTRUCTION	APCI-DES-ENG-STD-510.1.4 4P 6/62
990000200	URE-VESSELS- SHELL-DESIGN	APCI-DES-ENG-STD-510.2 4P 2/65
990000210	SURE-VESSELS- HEAD-DESIGN	APCI-DES-ENG-STD-510.3 13P 8/62
990000150	CRYOGENIC LIQUID DISPOSAL	APCI-DES-ENG-STD-514.6.2 4P 5/26/61
990000160	S OXYGEN STORAGE CYLINDER	APCI-DES-ENG-STD-515.1.3 3P 10/17/60
990002820	G PRESSURE-GAUGES SNUBBER	APCI-DES-ENG-STD-531.10.2 2P 12/5/61
990000220	TION- PRESSURE INDICATORS	APCI-DES-ENG-STD-531.2 5P 10/63
990002430	PCI OXYGEN CONTROL-PANEL	APCI-DES-ENG-STD-534.1 (TO BE PUBLISHED)
990000230	ETTINGS OF SAFETY DEVICES	APCI-DES-ENG-STD-537.1 6P 4/21/59
990000240	SAFETY AND RELIEF VALVES	APCI-DES-ENG-STD-537.9 4P 7/65
990000250	HIELDS AND OXYGEN-SYSTEMS	APCI-DES-ENG-STD-546.1 9P 1/15/71
990000260	CATING OXYGEN COMPRESSORS	APCI-DES-ENG-STD-551.1.9.1 14P 2/3/71
990000270	IFUGAL OXYGEN COMPRESSORS	APCI-DES-ENG-STD-551.2.8.1 18P 2/3/71
990001180	OVED PIPE THREAD SEALANTS	APCI-DES-ENG-STD-570.5.1 1P 11/11/60
990000290	XYGEN COMPRESSOR LOCATION	APCI-DES-ENG-STD-570.6 2P 1/15/71
990002560	R SYSTEM APCI OPERATED	APCI-DES-ENG-STD-570.7 32P 7/19/71
990001550	READED-ENDS ALUMINUM-PIPE	APCI-DES-ENG-STD-571.1 5P 10/65
990001560	30PSIG-MAX-OWG ALUMINUM	APCI-DES-ENG-STD-571.2 3P 11/67
990001570	150-PSIG-MAX-OWG ALUMINUM	APCI-DES-ENG-STD-571.3 4P 11/67
990001580	300-PSIG-MAX-OWG ALUMINUM	APCI-DES-ENG-STD-571.4 3P 11/67
990001590	SIG-MAX-OWG ALUMINUM-TUBE	APCI-DES-ENG-STD-571.50 2P 11/1/68
990001600	SIG-MAX-OWG ALUMINUM-TUBE	APCI-DES-ENG-STD-571.51 2P 11/1/68
990001510	ADED-ENDS- RED BRASS-PIPE	APCI-DES-ENG-STD-572.1 5P 5/62
990001610	S- PLAIN-ENDS COPPER-TUBE	APCI-DES-ENG-STD-574.1 5P 5/62
990001630	PSIG-MAX-OWG COPPER-TUBE	APCI-DES-ENG-STD-574.10 3P 1/64
990001620	PSIG-MAX-OWG COPPER-TUBE	APCI-DES-ENG-STD-574.2 3P 1/64
990001640	-PSIG-MAX-OWG COPPER-TUBE	APCI-DES-ENG-STD-574.50 2P 11/1/68
990001650	-PSIG-MAX-OWG COPPER-TUBE	APCI-DES-ENG-STD-574.51 2P 11/1/68
990001660	-PSIG-MAX-OWG COPPER-TUBE	APCI-DES-ENG-STD-574.52 1P 4/67
990001670	-PSIG-MAX-OWG COPPER-TUBE	APCI-DES-ENG-STD-574.54 2P 1/64
990001840	MAX-OWG CARBON STEEL-PIPE	APCI-DES-ENG-STD-578.10.19 2P 6/62
990001680	D-ENDS- CARBON STEEL-PIPE	APCI-DES-ENG-STD-578.10.1 6P 10/65
990001690	PSIG-MAX-OWG CARBON STEEL	APCI-DES-ENG-STD-578.10.2 4P 10/69
990001700	MAX-OWG CARBON STEEL-PIPE	APCI-DES-ENG-STD-578.10.3 3P 6/62
990001710	MAX-OWG CARBON STEEL-PIPE	APCI-DES-ENG-STD-578.10.4 4P 1/64
990001720	MAX-OWG CARBON STEEL-PIPE	APCI-DES-ENG-STD-578.10.5 4P 1/64
990001730	PSIG-MAX-OWG CARBON STEEL	APCI-DES-ENG-STD-578.10.6 3P 6/62
990001740	NDS- STAINLESS STEEL-PIPE	APCI-DES-ENG-STD-578.30.1 7P 5/62
990001810	-OWG STAINLESS STEEL-PIPE	APCI-DES-ENG-STD-578.30.15 4P 11/67
990001750	-OWG STAINLESS STEEL-PIPE	APCI-DES-ENG-STD-578.30.2 4P 11/67
990001760	-OWG STAINLESS STEEL-PIPE	APCI-DES-ENG-STD-578.30.3 4P 11/67
990001770	-OWG STAINLESS STEEL-PIPE	APCI-DES-ENG-STD-578.30.4 3P 1/64
990001780	-OWG STAINLESS STEEL-PIPE	APCI-DES-ENG-STD-578.30.5 3P 1/64
990001790	-OWG STAINLESS STEEL-PIPE	APCI-DES-ENG-STD-578.30.6 3P 1/64
990001800	-OWG STAINLESS STEEL-PIPE	APCI-DES-ENG-STD-578.30.8 3P 1/64
990001820	-MAX STAINLESS STEEL-PIPE	APCI-DES-ENG-STD-578.40.1 3P 9/69
990000280	CI PIPING- OXYGEN-PIPING	APCI-DES-ENG-STD-578.60.1 14P 4/24/72
990000300	50-PSIG-MAX CARBON-STEEL	APCI-DES-ENG-STD-578.60.3 3P 9/69
990000310	75-PSIG-MAX CARBON-STEEL	APCI-DES-ENG-STD-578.60.4 3P 9/69

990000320	SIG-MAX-DWG CARBON-STEEL	APCI-DES-ENG-STD-578.60.5 3P 9/69
990000330	20-PSIG-MAX CARBON-STEEL	APCI-DES-ENG-STD-578.60.6 3P 9/69
990000370	UMINUM TO STAINLESS-STEEL	APCI-DES-ENG-STD-579.15 2P 9/66
990001830	RODUCTION HAND VALVE-CODE	APCI-DES-ENG-STD-579.3 12P 1/63
990000340	AND MATERIAL REQUIREMENTS	APCI-DES-ENG-STD-579.3.1 2P 5/64
990000350	TENDED BONNET VALVE CODE	APCI-DES-ENG-STD-579.4 3P 4/63
990000360	NT AND CLEANING PROCEDURE	APCI-DES-ENG-STD-579.5 3P 8/12/60
990000390	XES THERMAL TANKS PERLITE	APCI-DES-ENG-STD-581.1 4P 5/26/61
990000400	MINERAL FIBER GRANULATED	APCI-DES-ENG-STD-581.2 2P 6/26/69
990000410	THERMAL TANKS, GLASS WOOL	APCI-DES-ENG-STD-581.3 1P 10/24/60
990002230	QUALITY CONTROL PROGRAM	APCI-DIST-OPER-MAN-6.3 6P 7/65 1/69 4/68 PLUS EXHIBIT-A AND B 7/19/65
990002390	LLON CAPACITY OR LARGER)	APCI-DIST-OPER-MAN-9.1 6P PLUS EXHIBITS ABC 4/66
990001930	D CUSTOMER INSTALLATIONS	APCI-DIST-OPER-MAN-V-1-SEC-4.2.3 1P 5/69
990001920	R BULK GAS SUPPLY SYSTEM	APCI-DIST-OPER-MAN-V-1-SEC-4.1.3 2P 6/71
990002260	YSES REQUIREMENTS SUMMARY	APCI-DIST-OPER-MAN-V-1-SEC-6.32 7P 3/70
990003080	G 1200-SERIES REGULATIONS	APCI-DRAWING-000-0-407004E 1P 3/4/66
990002340	GEN PUMP FILTER ASSEMBLY	APCI-DRAWING-58521C REV-B 12/18/57
990002470	POR DISPOSAL-TANK-500-GAL	APCI-DRAWING-924830 REV-B 9/30/68
990004290	KRYTOX-143-AA-OIL DUPONT	APCI-IA1A-01 1P 2/21/72
990004300	HALOCARBON PRODUCTS CORP	APCI-IA1A-02 1P 2/21/72
990004310	HALOCARBON PRODUCTS CORP	APCI-IA1A-03 1P 2/21/72
990004320	HALOCARBON PRODUCTS CORP	APCI-IA1A-04 1P 2/21/72
