

U. S. Government

RESEARCH REPORTS

January 19, 1958

Vol. 29, No. 1

. . . A monthly listing of
Government research reports
available to industry . . .

In this issue:



Alkaline Storage Batteries: An
Investigation of Nickel Oxide Positive
Plate Characteristics

Alumina-Base Cermets

Titanium Production Development
Including Metallurgical and Alloying

Determination of Halogen in Gasoline

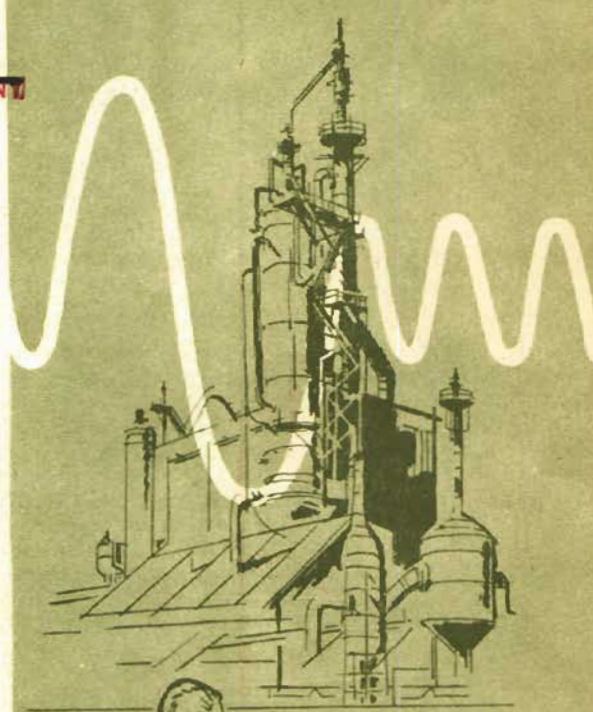
Chemical Analysis of Surfaces by Nuclear
Methods

Evaluation of Coral Rubber
(Cispolyisoprene)

Environmental Requirements Guide for
Electronic Parts

Feasibility of Using Wholly External
Ultrasonics To Measure Fluid Flow
Within Thick-Walled Metal Pipes

*Complete list of printed reports
begins on page 1*



U. S. DEPARTMENT OF COMMERCE

Office of Technical Services

The PB Reports . . .

announced in this publication have just been released, usually by agencies of the U. S. Government, for dissemination to the public. In most instances they result from Government or Government-sponsored research.

The Office of Technical Services is responsible, under Public Law 776, 81st Congress, for the collection and distribution of these technical reports in the interest of American science and industry.

The more important reports are reprinted for sale to the public by OTS. Many of the reports are so specialized that the demand for them does not warrant reproduction of printed copies; originals of these documents are deposited at the Library of Congress. There they may be inspected in the Annex Reading Room, or copies may be ordered from the Library in either photocopy or microfilm.

PB reports of special interest to smaller businesses are abstracted in OTS's monthly *Technical Reports Newsletter*, available from the Superintendent of Documents,

Washington 25, D. C., at \$1 a year domestic, \$1.50 foreign.

Since 1945 thousands of business firms have used PB reports in their research programs. These reports now constitute one of the world's largest collections of non-confidential technical information, numbering over 250,000 items. OTS has published catalogs of related reports in more than 300 areas of industrial interest. For further information relative to any of its activities, you are invited to write OTS, U. S. Department of Commerce, Washington 25, D. C.

Except to the extent indicated by acknowledgment of authorship, OTS does not edit PB reports, nor does it accept responsibility for the information and conclusions contained in them. If copyrighted material appears, permission for its use should be requested from the copyright owners. Any national security restrictions that may have applied to these reports have been removed. Patents may cover the subject matter of any report, and the reader is advised to make patent searches before developing applications based on the reports.

How To Order

ALWAYS USE COMPLETE TITLE AND PB NUMBER of each report ordered. The letter "s" accompanying some PB numbers means "supplement," "t" means "translation," and "r" means a partial or complete revision. These letters should be included as part of the PB number. Prepayment is required.

TO ORDER FROM LC • Address your order to Library of Congress, Photoduplication Service, Publications Board Project, Washington 25, D. C. Make check or money order payable to Chief, Photoduplication Service, Library of Congress. State whether report is desired in microfilm or photocopy. Microfilm copies are in 35 millimeter film and require special reading equipment; if you do not have

such a machine you may be able to use one at a library in your area.