990004330	INING MANUFACTURING CO	APCI-IA1A-05 1P 2/21/72
990004340	HALOCARBON PRODUCTS CORP	APCI-IA1A-06 1P 2/21/72
990004350	LUBE, FS, HOOKER CHEMICAL	APCI-IA1A-07 1P 2/21/72
990004360	KRYTOX-143-AB-OIL DUPONT	APCI-IA1A-08 1P 2/21/72
990004370	KRYTOX-143-AC-OIL DUPONT	APCI-IA1A-09 1P 2/21/72
990004380	KRYTOX-143-AZ-OIL DUPONT	APCI-IA1A-10 1P 2/21/72
990004390	BE, FS-5, HOOKER CHEMICAL	APCI-IA1A-11 1P 2/21/72
990004400	L-RAY CO FARMINGDALE/NJ	APCI-IA1A-12 1P 2/21/72
990004410	BE PRODUCTS GLEN/COVE/NY	APCI-IA1A-13 1P 2/21/72
990004420	DURO-GLIDE, CHEMPLAST INC	APCI-IA1A-14 1P 2/21/72
990004430	KRYTOX-143-AD-OIL DUPONT	APCI-IA1A-15 1P 2/21/72
990004440	NGSLEY AND KEITH LTD/UK	APCI-IA1A-16 1P 2/21/72
990004450	BRICANTS- ESSO BEACON-325	APCI-IA1A-17 1P 2/21/72
990004460	IN-Y04 MONTECATINI-EDISON	APCI-IA1A-18 1P 2/21/72
990004470	COMPOUNDS- PERMATEX-1516	APCI-IA2A-01 1P 2/21/72
990004480	NDS- TEFLON-TAPE PERMACEL	APCI-IA2A-02 2P 2/21/72
990004490	NDS- T-FILM ECO MFGR CO	APCI-IA2A-03 1P 2/21/72
990004500	NATIONAL GREENHOUSE CO	APCI-IA2A-04 1P 2/21/72
990004510	L-RAY CO FARMINGDALE/NJ	APCI-IA2A-05 1P 2/21/72
990004520	OSSLITE-FLUOROCARBON-TAPE	APCI-IA2A-06 2P 2/21/72
990004530	ING COMPOUNDS- DAMCO TAPE	APCI-IA2A-07 2P 2/21/72
990004540	NG COMPOUNDS- SANDEN TAPE	APCI-IA2A-08 2P 2/21/72
990004550	- CRANE PACKING CO-TAPE	APCI-IA2A-09 2P 2/21/72
990004560	READING COMPOUNDS- OXOMAT	APCI-IA2A-10 1P 2/21/72
990004570	THREE-M FLUOROCARBON-TAPE	APCI-IA2A-11 2P 2/21/72
990004580	CATE AND CHINA-CLAY-PASTE	APCI-IA2A-12 1P 2/21/72
990004590	PITTSBURGH-CORNING CORP	APCI-IA3A-01 1P 2/21/72
990004600	TRANSITE, JOHNS-MANVILLE	APCI-IA3A-02 1P 2/21/72
990004610	INSULATIONS- GLASS-WOOL	APCI-IA3A-03 1P 2/21/72
990004620	INSULATIONS- MINERAL-WOOL	APCI-IA3A-04 1P 2/21/72
990004630	CAL INSULATIONS- PERLITE	APCI-IA3A-05 1P 2/21/72
990004640	ONS- MILFOAM MILFOAM CORP	APCI-IA3A-06 1P 2/21/72

990004650	BLUE NATIONAL-GYPSUM CORP	APCI-IA3A-07	1P	2/21/72
990004660	MOLITE-12-CURING-CATALYST	APCI-IA4A-01	1P	2/21/72
990004670	D ADHESIVES- KEENE-BINDER	APCI-IA4A-02	1P	2/21/72
990004680	AND ADHESIVES- KEL-F-81	APCI-IA4A-03	1P	2/21/72
990004690	ERS, AND ADHESIVES- NYLON	APCI-IA4A-04	1P	2/21/72
990004700	AND ADHESIVES- NEOPRENE	APCI-IA4A-05	1P	2/21/72
990004710	ADHESIVES- VITON-A DUPONT	APCI-IA4A-06	1P	2/21/72
990004720	VES- NYLON-66 ICI LTD/UK	APCI-IA4A-07	1P	2/21/72
990004730	REGNATED-ASBESTOS-PACKING	APCI-IA5A-01	1P	2/21/72
990004740	EEN, MELRATH GASKETS CO	APCI-IA5A-02	1P	2/21/72
990004750	VALLEY/FORGE GASKET CO	APCI-IA5A-03	1P	2/21/72
990004760	REEN-E-600, JOHN/DORE CO	APCI-IA5A-04	1P	2/21/71
990004770	SBESTOS GASKET MATERIAL)	APCI-IA5A-05	1P	2/21/72
990004780	AL NICOLET INDUSTRIES INC	APCI-IA5A-06	1P	2/21/72
990004790	ATERIAL) GARLOCK MFG CO	APCI-IA5A-07	1P	2/21/72
990004800	CANIZED-RED-FIBRE-GASKETS	APCI-IA5A-08	1P	2/21/72
990004810	TERIAL NICOLET INDUSTRIES	APCI-IA5A-09	1P	2/21/72
990004820	PACKINGS- TEFLON, DUPONT	APCI-IA5A-10	2P	2/21/72
990004830	PACKINGS- VITON-A DUPONT	APCI-IA5A-11	1P	2/21/72
990004840	STOS CEMENT CO LTD/UK	APCI-IA5A-12	1P	2/21/72
990004850		APCI-IA5A-13	1P	2/21/72
990004860	E TAPES TYGADURE LTD/UK	APCI-IA5A-14	1P	2/21/72
990004870	T PITTSBURGH CHEMICAL CO	APCI-IA6A-01	1P	2/21/72
990004880	I-97 BENJAMIN FOSTER CO	APCI-IA6A-02	1P	2/21/72
990004890	PROTECTIVE COATING CO	APCI-IA6A-03	1P	2/21/72
990004900	NTS- COPPER-PIPE ASTM-B42	APCI-IA6A-04	1P	2/21/72
990004910	NTS- COPPER-TUBE ASTM-B75	APCI-IA6A-05	1P	2/21/72
990004920	- RED-BRASS-PIPE ASTM-B43	APCI-IA6A-06	1P	2/21/72
990004930	LUMINUM ASTM-B211-2024-T4	APCI-IA6A-07	2P	2/21/72
990004940	ALUMINUM, ASTM-B-210-3003	APCI-IA6A-08	2P	2/21/72
990004950	ALUMINUM ASTM-B209-5083-0	APCI-IA6A-09	2P	2/21/72
990004960	LUMINUM ASTM-B210-6061-T6	APCI-IA6A-10	2P	2/21/72
990004970	LUMINUM ASTM-B241-6061-T6	APCI-IA6A-11	2P	2/21/72
990004980	LUMINUM ASTM-B247-6061-T6	APCI-IA6A-12	2P	2/21/72
990004990	- ALUMINUM B361-WP6061-T6	APCI-IA6A-13	2P	2/21/72
990005000	N STEEL (OXYGEN SERVICE)	APCI-IA6A-14	3P	2/21/72
990005010	ESS STEEL ASTM-A312-TP304	APCI-IA6A-15	2P	2/21/72
990005020	NLESS STEEL ASTM-A240-304	APCI-IA6A-16	2P	2/21/72
990005030	03-WP304 AND A403-WP304L	APCI-IA6A-17	2P	2/21/72
990005040	ESS STEEL ASTM-A320-B8304	APCI-IA6A-18	2P	2/21/72
990005050	ESS STEEL ASTM-A194-8T321	APCI-IA6A-19	2P	2/21/72
990005060	S-TYPE-416-CADMIUM-PLATED	APCI-IA6A-20	1P	2/21/72
990005070	F-304 AND ASTM-A182-F-316	APCI-IA6A-21	2P	2/21/72
990005080	ENTIFIED AS TO ASTM-SPEC	APCI-IA6A-22	2P	2/21/72
990005090	OPPER-SILICON ASTM-B98GRB	APCI-IA6A-23	2P	2/21/72
990005100	MENTS- FREE-MACHING BRASS	APCI-IA6A-24	2P	2/21/72
990005110	ATMENTS- BERYLLIUM COPPER	APCI-IA6A-25	2P	2/21/72
990005120	NLESS STEEL ASTM-A269-304	APCI-IA6A-26	2P	2/21/72
990005130	- BRONZE ASTM-B61 OR B62	APCI-IA6A-27	2P	2/21/72
990005140	-SHEET OR PLATE ASTM-B36	APCI-IA6A-28	2P	2/21/72
990005150	EATMENTS- MONEL ASTM-B164	APCI-IA6A-29	2P	2/21/72
990005160	SS STEEL ASTM-A351-GR-CF8	APCI-IA6A-30	2P	2/21/72
990005170	NICKEL STEEL ASTM-A353GB	APCI-IA6A-31	2P	2/21/72
990005180	TS- COPPER-TUBE ASTM-B88	APCI-IA6A-32	1P	2/21/72

990005190	IBLE EXPOSURE TO OXYGEN	APCI-IA6A-33	3P	2/21/72
990005200	NTINENTAL-STANDARD-GGG-38	APCI-IA6A-34	1P	2/21/72
990005210	URFACE TREATMENTS- SILVER	APCI-IA6A-35	1P	2/21/72
990005220	STABILIZER BALANCE FE	APCI-IA6A-36	1P	2/21/72
990005230	PERCENT PBO.35-.9-PERCENT	APCI-IA6A-37	1P	2/21/72
990005240	K-PERCENT-ZINC REMAINDER	APCI-IA6A-38	1P	2/21/72
990005250	MISC- 1,1 DICHLOROTHANE	APCI-IA7A-01	1P	2/21/72
990005260	C- 1,1,1 TRICHLOROETHANE	APCI-IA7A-02	1P	2/21/72
990005270	TS, AND MISC- CHLOROFORM	APCI-IA7A-03	1P	2/21/72
990005280	ISC- CARBON-TETRACHLORIDE	APCI-IA7A-04	1P	2/21/72
990005290	MISC- TRICHLOROETHYLENE	APCI-IA7A-05	1P	2/21/72
990005300	MISC- METHYLENE-CHLORIDE	APCI-IA7A-06	1P	2/21/72
990005310	CLEANING-PROCEDURES-APCI	APCI-IB1C-01	14P	2/21/72
990005320	CLEANING-PROCEDURES-APL	APCI-IB1C-02	1P	2/21/72
990005330	TY-CONTROL, FIRE HAZARDS	APCI-IB1D(1)-1	2P	9/9/71
990005340	ITY, QUALITY-CONTROL-APCI	APCI-IB1D(2)-1	3P	9/9/71
990005350	LITY, QUALITY-CONTROL-APL	APCI-IB1D(2)-2	2P	2/21/72
990005370	L-MATERIALS-COMPATIBILITY	APCI-IB2A-1	2P	9/2/71
990005380	-SENSITIVITY OF MATERIALS	APCI-IB2C-1	1P	9/2/71
990005390	Y FABRICATION AND WELDING	APCI-IB2D-1	2P	10/28/71
990005400	RTS SUITABILITY CONTROLS	APCI-IB2E(2)-1	1P	9/2/71
990005360	L-MATERIALS-COMPATIBILITY	APCI-IB2-1	2P	2/10/72
990005420	CATED OX STORAGE TANKS	APCI-IIA4-1	1P	12/30/71
990005430	OTTOM LOX STORAGE TANKS	APCI-IIA4-2	1P	12/30/71
990005410	NAL-HAZARDS- OVERPRESSURE	APCI-IIA-1	2P	2/18/72
990005450	INESS OF DISPOSAL SYSTEM	APCI-IIB1-1	2P	2/12/72
990005470	NLINESS OF OXYGEN PIPING	APCI-IIB1-2	1P	2/19/72
990005480	S PROCEDURAL ARRANGEMENTS	APCI-IIB4-1	1P	2/19/72
990005440	GASES COMPANY PRACTICES	APCI-IIB-1	5P	11/1/71
990005490	OUPLING TO OTHER SYSTEMS	APCI-IIC1-1	APCI-IIC2-1 1P	12/22/71
990005490	ER SYSTEMS APCI-IIC1-1	APCI-IIC2-1	1P	12/22/71
990005510	ATE DISPOSAL ARRANGEMENTS	APCI-IID1-1	2P	8/22/71
990005520	RCES IN DISPOSAL SYSTEMS	APCI-IID2-1	1P	8/22/71
990005530	NINGS AND ESCAPE SYSTEMS	APCI-IID3-1	1P	8/22/71
990005540	ND RESPONSE TIME LIMITS	APCI-IID4-1	1P	8/22/71
990005500	ZARDS- SPILLS AND LEAKAGE	APCI-IID-1	2P	9/3/71
990005550	CONTAMINANTS ACUUMULATION	APCI-IIE-1	1P	7/21/71
990005560	ORT, TRANSPORT TO SYSTEM	APCI-IIF1-1	1P	12/22/71
990005570	LIQUID OXYGEN TRANSFER	APCI-IIF1-2	1P	8/22/71
990005580	NIC LIQUID STORAGE TANKS	APCI-IIF1-3	1P	2/3/72
990005590	OCEDURES FOR LIQUID PUMPS	APCI-IIF1-4	1P	2/21/72
990005620	PORTATION PRESSURE-RELIEF	APCI-IIF2A-1	1P	8/22/71
990005630	ION CONTAMINATION-CONTROL	APCI-IIF2B-1	1P	9/3/71
990005640	AL FROM VENTS AND LINES	APCI-IIF2C-1	1P	8/22/71
990005650	HICLE ACCIDENT PROCEDURES	APCI-IIF2D-1	1P	8/22/71
990005660	AND CONTROLLED SLOSHING	APCI-IIF2E-1	1P	8/22/71
990005600	TATION- LIST OF STANDARDS	APCI-IIF2-1	2P	2/18/72
990005610	IGN CONCEPTS AND CRITERIA	APCI-IIF2-2	1P	2/21/72
990005710	S GAS-PRESSURE-REGULATORS	APCI-IIF3A-1	3P	12/10/71
990005720	IONS AND FAILURES VALVES	APCI-IIF3A(3)-1	1P	12/30/71
990005730	D PRESSURE), LINE-SURGES	APCI-IIF3B-1	1P	2/18/72
990005740	VIBRATIONS DETERIORATION	APCI-IIF3C-1	1P	12/30/71
990005670	MALFUNCTION AND FAILURES	APCI-IIF3-1	1P	11/12/71
990005680	IPMENT OR INSTRUMENTATION	APCI-IIF3-2	2P	2/4/72

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990005700 RES COMPRESSORS AND PUMPS   APCI-IIF3-4  15P  1/23/72
990005690 TH OTHER OXYGEN-EQUIPMENT   APCI-IIF3-6  2P  2/3/72
990005750 RDS- FIRES AND EXPLOSIONS   APCI-IIG-1  6P  11/1/71
990005760 ERE WHY AND HOW STRUCTURE   APCI-IIIA1-1  1P  9/12/71
990005770 N WHERE WHY AND HOW LEAKS   APCI-IIIA2-1  1P  9/12/71
990005780 RUMENTATION AND  CONTROLS   APCI-IIIA3-1  1P  9/12/71
990005790  AND HOW INSULATION CHECK   APCI-IIIA4-1  1P  9/12/71
990005800 IONS OF THE AGING  SYSTEM   APCI-IIIA5-1  1P  8/22/71
990005810 IVE  MAINTENANCE  PROGRAM   APCI-IIIA5-2  5P  9/12/71
990005820 S, TRAPS, AND INSTRUMENTS   APCI-IIIB-1  2P  11/1/71
990005830  PROGRAM PRESSURE TESTING   APCI-IIIC-1  3P  9/12/71
990005850 ING AND  AREA  PLACARDING   APCI-IVA-1  4P  11/5/71
990005860 ERGENCIES WARNING DEVICES   APCI-IVB-1  5P  11/12/71
990005870 CIES PROTECTION PERSONNEL   APCI-IVC1-1  6P  1/13/72
990005880 CENT  SYSTEMS  PROTECTION   APCI-IVC2-1  4P  1/10/72
990005890 CTION GENERAL PRECAUTIONS   APCI-IVE-1  2P  11/8/71
990005900  RELATED TO OXYGEN-SAFETY   APCI-IVE-2  1P  2/21/72
990005840  APCI  SYSTEM-EMERGENCIES   APCI-IV-1  1P  12/23/71
990001300 -034 TO  61-40 AND  61-42   APCI-IWO-NO-10-0589  1P  2/3/61
990001210 EN   APCI-ANAL-REP-61-435   APCI-IWO-NO-10-0858  1P  6/6/61
990001340 TEMPERATURES   APCI-TR-53   APCI-IWO-NO-10-1370  20P  8/62
990001850  WITH CARBON STEEL SPRING   APCI-IWO-NO-10-7071  APCI-PROJECT-NO-00-5-3246-51.12.50  APCI-TM-079  3P  4/27/6
990001430 NAL-REP-63-1662 AND  1663   APCI-IWO-NO-69-1034  1P  11/6/63