TO ORDER FROM OTS • Address your order to Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Make check or money order payable to OTS, Department of Commerce. Reports available from OTS may also be ordered through Department of Commerce field offices.

TO ORDER FROM OTHER SOURCES • When an agency other than OTS or LC is the source, use the full address included in the abstract of the report. Make check or money order payable to that agency.

U. S. GOVERNMENT RESEARCH REPORTS

OFFICE OF TECHNICAL SERVICES
John C. Green, *Director*

U. S. DEPARTMENT OF COMMERCE
Sinclair Weeks, *Secretary*

Issued monthly. Annual subscription \$6 (\$3 additional for foreign mailing). Single copy 60 cents. In the U. S. make remittance payable to Superintendent of Documents and mail either to a Department of Commerce field office or to Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Address changes should be sent to Superintendent of Documents. Outside the U. S. make remittance payable to and order from OTS, U. S. Department of Commerce, Washington 25, D. C. Foreign address changes should be sent to OTS.

Contents are not copyrighted and may be reprinted freely. Mention of source will be appreciated.
Use of funds for printing this publication approved by the Director of the Bureau of the Budget, August 22, 1955.



Contents

	Page		Page
Apparel.....	3	Minerals and Mineral Products.....	27
Bibliography.....	3	Photographic and Optical Goods.....	27
Chemicals and Allied Products.....	4	Physics.....	27
Electrical Machinery.....	11	Physiology.....	29
Fuels and Lubricants.....	15	Psychology.....	29
Highways and Bridges.....	16	Rubber and Rubber Products.....	31
Instruments.....	17	Structural Engineering.....	32
Machinery.....	18	Transportation Equipment.....	33
Mathematics and Statistical Analysis.....	18	Water Supply, Sanitation and Public Health.....	38
Metals and Metal Products.....	21	Miscellaneous.....	38
Meteorology and Climatology.....	25	Atomic Energy Commission Reports.....	41

Printed Reports Available from OTS Announced in This Issue

	Page
Alkaline storage batteries. An investigation of nickel oxide positive plate characteristics. (PB 131329) 75 cents.....	15
Alumina-base cermets. (PB 131342) 50 cents.....	27
Bending vibrations of a twisted rotating beam. (PB 131234) \$1.00.....	32
Cargo handling in helicopters. (PB 131195) \$4.50.....	33
Chemical analysis of surfaces by nuclear methods. (PB 131298) \$1.00.....	9
Comparison of the creep-rupture properties of nickel in air and in vacuum. (PB 131344) 50 cents.....	21
Constitutional and aging characteristics of magnesium-thorium and magnesium-thorium ternary alloys. (PB 121939) \$2.00.....	21
Crack-extension-force near a riveted stiffener. (PB 131036) 75 cents.....	32
Determination of halogen in gasoline. (PB 131327) 50 cents.....	9
Direct determination of oxygen and nitrogen in titanium and titanium alloys using bromine trifluoride. (PB 131290) 50 cents.....	9
Effect of corrosion preventives on chromic acid films adsorbed on phosphate coatings. (PB 131296) 50 cents.....	6

	Page
Environmental requirements guide for electronic parts. (PB 131423) 50 cents	12
Evaluation of coral rubber (cis polyisoprene). (PB 131232) 50 cents	31
Evaluation of designs and materials for high speed-high temperature shaft seals for turbojet engines. (PB 121992) \$2.00	36
Evaluation of fatigue properties of titanium and titanium alloys. (PB 121631) \$3.75	23
Factors influencing operating limits of high flux axial compressors. (PB 131388) 75 cents	33-34
Fatigue, stress, body change and behavior. Selected bibliography. (PB 131299) \$1.75	4
Feasibility of using wholly external ultrasonics to measure fluid flow within thick-walled metal pipes. (PB 131079) \$1.25	17
Foamed metal low density core material for sandwich construction. Part I. (PB 131419) 75 cents	23
Foamed metal low density core material for sandwich construction. Part II. (PB 131466) 75 cents	23
Foamed metal low density core material for sandwich construction. Part III. (PB 131467) 75 cents	23
Heat-transfer studies on a forced convection loop with biphenyl and bi- phenyl polymers. (PB 131214) \$1.00	4-5
Hydrogen, crack initiation, and delayed failure in steel. (PB 131340) \$1.50	23
Investigation into the use of heterocyclic compounds as lubricant additives. (PB 131223) 50 cents	15
Investigation of solid-propellant fuel cartridges for fire extinguishment at polar temperatures. (PB 131275) 50 cents	17
Investigation of the effects of low pressure glass fabric base structural laminates. (PB 131372) \$2.00	5
Naval Research Laboratory research reactor. Part III: An eight- decade logarithmic amplifier for nuclear reactor instrumentation. (PB 131303) 50 cents	28
Notes on elementary quantum statistics. (PB 131125) \$5.50	20
Ordnance work on chromium-base alloys, 1946-1955. (PB 131229) 50 cents	23
Organosilicon compounds. Part II: Cyclopentamethylenedialkylsilanes. (PB 131389) 50 cents	5
Performance of copper-mandrel potentiometers in a-c operational amplifiers. (PB 131289) \$1.00	15
Preparation of mutually consistent magnetic charts. (PB 131477) \$1.25	20
Preparation of polymethyl acrylate. (PB 131249) 50 cents	6
Rapid detection of urea- and melamine-formaldehyde, isocyanate, and urethane resins in coatings. (PB 131292) 50 cents	7
Rapid identification of nitrogen, phosphorus, silicon and titanium in coating vehicles. (PB 131291) 50 cents	10