990001140 ST   APCI-ANAL-REP-61-683   APCI-IWO-NO-80-0068  1P  9/18/61
990001330 TM   APCI-ANAL-REP-60-496   APCI-IWO-NO-81-0017  1P  1/6/61
990001160 APCI-ANAL-REP-60-495,61-3   APCI-IWO-NO-81-0018  1P  1/16/61
990001350 OMPOUND SQ-32 AND VITON A   APCI-IWO-NO-81-0095  1P  4/27/66
990001410 OO   APCI-ANAL-REP-70-026   APCI-IWO-NO-EA-7027  2P  1/30/70
990002930 EEN) FOAM-GLAS  (CORNING)   APCI-IWO-NO-LA-0333  APCI-MEMO-68  10/24/68  2P
990001870 YGEN-NITROGEN-ATMOSPHERES   APCI-IWO-NO-LB-0043  APCI-TM-112  6P  5/8/68
990003090   STYLE-NO-61 GARLOCK-900   APCI-IWO-NO-LB-0795  APCI-ANAL-REP-71-264  2P  5/28/71
990001420  70-014,70-015   APCI-123   APCI-IWO-NO-XD0123  2P  1/30/70
990003060 E-O-RING  (1/8-INCH  DIA)   APCI-IWO-NO-XD-0128  APCI-ANAL-REP-71-399  1P  8/17/71
990003120  FROM CREST  PRODUCTS  CO   APCI-IWO-NO-XD-0134  APCI-ANAL-REP-71-446  1P  10/25/71
990003420 ITY LOX/LIN STORAGE  TANK   APCI-JOB  SPECIFICATION FOR  JOB-NO-00-2-2775  APCI-NO-71-2775-16.10-1A  2P  9/16
990000590 E LUBRICANTS, STEEL-PIPES   APCI-MAR-87-0-8820  1P  4/61
990000570 ERIMENTATION- TEFLON-HOSE   APCI-MAR-87-0-8820  1P  5/60
990000580 K-HOSES  PLASITE-NO-7122H   APCI-MAR-87-0-8820  1P  6/60
990000600 ANE FOAM (EPON-FOAM-H-60)   APCI-MAR-87-0-8820  1P  8/61
990000610  LED-PLATE-251, PIPE-DOPE   APCI-MAR-87-0-8820  1P  9/61
990000650 SIDUE, METHYLENE-CHLORIDE   APCI-MAR-87-0-8821  1P  1/62
990000640 CYL-SEAL SEALING COMPOUND   APCI-MAR-87-0-8821  1P  12/61
990000620 LE WOOD, ACTIVATED CARBON   APCI-MAR-87-0-8821  1P  10/61
990000630 N, T-FILM-THREAD COMPOUND   APCI-MAR-87-0-8821  1P  11/61
990000660 ED ASBESTOS-ROPE MATERIAL   APCI-MAR-87-0-8821  1P  2/62
990000670 PREGNATED FIBERGLASS LAVA   APCI-MAR-87-0-8821  1P  3/62
990000680 -SPRAY-KOTE, AND DRI-LUBE   APCI-MAR-87-0-8821  1P  4/62
990000690 -FIBER-REINFORCED PLASTIC   APCI-MAR-87-0-8821  1P  6/62
990000700 UBRICANT, TARSET, PLASITE   APCI-MAR-87-0-8821  1P  7/62
990000710 OTE-TYPE-Z AND  TYPE-X-15   APCI-MAR-87-0-8822  1P  3/63
990000720 YMER, NYLON, CUTTING-OILS   APCI-MAR-87-0-8822  1P  5/63
990000760 LLULUBE-300 CELLULUBE-220   APCI-MAR-87-0-8822  1P  7/63
990000730 LULUBE-300, CELLULUBE-220   APCI-MAR-87-0-8822  2P  6/63
990000750 O, TITANIUM-TETRACHLORIDE   APCI-MAR-87-0-8822  2P  9/63
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990000740	L, TITANIUM-TETRACHLORIDE	APCI-MAR-87-0-8822	3P	8/63
990001450	ITY CONTROL OF ROCK WOOL	APCI-MEMO 2	HIMMELBERGER,F.	APCI QUALITY CONTROL OF ROCK WOOL APCI-MEMO-59
990001110	LEAD SEAL-NO-2-JOHN CRANE	APCI-MEMO-59	01/28/59	2P
990001470	K WOOL BETHLEHEM-STEEL-CO	APCI-MEMO-59	11/12/59	2P
990001450	ITY CONTROL OF ROCK WOOL	APCI-MEMO-59	11/6/59	2P
990001120	FLAMMABILITY TEMPERATURE	APCI-MEMO-59	12/11/59	1P
990001500	LASITE PROTECTIVE COATING	APCI-MEMO-60	06/9/60	2P
990001440	ON COATED ASBESTOS-BLUE	APCI-MEMO-60	09/30/60	2P PLUS 1P ATTACHMENT
990001660	A FLOWING OXYGEN STREAM	APCI-MEMO-61	04/17/61	3P PLUS 7P ATTACHMENTS
990002740	APCI-PROJECT-NO-87-0-8820	APCI-MEMO-61	06/28/61	5P
990002750	TAKEN ON PRESSURE-GAUGES	APCI-MEMO-61	08/2/61	4P
990001000	ESTS OF T-FILM AND PENTON	APCI-MEMO-61	11/28/61	2P
990001100	OXYGEN REGULATORS T-FILM	APCI-MEMO-61	11/30/61	1P
990001070	AND OF METHYLENE-CHLORIDE	APCI-MEMO-61	12/11/61	2P
990001360	APCI-PROJECT-NO-87-8-8821	APCI-MEMO-62	01/3/62	5P
990000890	CI STORAGE TANK CLEANING	APCI-MEMO-63	01/24/63	1P
990001320	YGEN COMPATIBILITY- NYLON	APCI-MEMO-63	05/17/63	1P
990001170	Y TEST ON MOLY-LUBE-NO-99	APCI-MEMO-63	06/11/63	1P
990001130	ARBON-TAPE, PERMACEL-TAPE	APCI-MEMO-63	07/30/63	1P
990000940	EANING FOR OXYGEN SERVICE	APCI-MEMO-63	08/5/63	2P PLUS 9P ATTACHMENTS
990002610	MP EXPLOSION AIRCO-BUTLER	APCI-MEMO-63	10/21/63	1P PLUS 6P ATTACHMENTS
990001190	THREAD SEALANT MOLYLUBE-N	APCI-MEMO-63	10/4/63	1P
990002920	NT OF AIR-SYSTEMS UNARCO	APCI-MEMO-63	11/1/63	3P
990000900	GE TANK-NO-6 SANTA/SUSANA	APCI-MEMO-64	03/11/64	1P PLUS 1P ATTACHMENT
990002570	ECIALTY-GAS GAUGE-FAILURE	APCI-MEMO-64	04/13/64	4P
990000920	PANY_S LOX-TANK VAPORIZER	APCI-MEMO-64	04/9/64	1P PLUS 1P ATTACHMENT
990002250	T-OPER-MAN-VOL-4-SECT-6.3	APCI-MEMO-66	10/17/66	2P PLUS SCHEDULE FOR SUBMITTING ROUTINE PRODUCT SAMPL
990002770	OR ACCIDENT- GRANITE/CITY	APCI-MEMO-67	12/15/67	1P
990002780	T- GRANITE/CITY FACILITY	APCI-MEMO-67	12/15/67	1P
990002640	OXYGEN PIPE-LINE FAILURE	APCI-MEMO-67	12/29/67	1P
990002240	N QUALITY-CONTROL-SAMPLES	APCI-MEMO-68	05/1/68	1P
990002200	OX-SPILL NCG CONSHOHOCKEN	APCI-MEMO-68	05/23/68	2P
990002840	QUIPMENT FAILURE SHAKOPEE	APCI-MEMO-68	06/12/68	2P
990003260	EMS FOR OPERATING-PLANTS	APCI-MEMO-68	06/25/68	2P
990002810	-MISS ACCIDENT- CREIGHTON	APCI-MEMO-68	06/4/68	2P
990002930	NOI APCI-IWO-NO-LA-0333	APCI-MEMO-68	10/24/68	2P
990002650	APCI LOX TRANSFER PUMPS	APCI-MEMO-68	12/30/68	2P PLUS 2P ATTACHMENTS
990002660	LOX TRANSFER PUMP SCREENS	APCI-MEMO-69	01/24/69	2P PLUS 3P ATTACHMENTS
990001380	APCI HALOCARBON-WAX-6-25	APCI-MEMO-69	02/6/69	1P