	Page
Report of NRL progress, Dec 1957. (PB 131488) \$1.25.....	39
Simple conversion of an analytical balance for automatically recording weight changes. (PB 131285) 50 cents.....	18
Static electrification of steel cartridge casings with dielectric coatings and the MK 47 electric primer. (PB 131304) 50 cents.....	7
Statistics manual, with examples taken from ordnance. (PB 131483) \$6.00.....	20
Structural and vibrational characteristics of WADC S-2 model propeller blades. (PB 131370) \$2.50.....	34
Study of the effects of nuclear radiations on elastomeric compounds and compounding materials. Part I. (PB 121811) \$2.75.....	31
Study of the effects of nuclear radiations on elastomeric compounds and compounding materials. Part II. (PB 121705) \$2.25.....	31
Survey of the literature on rhenium. (PB 121826) \$4.50.....	4
Tables of the error function and of its first twenty derivatives. (PB 131464) \$2.50.....	20-21
Temperature and stress dependence of the atmosphere effect on Nichrome V. (PB 131339) 50 cents.....	24
Titanium production development including metallurgical and alloying. (PB 121632) \$2.75.....	24
Uncoupled torsional vibrations of a thin, twisted, rotating beam. (PB 131237) \$1.00.....	33

APPAREL

F. F. S. with pneumatic pressurization as an anti-g device, by E. H. Lambert, C. F. Code, E. J. Baldes and E. H. Wood of the Acceleration Laboratory of the Mayo Aero Medical Unit at Rochester, Minn. U.S. Office of Scientific Research and Development. Committee on Medical Research. Jan 1944. 8p photos, graphs, tables. Order from LC. Mi \$1.80, ph \$1.80. PB 128960

The protective value of the F. F. S. anti-g suit when inflated by air pressure has been determined on eight subjects. The average protection against visual symptoms was 2.2 g. The average protection afforded the blood content of the ear was also 2.2 g. The amplitude of the ear pulse was protected 2.5 g. In an earlier study placing 4.7 liters of water in the suit resulted in slightly less than 1g protection. This difference is discussed. Contract OEM cmr 129. CMR CAM 248.

Tests of protection against the effects of acceleration afforded the human by the use of the latest model of the gradient pressure suit (G.P.S.) when inflated by three different pressure arrangements, by H. Lampert, E. C. Hoff, E. J. Baldes, A. R.

Sweeney, C. F. Code and E. H. Wood from the Aero Medical Unit, Mayo Clinic, Rochester, Minn. U.S. Office of Scientific Research and Development. Committee on Medical Research. Aug 1943. 12p tables. Order from LC. Mi \$2.40, ph \$3.30. PB 128959

The data herein reported indicate that inflation of the gradient pressure suit will provide approximately 1.5g protection against the visual symptoms produced by acceleration. The protection will seldom be below 1 g and may go as high as 2 g. Inflation of the suit with a gradient pressure throughout gave, on the average to three subjects, 1.3 g protection against visual symptoms, 1.6 g protection to the ear opacity (loss of blood from the ear), and 1.6 g protection to the ear pulse. CMR CAM 187.

BIBLIOGRAPHY

Abstracts of published papers and list of translations, vol. 4, no. 5 (abstracts 243-296). Australia. Commonwealth Scientific and Industrial Research Organization, Melbourne. Jun 1956. 28p. Order from LC. Mi \$2.70, ph \$4.80. PB 124960

For earlier issues see PB 119617, 122887, 122458, 122888, 123070 and 124710. 1. Scientific research - Bibliography - Australia 2. Industrial research - Bibliography - Australia

Fatigue, stress, body change and behavior, selected bibliography, by William Beven and Rollin M. Patton. Lockheed Aircraft Corporation. Human Engineering Dept. Military Operations Research Engineering Div. Georgia Div., Marietta, Ga. Apr 1957. 69p. Order from OTS. \$1.75.

PB 131299

This bibliography surveys the entire field of stress and fatigue, and the accompanying behavior and bodily changes. A total of 883 references are alphabetized. A topical index is included. AD 118091. Project no. 6335, Task no. 63614. Covers the period 1946-1956 under Contract AF 33(616)-3745. AF WADC TR 57-125.

List of reports of the Arctic Construction and Frost Effects Laboratory. U.S. Army. Corps of Engineers. New England Division. Arctic Construction and Frost Effects Laboratory, Boston, Mass. Nov 1956. 41p. Order from LC. Mi \$3.30, ph \$7.80. PB 125949

Miscellaneous paper no. 14. 1. Building - Research - Bibliography - Arctic regions 2. Arctic regions - Bibliography 3. Frost - Bibliography - Arctic regions

Literature search on organic coolants. Part II, by Eugene P. Meckly. Mine Safety Appliance Co., Callery, Pa. Jun 1956. 42p. Order from LC. Mi \$3.30, ph \$7.80. PB 126456

This bibliography represents the second part of a literature search on organic compounds for cooling or moderating nuclear reactors. Part I included classified report literature and was issued as "Confidential Restricted." This search was limited to the following compounds: biphenyl, terphenyls and higher polyphenyls, alkyl benzenes, Dowtherms, diesel fuels, isopropyl diphenyl, diisopropyl diphenyl. No references were found to the last three. Abstracts from Chemical Abstracts were used whenever possible.

Selected abstracts on the use of organic materials as moderator-coolants of reactors, by G. Naish and R. W. Bowring. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Aug 1956. 11p. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 41 cents. PB 126187

S.O. Code no. 91-3-2-92. 1. Atomic power - Research - Gt. Brit. 2. Reactors - Coolants - Bibliography - Gt. Brit. 3. AERE Inf/Bib 105

Survey of the literature on rhenium, by C. T. Sims, E. N. Wyler, G. B. Gaines and D. M. Rosenbaum. Battelle Memorial Institute, Columbus, O. Jun 1956. 236p photos, map, diagrs, graphs, tables. Order from OTS. \$4.50. PB 121826

The survey includes all available data on rhenium, compiled and edited so as to present a complete but compact picture of the metal as it is now known. The information has been classified into such major fields of interest as the history of rhenium, its occurrence, recovery and production, and its physical, chemical, electronic, and metallurgical properties. The main body of the report covers the period from the discovery of rhenium to mid 1952 and the appendix continues the survey to mid 1955. AD 110596. Project 7080, Task 70659. Covers work from June 1952-Jan 1956 under Contract AF 33(616)-232. AF WADC TR 56-319.

CHEMICALS AND ALLIED PRODUCTS

Organic Chemicals

Conductance of hydrogen chloride in acetonitrile, by Steven S. Danyluk and George J. Janz. Rensselaer Polytechnic Institute. Dept. of Chemistry, Troy, N. Y. Nov 1956. 49p diagrs, graphs, tables. Order from LC. Mi \$3.60, ph \$9.30. PB 125007

The equivalent conductance of "stabilized" solutions of hydrogen chloride has been studied as a function of concentration over the range 0.0009 to 0.6 equiv./litre. Interpretation of the results in the light of the Bjerrum ion-pair formation and Fuoss-Kraus triple-ion formation theories in solvents of low dielectric constant is discussed. The low values of the equivalent conductance are in accord with ionic association processes in hydrogen chloride-acetonitrile solutions. AD 115029. Project Chem 40-3. Technical note no. 6. Contract AF 18(600)-333. AF OSR TN 56-600.