990002730	LOW-METER RING SEAL-FLUID	APCI-MEMO-70	02/27/70	1P
990000910	TER,H.H. APCI LOX TANKS	APCI-MEMO-70	06/26/70	1P
990002580	PUMP FIRES AND EXPLOSIONS	APCI-MEMO-70	06/26/70	3P
990001460	RANSFER FLUOROGREEN-E-600	APCI-MEMO-70	10/23/70	1P
990002760	APCI NASH VACUUM PUMPS	APCI-MEMO-71	01/19/71	2P
990003270	LOX-PUMP SAFETY-BARRIERS	APCI-MEMO-71	02/19/71	2P
990002790	SS ACCIDENT- BURNS/HARBOR	APCI-MEMO-71	02/8/71	2P
990002480	LATHROP AUTO-LOAD SYSTEM	APCI-MEMO-71	03/22/71	2P PLUS 3P ATTACHMENTS
990003240	ARING PROTECTION PROGRAM	APCI-MEMO-71	04/7/71	2P PLUS 1P ATTACHMENT
990002490	APCI AUTO LOAD SYSTEMS	APCI-MEMO-71	05/4/71	2P PLUS 3P ATTACHMENTS
990002170	AFETY REVIEW CHECK-LIST	APCI-MEMO-71	05/4/71	3P
990003140	RED LOX TANKERS BY AMETEK	APCI-MEMO-71	06/22/71	1P
990003100	SHEET PACKING STYLE-61	APCI-MEMO-71	06/2/71	1P PLUS 2P ATTACHMENTS
990003070	Y-MEMORIAL-HOSPITAL 5/70	APCI-MEMO-71	06/3/71	17P
990002220	A AND CLASS-AAA CLEANING	APCI-MEMO-71	07/22/71	1P

990002210	CLEANLINESS REQUIREMENTS	APCI-MEMO-71 07/22/71 2P
990002910	XYGEN COMPRESSOR SUCTION	APCI-MEMO-71 07/26/71 2P
990003400	UDY PROJECT 00-1-2495.07	APCI-MEMO-71 12/10/71 1P
990002670	COSMODYNE LOX-PUMP SAFETY	APCI-MEMO-71 1/01/26/71 2P
990002680	D. APCI LOX-PUMP SAFETY	APCI-MEMO-71 2/19/71 1P
990003420	ION FOR JOB-NO-00-2-2775	APCI-NO-71-2775-18.10-1A 2P 9/16/71
990002700	OF REGULATORS AND TORCHES	APCI-PAPER 17P PLUS 2P ATTACHMENTS 7/65
990002510	VE TO LIQUID-VAPOR-CLOUDS	APCI-PAPER 7P 1971
990001040	ION-EQUIPMENT MAINTENANCE	APCI-POM-1.12 7P 4/21/67
990002020	CNTROL PROCEDURE- TAG OUT	APCI-POM-SEC-1.03 2P PLUS EXHIBIT-A 1P 2/15/67
990002030	EDURE- SAFETY WORK-PERMIT	APCI-POM-SEC-1.04 3P PLUS EXHIBIT-A 1P 2/16/67
990000990	T SOLVENT WASHOUT-GENERAL	APCI-POM-SEC-1.05 12P 2/20/67
990002860	FOR ANALYTICAL PURPOSES	APCI-POM-SEC-1.07 5P 7/7/70
990000950	NTS AND IN OXYGEN SERVICE	APCI-POM-SEC-1.08 7P PLUS 3P ATTACHMENTS 4/4/67
990003310	RTABLE FIRE-EXTINGUISHERS	APCI-POM-SEC-1.13 5P 3/30/67
990002270	APCI COLD-BOX LEAKS	APCI-POM-SEC-1.14 5P 10/30/68
990002830	AND ASSOCIATED EQUIPMENT	APCI-POM-SEC-1.17 8P 4/23/69
990002380	ACITY OR LARGER) GENERAL	APCI-POM-SEC-2.02 7P PLUS EXHIBITS ABCDEFG 8/29/69
990000980	LVENT WASHOUT-FREQUENCIES	APCI-POM-SEC-5.07 3P 7/15/70
990002530	INDUSTRIAL SAFETY POLICY	APCI-POM-SEC-5.16 7P 10/30/68
990002330	SAFETY REPORTS AND FORMS	APCI-POM-SEC-5.18 6P PLUS EXHIBITS ABCDEFGH 3/3/70
990002550	APCI ACCIDENT REPORTING	APCI-POM-SEC-5.21 4P PLUS APPENDIX-A EXHIBIT-A 5/8/68
990002300	-VALVES AND RUPTURE-DISCS	APCI-POM-SEC-6.02 19P INCLUDING EXHIBITS ABCDE 12/8/64
990002290	ON PREVENTIVE MAINTENANCE	APCI-POM-SEC-6.05 5P 10/30/68
990002040	PCI CODED VESSEL REPAIRS	APCI-POM-SEC-6.09 4P 11/29/68 FOR ATTCHMTS SEE 205 206 207
990002280	PCI CODED VESSEL REPAIRS	APCI-POM-SEC-6.09 4P 15P OF ATTCHMTS 11/29/68
990002050	TH MARYLAND CASUALTY CO	APCI-POM-SEC-6.09-ATTCHMT-1 2P 8/27/69
990001850	ING APCI-IWO-NO-10-7071	APCI-PROJECT-NO-00-5-3246-51.12.50 APCI-TM-079 3P 4/27/65
990001880	IN AN OXYGEN-ATMOSPHERE	APCI-PROJECT-NO-00-7-3480-51.00 APCI-TM-114 5P 6/24/68
990002740	SURE-GAGES SAFETY DEVICES	APCI-PROJECT-NO-87-0-8820 APCI-MEMO-61 06/28/61 5P
990001090	OF STANDARD IGNITION TEST	APCI-PROJECT-NO-87-0-8820/1 8P 11/17/61
990001360	TETRACHLORIDE- CHLOROFORM	APCI-PROJECT-NO-87-8-8821 APCI-MEMO-62 01/3/62 5P
990000770	S FOR AIR-PLANT EQUIPMENT	APCI-QUAL-CONT-LAYOUT-101F 2P PLUS 5P OF ATTCHMTS 7/1/71
990000780	S USED FOR OXYGEN SERVICE	APCI-QUAL-CONT-LAYOUT-102F 3P 7/1/71
990001310	O MINERAL WOOL INSULATION	APCI-QUAL-CONT-LAYOUT-103L 2P 7/1/71
990002850	MANUFACTURING FACILITIES	APCI-QUAL-CONT-LAYOUT-103F 11P REV 12/14/65
990000790	CLEANLINESS REQUIREMENTS	APCI-QUAL-CONT-LAYOUT-104F 1P 7/1/71
990002070	PNEUMATIC TESTING-GENERAL	APCI-QUAL-CONT-LAYOUT-105A 3P 7/1/71
990000800	CLEANLINESS REQUIREMENTS	APCI-QUAL-CONT-LAYOUT-105F 3P 7/1/71
990000810	CLEANLINESS REQUIREMENTS	APCI-QUAL-CONT-LAYOUT-106F 3P 7/1/71
990000820	CLEANLINESS REQUIREMENTS	APCI-QUAL-CONT-LAYOUT-107F 3P 7/1/71
990000830	R VENDOR CLASS-B CLEANING	APCI-QUAL-CONT-LAYOUT-114F 2P 7/1/71
990000840	R VENDOR CLASS-A CLEANING	APCI-QUAL-CONT-LAYOUT-115F 2P 7/1/71
990000850	VENDOR CLASS-AA CLEANING	APCI-QUAL-CONT-LAYOUT-116F 2P 7/1/71
990002060	DROSTATIC TESTING-GENERAL	APCI-QUAL-CONT-LAYOUT-117A 2P 7/1/71
990000860	VENDOR CLASS-AAA CLEANING	APCI-QUAL-CONT-LAYOUT-117F 3P 7/1/71
990000870	GER CLEANING REQUIREMENTS	APCI-QUAL-CONT-LAYOUT-119F 2P 7/1/71
990000880	SPECIFIED PAINT SYSTEMS	APCI-QUAL-CONT-LAYOUT-120F 3P 7/1/71
990001490	PITTSBURGH CHEMICAL CO	APCI-R+D-NOTEBOOK-111 P129-32 4P 7/62
990001370	NO- RTV-60-NP-134372-M235	APCI-R+D-NOTEBOOK-111 P149 1P 1/63
990001220	WITH HIGH-PRESSURE OXYGEN	APCI-R+D-NOTEBOOK-111 P152 1P 1/63
990001480	APCI PIPE BURNING TESTS	APCI-R+D-NOTEBOOK-111 P26-9 4P 4/17/61
990001200	BE-KOTE-AR AND MOLYLUBE-N	APCI-R+D-NOTEBOOK-130 P16-7 2P 2/11/63