Crystal structure of cyanogen chloride, by R. B. Heiart and B. B. Carpenter. Brown University. Metcalf Research Laboratory, Providence, R. I. Nov 1955. 21p diagrs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 125944

The crystal structure of cyanogen chloride, ClCN, has been determined at about -30°C by X-ray diffraction techniques. For annual report no. 2 (1953) see PB 114675. Contract Nonr-562(04), NR 017-607, Technical report no. 2.

Heat-transfer studies on a forced convection loop with biphenyl and biphenyl polymers, by C. T. Ewing, J. P. Stone, C. H. Blachly, B. E. Walker

and R. R. Miller. U.S. Naval Research Laboratory. Nov 1957. 34p drawing, diagrs, graphs, tables. Order from OTS. \$1.00. PB 131214

The pumped loop at NRL is designed to study heat transfer characteristics of organic fluids and the effect of pyrolytic decomposition products on heat transfer surfaces. The studies are based on the direct determination of film coefficients, overall heat transfer coefficients, or both, on an electrically heated horizontal tube. Reliable film coefficients in the high turbulent region for biphenyl and two polymer-biphenyl mixtures (25% and 40% polymer) are presented and effectively correlated with an equation of the Dittus-Boelter type. Data showing a lack of fouling at surface temperatures of 850°F are presented for short term experiments with biphenyl and a low-polymer mixture (25% polymer). Plugging in gage and drain lines during loop operation, resulting from low solubility of paraquaterphenyl and/or higher parapolyphenyls, is discussed. Associated with the loop studies, physical properties for a number of phenyl compounds and mixtures were determined. Density and viscosity values are reported for biphenyl, meta-terphenyl, para-terphenyl, mono-isopropylbiphenyl, and two polymer-biphenyl mixtures. Equations are presented for extrapolation of the data to higher temperatures. Also, solubility values are reported for a number of phenyl compounds in biphenyl and other aromatic solvents. NRL R 4990.

Organosilicon compounds. Part II: Cyclopentamethylenedialkylsilanes, by Harold Rosenberg, Christ Tamborski and Marvin D. Rausch. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory. Wright-Patterson Air Force Base, Dayton, O. May 1957. 20p graphs, tables. Order from OTS. 50 cents. PB 131389

An investigation into the use of cyclic tetra-substituted organosilanes was conducted to determine their applicability as base materials for extreme-temperature lubricant and hydraulic fluid applications. A series of cyclopentamethylenedialkylsilanes was synthesized and certain of the physical properties correlated with molecular structure. In addition, one aryl derivative, cyclopentamethylene-diphenylsilane, was prepared and evaluated. AD 130761. Project no. 7340. Covers work from Nov 1954 to Dec 1955. For Part I see PB 121003. Part I has title: Organosilanes and related compounds as high-temperature lubricants. AF WADC TR 54-613, Part 2.

Preparation of selected polyethers, by L. R. Evans. New Mexico. College of Agriculture and Mechanical Arts, State College, N. Mex. Mar 1956. 14p. Order from LC. Mi \$2.40, ph \$3.30. PB 126027

Bis (chloromethyl) ether, $\text{CH}_2\text{ClOCH}_2\text{Cl}$, has been successfully reacted with alcohols in the presence of sodium hydroxide and with sodium alkoxides to pre-

pare $\text{CH}_3\text{OCH}_2\text{OCH}_2\text{OCH}_3$, $\text{CH}_3\text{CH}_2\text{OCH}_2\text{OCH}_2\text{OCH}_2\text{CH}_3$, and $(\text{CH}_3)_2\text{CHOCH}_2\text{OCH}_2\text{OCH}(\text{CH}_3)_2$. The reaction between dichlorodiethyl ether and sodium methoxide was carried out to prepare $\text{CH}_3\text{CH}_2\text{OCH}(\text{OCH}_3)\text{CH}_2\text{OCH}_3$. These reactions demonstrate the possibility of preparing many polyethers by this reaction, although several reactions with more highly chlorinated ethers or polyhydroxy compounds were unsuccessful. Project: R 478-0000, Task R 478-319. Contract AF 33(616)-455. AF WADC TR 54-434.