990001230	WITH HIGH-PRESSURE OXYGEN	APCI-R+D-NOTEBOOK-130 P3 1P 6/63

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990003580 ANSFER-LINES BIBLIOGRAPHY   APCI-REPORT  P86  2/28/64
990003300 OPERATIONS SAFETY  MANUAL   APCI-SAFETY  MANUAL-20P64  88P  1964  (OUT OF PRINT)
990003170 AVE ANOTHER  PAIR OF EYES   APCI-SAFETY-GRAM-NO-01  1P  6/1/61
990002600 I  OXYGEN COMPRESSOR FIRE   APCI-SAFETY-GRAM-NO-03  2P  7/7/61
990000010  A CYLINDER INTO A ROCKET   APCI-SAFETY-GRAM-NO-04C  1P  8/7/61
990000020 APCI  FIRE IN OXYGEN-LINE   APCI-SAFETY-GRAM-NO-05  1P  10/20/61
990000030 CI  LIQUID OXYGEN LOADING   APCI-SAFETY-GRAM-NO-06  1P  11/17/61
990000040 EELS IN CRYOGENIC SERVICE   APCI-SAFETY-GRAM-NO-10-REV-1  1P  10/25/63
990003210   APCI  WEAR SAFETY SHOES   APCI-SAFETY-GRAM-NO-11  2P  5/14/62
990000050   OXYGEN CYLINDER FAILURE   APCI-SAFETY-GRAM-NO-13  2P  6/1/62
990002500 Y CAUSED HIGHWAY ACCIDENT   APCI-SAFETY-GRAM-NO-17  1P  8/10/62
990000060 OLATION OF PIPING-SYSTEMS   APCI-SAFETY-GRAM-NO-21  1P  10/29/62
990000070  W.  APCI  GASEOUS OXYGEN   APCI-SAFETY-GRAM-NO-23C  6P  1/10/63
990000080 PCI  DRAIN-LINE EXPLOSION   APCI-SAFETY-GRAM-NO-24  2P  1/17/63
990000090 POUNDS FOR OXYGEN-SYSTEMS   APCI-SAFETY-GRAM-NO-27  5P  3/22/63
990003180  ONLY  PREVENTS AN INJURY   APCI-SAFETY-GRAM-NO-29  1P  8/1/63
990003290 RTH THE  COST AND  EFFORT   APCI-SAFETY-GRAM-NO-30  1P  8/9/63
990000100 YLINDERS BEFORE REFILLING   APCI-SAFETY-GRAM-NO-31  2P  8/21/63
990000110 PCI  VACUUM PUMP FAILURES   APCI-SAFETY-GRAM-NO-35  1P  10/4/63
990000120   PRESSURE GAUGE FAILURES   APCI-SAFETY-GRAM-NO-43  2P  5/8/64
990000360 CYLINDERS HAS ITS HAZARDS   APCI-SAFETY-GRAM-NO-49  2P  3/26/65
990000130 W.W.  APCI  HUMAN TORCHES   APCI-SAFETY-GRAM-NO-50C  1P  1/3/66
990000170 W.W.  APCI  LIQUID OXYGEN   APCI-SAFETY-GRAM-NO-54C  6P  1/31/67  P6  REVISED  1/31/68
990003190 C THEN THERE WAS DARKNESS   APCI-SAFETY-GRAM-NO-58  1P  3/15/67
990000140 S IN THE WELDING INDUSTRY   APCI-SAFETY-GRAM-NO-60C  5P  11/26/67
990001060 PCI  CARBON-TETRACHLORIDE   APCI-SAFETY-GRAM-NO-68  1P  2/21/69
990000420  CRITERIA- AIR-SEPARATION   APCI-SAFETY-STD-605.1  9P  11/10/60
990000430 R-SEPARATION PLANT-LAYOUT   APCI-SAFETY-STD-605.1.3  6P  1/6/61
990000460 AND SAFETY-RELIEF DEVICES   APCI-SAFETY-STD-607.1.12  14P  10/62
990000470 ENIC-LIQUID, AND DISPOSAL   APCI-SAFETY-STD-607.1.20  3P  4/62
990000440 ATION, OXYGEN, COMPRESSOR   APCI-SAFETY-STD-607.1.2.3  6P  12/62
990000450 NT COMPONENTS- COLD-BOXES   APCI-SAFETY-STD-607.1.5  7P  1/63
990000480 EM, AND CRYOGENIC-LIQUIDS   APCI-SAFETY-STD-607.2.1.1  3P  4/62
990000490 EMS, AND COMPRESSED-GASES   APCI-SAFETY-STD-607.2.2.5  P1-4  3/65  P5-6  1/64
990000500 ERIALS AND OXYGEN SERVICE   APCI-SAFETY-STD-608.1  7P  10/65
990000510 YGEN COMPATIBLE MATERIALS   APCI-SAFETY-STD-609.1  8P  6/65
990000520 AIR-SEPARATION PLANT-SITE   APCI-SAFETY-STD-610.1.1  5P  11/28/60
990002180 EPARATION-PLANT OPERATION   APCI-SAFETY-STD-610.1/5  17P  2/16/61
990002410 NDUSTRIAL  SAFETY  POLICY   APCI-SAFETY-STD-625.0.1  13P  10/3/61
990003250 AFETY- OCCUPATIONAL NOISE   APCI-SAFETY-STD-625.0.1.2  3P  4/9/71
990002080 EDURES- TAG OUT PROCEDURE   APCI-SAFETY-STD-626.3.3  2P  5/62
990002090 ANT SAFETY  WORK  PERMITS   APCI-SAFETY-STD-626.3.5  3P  6/19/61
990000530 RES- EMERGENCY PROCEDURES   APCI-SAFETY-STD-626.3.8  8P  5/62
990002400 ROCEDURES-PURGING METHODS   APCI-SAFETY-STD-626.4.1  7P  1/70  2/70
990003220 RY  PROTECTIVE  EQUIPMENT   APCI-SAFETY-STD-627.3  14P  1/64
990003200 ARING  APPAREL HARD  HATS   APCI-SAFETY-STD-627.4.1  1P  6/15/70
990003160 QUIPMENT- EYE  PROTECTION   APCI-SAFETY-STD-627.4.2  5P  10/62
990003330 HEAT  PROTECTIVE CLOTHING   APCI-SAFETY-STD-627.4.7  2P  5/68
990003230               E EQUIPMENT   APCI-SAFETY-STD-627.4.8  1P  9/69
990003340 AGE AIR-SEPARATION  PLANT   APCI-SAFETY-STD-627.5.1  4P  6/15/70
990000540 EANING FOR OXYGEN SERVICE   APCI-SAFETY-STD-629.0.10  1P  6/19/61
990002440 ENT- OUTSIDE FIRE-HYDRANT   APCI-SAFETY-STD-630.2.2  1P  7/26/61
990002450 DRANT-HOUSE AND EQUIPMENT   APCI-SAFETY-STD-630.2.3  3P  REV-6/15/70
990000550 AND LOX LOADING  FACILITY   APCI-SAFETY-STD-630.2.6  3P  1/64
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990002460 QUIPMENT- INSIDE- OUTSIDE    APCI-SAFETY-STD-630.3.2  3P  5/68
990001940  AND UNLOADING'OPERATIONS    APCI-SAFETY-STD-635.19  6P  2/68
990001970 ETY- FIRE  EXTINGUISHMENT    APCI-SAFETY-STD-635.30  5P  2/68
990000380 AIR-SEPARATION COLD-BOXES    APCI-TB-39  1P  6/14/71
990003280 IELDS FOR OXYGEN  SYSTEMS    APCI-TB-42  3P  9/30/71  APPLICABLE TO  APCI-DES-ENG-STD-546.1
990002870 ES 1200-SERIES REGULATORS    APCI-TEST-PROCEDURE  4P  1/30/70
990001400 OBILE-DTE-105-HYDROCARBON    APCI-TM-040  7P  9/18/59
990001650 ECT-NO-00-5-3246-51.12.50    APCI-TM-079  3P  4/27/65
990001870 RES   APCI-IWO-NO-LB-0043    APCI-TM-112  6P  5/8/68
990001880 ROJECT-NO-00-7-3480-51.00    APCI-TM-114  5P  6/24/68
990005950 RES  (80 TO  100-PERCENT)    APCI-TM-186  44P  3/72
990001340 ID-NITROGEN  TEMPERATURES    APCI-TR-53   APCI-IWO-NO-10-1370  20P  8/62
990005910 VING  SPILLS AND  LEAKAGE    APCI-V-1  1P  8/22/71
990005920   EQUIPMENT AND  PROPERTY    APCI-V-2  26P  2/4/72
990005930 CIDENTS INVOLVING  OXYGEN    APCI-V-3  2P  2/21/72
990005940 R  AIR-SEPARATION  PLANTS    APCI-V-4  2P  5/12/72
990003430 W-PRESSURE STORAGE  TANKS    API  STANDARD-620  2/70
990004160   APL  OVERHAUL PROCEDURE    APL-C-155/9.5  33P  1971
990003610 ESTS FOR CLASS-A CLEANING    APL-ENGR-SPEC-A.02  3P  5/12/69
990003620 EANLINESS  (OXYGEN-CLEAN)    APL-ENGR-SPEC-A.03  4P  4/1/71
990003600 T FOR CLASS-B CLEANLINESS    APL-ENGR-SPEC-A-01  2P  5/12/69
990003660 RVICE VESSEL  FABRICATION    APL-ENGR-SPEC-C.03  7P  7/26/71
990003670 SSURE-VESSEL  FABRICATION    APL-ENGR-SPEC-C.04  8P  7/26/71
990003680 D SURFACE HEAT-EXCHANGERS    APL-ENGR-SPEC-E.02  9P  6/28/70
990003690 GEN SERVICE  (APL-PLANTS)    APL-ENGR-SPEC-E.04  12P  6/1/71
990003700 OOLERS FOR OXYGEN SERVICE    APL-ENGR-SPEC-E.05  13P  6/1/71
990003710 NTRIFUGAL CRYOGENIC PUMPS    APL-ENGR-SPEC-G.03  14P  4/1/71
990003720 URE-GAUGE- OXYGEN SERVICE    APL-ENGR-SPEC-J.07  3P  6/18/69
990003730 VALVES FOR OXYGEN SERVICE    APL-ENGR-SPEC-J.15  3P  6/18/69
990003740 AS SERVICE  -20F TO  100F    APL-ENGR-SPEC-J.18  4P  6/18/69
990003630 YGEN SERVICE  COMPRESSORS    APL-ENGR-SPEC-K.02  3P  6/23/69
990003640 ION AND TEST REQUIREMENTS    APL-ENGR-SPEC-L.06  4P  7/7/69
990003750 SE FOR CRYOGENIC  LIQUIDS    APL-ENGR-SPEC-L.11  3P  7/7/69
990003760  MANIFOLDS OXYGEN SERVICE    APL-ENGR-SPEC-L.12.1  2P  7/7/69
990003770 NSINTERED  P.T.F.E.  TAPE    APL-ENGR-SPEC-L.14  2P  7/8/69
990003970 ION, TESTING AND CLEANING    APL-ENGR-SPEC-M.02  8P  APPENDIX I II III  3P  4/19/71
990003650 ION, TESTING AND CLEANING    APL-ENGR-SPEC-M.02  9P PLUS  APPENDIX I II III  4/19/71
990003790 W.  APL  EXPANDED PERLITE    APL-ENGR-SPEC-N.01  3P  1/2/70
990003800 M,J.W.  APL  MINERAL WOOL    APL-ENGR-SPEC-N.02  3P  1/2/70
990003810 ASS SECTION FOR PIPELINES    APL-ENGR-SPEC-N.05  5P  10/1/70
990003780 LINGS FOR USE IN THE  U.K    APL-ENGR-STD-LS.08  6P  10/21/69
990004040 W.  APL  OXYGEN PIPELINES    APL-ENGR-STD-LS.30/1  8P  7/1/70
990004050 OXYGEN TRANSMISSION-LINES    APL-ENGR-STD-LS.30/2  3P  1/12/70
990004080 ERVICE  500PSIG  (CS05.0)    APL-ENGR-STD-LS.31.3  6P  6/12/70
990004090 ERVICE  720PSIG  (CS07.2)    APL-ENGR-STD-LS.31.4  6P  6/12/70
990004060 RVICE  150PSIG  (CS0.1.5)    APL-ENGR-STD-LS.31/1  7P  6/12/70
990004070 ERVICE  275PSIG  (CS02.7)    APL-ENGR-STD-LS.31/2  6P  1/29/70
990004110 ATION AT  CUSTOMER  SITES    APL-IGD-ENGR-MAN-40-01  7P  7/19/71
990004120 ER BY  PUMP AT CARRINGTON    APL-IGD-ENGR-MAN-50-01  3P  5/27/71
990004130 ERS BY  PUMP AT BRACKNELL    APL-IGD-ENGR-MAN-50-02  3P  5/27/71
990004140 Y  PUMP AT STOKE-ON-TRENT    APL-IGD-ENGR-MAN-50-03  3P  5/27/71
990004150 YOGENIC  LIQUID CONTAINER    APL-IGD-ENGR-MAN-52-02  7P  6/3/71
990004160 (STANDARD  PURITY  GASES)    APL-IGD-ENGR-MAN-55.01  3P  7/2/71
990003980 ASHING OF PIPING  SYSTEMS    APL-IGD-ENGR-MAN-56-06  4P  7/3/71
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990004170	ATION OF A CRYOGENIC TANK	APL-IGD-ENGR-MAN-60-01 6P 5/19/71
990004210	DGE ALLOY CASTINGS LTD	APL-MEMO-64 02/5/64 16P
990003990	BLIES FOR OXYGEN SERVICE	APL-QCP-Q10 REV.0 2P
990004000	OR DEGREASING OF PIPEWORK	APL-QCP-Q11 REV.0 2P
990004010	TANKS FOR OXYGEN SERVICE	APL-QCP-Q12 REV.0 1P
990004020	TANKS FOR OXYGEN SERVICE	APL-QCP-Q13 REV.0 1P
990004190	MENTS WITH LIQUID OXYGEN	APL-SAFETY-BULL-025 1P REPRINTED 1/68
990003820	APL FIRE IN OXYGEN-LINE	APL-SAFETY-BULL-028 1P 1/68
990004200	OXYGEN KILLS TWO WORKMEN	APL-SAFETY-BULL-037 1P REPRINTED 1/68
990003830	OXYGEN CHARGING MANIFOLD	APL-SAFETY-BULL-046 2P
990003840	D TO A COMMON VENT PIPE	APL-SAFETY-BULL-075 3P 12/11/69
990003850	ENTS ON OXYGEN EQUIPMENT	APL-SAFETY-BULL-102 1P 2/8/71
990003860	SPC ROGNAC PLANT 3/2/71	APL-SAFETY-BULL-107 3P 4/14/71
990003870	A CYLINDER FILLING DEPOT	APL-SAFETY-BULL-114 3P 7/13/71
990001050	ICHLOROETHYLENE (T.C.E.)	APL-SAFETY-DEPT-INFO-SHEET-38 2P 2/10/71
990004270	FILMS IN OXYGEN SYSTEMS	APL-SAFETY-DEPT-INFO-SHEET-41 2P 4/8/71
990004280	POSED TO GASEOUS OXYGEN	APL-SAFETY-DEPT-INFO-SHEET-42 1P 4/8/71
990004220	TS LTD OXYGEN EQUIPMENT	APL-SAFETY-DEPT-INFO-SHEET-19 9P
990004230	OXYGEN RICH ENVIRONMENTS	APL-SAFETY-DEPT-INFO-SHEET-33 6P
990003880	-PUMP-TYPE-GB114-NO-29224	APL-SAFETY-DEPT-REP-16 6P 2/28/69
990003890	P-TYPE-GB114-SERIAL-NO-79	APL-SAFETY-DEPT-REP-26 6P 1/15/70
990003900	NCASTER 11940 AM 5/2/70	APL-SAFETY-DEPT-REP-30 (PRELIMINARY) 2P 5/5/70
990003910	INSTRUMENTS LTD-BEDFORD	APL-SAFETY-DEPT-REP-31 5P REV-1 2/11/71
990003920	MP ON AN SSPC LOX-TANKER	APL-SAFETY-DEPT-REP-32 9P 7/10/70
990003930	N AT STOKE PLANT 8/7/70	APL-SAFETY-DEPT-REP-34 14P 8/24/70
990003940	AT THE CARRINGTON PLANT	APL-SAFETY-DEPT-REP-35 7P PLUS APPENDIX I THROUGH VI 19P 3/5/71
990003950	D IN SAFETY DEPT-REP-35	APL-SAFETY-DEPT-REP-36 6P 3/10/71
990003960	GERSTONE/NEWPORT 5/18/71	APL-SAFETY-DEPT-REP-37 7P 6/2/71
990003020	CE VISIT TO H.M.S.-EAGLE	APL-X0425 5P PLUS APPENDIX A AND B 8/18/71 PLUS MINUTES OF MEETING HELD ON B
990001540	TICS OF METALS AND ALLOYS	ARS JOURNAL P917-23 7P 7/61
990002360	LET AND INLET CONNECTIONS	ASA-B57.1 57P 1965
990002100	SURE VESSELS DIVISION-1	ASME BOILER AND PRESSURE VESSEL CODE SECTION VIII 361P 1971
990002110	G AND BRAZING OPERATORS	ASME BOILER AND PRESSURE VESSEL CODE SECTION IX 88P 1971
990002140	R EXTENSION AND BENDING	ASME WINTER ANNUAL MEETING PITTSBURGH 11/12-17/66 TRANS ASME SER-D-J BAS
990002160	ELDED ALUMINUM ALLOY-5083	ASME WINTER ANNUAL-MEETING NEW/YORK 8P 11/29/70-12/3/70
990003390	PAINTING STEEL SURFACES	ASTM-D2200-67 2P 1967
990006000	ROM LIQUID OXYGEN POOLS	CGA AIR-SEPARATION PLANT SAFETY SYMPOSIUM P12-23 12P 4/23/69
990003320	H. APCI FIRE PROTECTION	CGA AIR-SEPARATION PLANT SAFETY SYMPOSIUM PP175-184 10P 10/63
990001950	FOR COLD LIQUEFIED-GASES	CGA-PAMPHLET-341-TENTATIVE-STANDARDS 13P 1970
990001980	LEANED FOR OXYGEN SERVICE	CGA-PAMPHLET-G-4.1 21P 3/59
990002710	LING OF COMPRESSED GASES	CGA-PAMPHLET-P-1 10P 1965
990001960	ERS FOR COMPRESSED GASES	CGA-PAMPHLET-S-1.1 20P 1969
990003150	D-GAS STORAGE-CONTAINERS	CGA-PAMPHLET-S-1.3 11P 1966
990002350	LET AND INLET CONNECTIONS	CGA-PAMPHLET-V-1 57P 1965
990003450	IBUTION CGA-DOCKET 70-11	CGA-THIRD DRAFT 23P 3/22/72
990003030	NTRACT-AF33(616)6730 14P	CRYOGENIC ENGINEERING CONFERENCE ANN/ARBOR 8/15-17/61
990001890	ITRITE-SOLUTION INHIBITOR	CRYOGENIC ENGINEERING CONFERENCE PROCEEDINGS 1958 ADVANCES IN CRYOGENIC EN
990002690	L PUMPS FOR LIQUID-OXYGEN	CRYOGENICS V-10 PP241-248 8P 6/70
990002370	LET AND INLET CONNECTIONS	CSA-B96 57P 1965
990003050	BLACK) VITON-E60 (GREEN)	DEMAG-LETTER TO APCI 1P 8/11/71
990001520	GASEOUS OXYGEN AD297124	DMIC-MEMO-163
990001530	ITION OF METALS IN OXYGEN	DMIC-REPORT-224 33P PLUS APPENDIX
990002150	RYOGENIC PRESSURE-VESSELS	ESSO-REPORT-NO-EE.26ER.70 17P 8/24/70
990003540	ANDARDS MISC AMENDMENTS	FEDERAL REGISTER V-35 N-223 11/17/70

990003510	NT OF MINIMUM STANDARDS	FEDERAL REGISTER VOL-35 NO-161 8/19/70
990003520	ON AND MAINTENANCE PLANS	FEDERAL REGISTER VOL-35 NO-205 10/31/70
990003530	DARDS ODORIZATION OF GAS	FEDERAL REGISTER VOL-35 NO-220 11/11/70
990003550	NOTICE OF PUBLIC HEARING	FEDERAL REGISTER VOL-36 NO-126 6/30/71
990003570	UWABLE OPERATING PRESSURE	FEDERAL REGISTER VOL-36 NO-176 9/10/71
990003560	TS FOR CORROSION CONTROL	FEDERAL REGISTER VOL-36 NO-126 6/30/71
990002520	CIDENT IN AN OXYGEN CLOUD	FIRE JOURNAL PP76-8 AND 81 4P 1/71
990004260	FICIAL GAS ENVIRONMENTS	FPRC/1270 28P 9/67
990004240	ENVIRONMENT EXPERIMENTS	FPRC/MEMO-217 24P 1/65
990004250	N RICH GAS ENVIRONMENTS	FPRC/MEMO-223 12P 7/65
990002130	R EXTENSION AND BENDING	INTERNATIONAL CONFERENCE ON FRACTURE PROCEEDINGS V-1 PP341-62 22P 1965
990005970	R GASEOUS OXYGEN SYSTEMS	MAB-3268-69 9P 11/5/69
990002800	LIQUID-OXYGEN EXPLOSION	MCA-CASE-HISTORY-NO-824 2P 8/62
990001290	ES AND TEST DATA-HANDBOOK	MSC-02681 380P 5/29/70
990001280	ERIALS WITH LIQUID OXYGEN	MTP-P+VE-M-63-14 94P 12/4/63
990001240	ERIALS WITH LIQUID OXYGEN	NASA-TMX-53052 34P 5/26/64
990001250	LS WITH LIQUID OXYGEN III	NASA-TMX-53533 54P 11/3/66
990001260	ALS WITH LIQUID OXYGEN IV	NASA-TMX-53773 50P 8/23/68
990001270	ERIALS WITH LIQUID OXYGEN	NASA-TMX-985 72P 8/64
990002190	AND HIGH-PRESSURE OXYGEN	NATIONAL SAFETY CONGRESS CHICAGO 7P PLUS 9P FIGURES PRESENTED BY W L BALL 1
990001910	-NO-566 3P PASSED 5/71	NFPA-NO-50
990002420	S FOR WELDING AND CUTTING	NFPA-NO-51 8P 1969 AND CUTTING AND WELDING PROCESSES NFPA-NC-51B 32P 1962
990002420	NG AND WELDING PROCESSES	NFPA-NO-51B 32P 1962
990001900	AT CONSUMER SITES-1965	NFPA-NO-566 10P 1965
990000930	-GAS PROCESSING EQUIPMENT	PENNSALT-TECHNICAL-BULLETIN 6P 2/3/60
990002140	PITTSBURGH 11/12-17/66	TRANS ASME SER-D-J BASIC ENG V-89 PP885-62 8P 12/67
990003030	IQUID AND GASEOUS OXYGEN	USAF-CONTRACT-AF33(616)6730 14P CRYOGENIC ENGINEERING CONFERENCE ANN/ARBOR
990002720	TY IN WELDING AND CUTTING	USAS-Z49.1 49P 1967

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16. Abstract

A thorough and detailed study of Air Products and Chemicals, Inc. and Air Products Ltd. practices in the design and use of equipment in oxygen service, was performed. The report includes Liquid and Gaseous Oxygen Safety Review information covering: Material Compatibility, Operational Hazards, Maintenance Programs, Systems Emergencies, and Accident/Incident Investigations and Reports, and a set of references. Areas requiring further research and development for systems involving exposure to oxygen environment have been identified. An index to the Liquid and Gaseous Safety Review Data Forms and a General Index have been included to allow for easy retrieval of the reported information.

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