Plastics and Plasticizers

Evaluation of the properties of some hydropol resins, by Robert E. Monica and Bryce Maxwell. Princeton University. Plastics Laboratory, Princeton, N.J. Jul 1952. 33p drawing, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 125010

A series of hydrogenated polybutadiene (Hydropol) resins of various molecular weight and degree of unsaturation have been evaluated for their mechanical, chemical and electrical properties. Studies have also been made on the extrudability and wire coating properties of these materials. The results of these tests are compared with the results of similar tests on a typical polyethylene resin and conclusions are drawn as to the effect of the degree of unsaturation and molecular weight on the properties of the resins. Dept. of the Army project: 3-99-15-022. Signal Corps project: 32-152B. Research sponsored by the Phillips Petroleum Co. Contract DA 36-039-sc-133, Technical report no. 7A. PU PL TR 26A.

Investigation of the effects of glass fabric geometry on the strength properties of low pressure glass fabric base structural laminates, by W. R. Bowditch and E. L. Johnson. Taylor Fibre Company. Research Dept., Norristown, Pa. May 1957. 78p photos, drawings, diagr, tables. Order from OTS. \$2.00. PB 131372

In the initial evaluation program, seventeen experimental fabrics and two high modulus fabrics were compared to four standard glass fabrics in laminate form. Five experimental fabrics were selected for further evaluation after improvements were made in crimp, twist, fiber diameter and weave. AD 118324. Project no. 7340, Task no. 73400. Covers work from May 1954 to May 1956 under Contract AF 33(616)-2543. AF WADC TR 56-270.

Investigation of the flow behavior of polyethylene, by R. F. Westover and Bryce Maxwell. Princeton University. Plastics Laboratory, Princeton, N.J. Oct 1952. 31p diagr, graphs, table. Order from LC. Mi \$3.00, ph \$6.00. PB 125008

A fairly low molecular weight polyethylene was extruded by means of a piston type extrudometer.

This instrument was designed to give extruding pressures up to 20,000 pounds per square inch, which is approximately ten times the pressures commonly used for such investigations. Other advantages of this extruder are brought out. The effects of temperature, pressure and tube diameter upon the rate of flow of the polyethylene were studied along with their relationship to the effective viscosity of the extruded material. The relationship of the rate of flow to the final diameter of the cooled polyethylene cylinder was studied for all the temperatures and tube sizes used. An effort was made to obtain a better understanding of the phenomenon of turbulence in plastic materials. Signal Corps project: 32-152B. Dept. of the Army project: 3-99-15-022. Contract DA 36-039-sc-133, Report 9A. PU PL TR 27A.

Investigation of the properties of polysulfone resins, by E. B. Sharp and Bryce Maxwell. Princeton University. Plastics Laboratory, Princeton, N. J. Nov 1951. 26p diagr, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 125009

The mechanical and electrical properties of a series of polysulfone resins have been evaluated. The effect of the length of side chains on these properties has been studied to determine the best possible formulation of starting monomers needed to obtain any specific properties. The crazing of these materials has also been investigated in order to gain more specific knowledge of the phenomenon, and to compare the crazing of these materials with that found in polystyrene. By the selection of the proper starting monomers materials of varying rigidity may be prepared. It is concluded that the polysulfone materials can be made with properties comparable to polystyrene, except that the electrical loss is slightly higher and the crazing characteristics somewhat better. Dept. of the Army project: 3-99-15-022. Signal Corps project: 32-152B. Contract DA 039-sc-133, Report 5A. PU PL TR 23A.

Monoradical and diradical polymerization of styrene, by D. H. Johnson and A. V. Tobolsky. Princeton University. Plastics Laboratory, Princeton, N. J. Aug 1951. 40p graphs. Order from LC. Mi \$3.00, ph \$6.30. PB 125011

Relations between reciprocal number average degree of polymerization and rate of polymerization have been derived for monoradical and diradical initiation accounting for the effects of termination by combination and disproportionation and also for the effect of chain transfer to catalyst. These equations were applied to experimental data on the polymerization of styrene at 60°C. initiated by various catalysts and by light. Dept. of the Army project: 3-99-15-022. Signal Corps project: 32-152B. Contract DA 36-039-sc-133, Report 4B. PU PL TR 22B.

Plastic coated glass fiber insect screens, by James M. Osborn and Frederick C. Myers. U.S. Army. Corps of Engineers. Engineer Research

and Development Laboratories, Fort Belvoir, Va. Oct 1953. 54p photos, drawing, diagr, tables. Order from LC. Mi \$3.60, ph \$9.30.

PB 129018

This investigation was initiated to (1) determine the physical and performance characteristics of plastic coated glass fiber insect screening materials, (2) develop a satisfactory screening material of this type and (3) prepare a specification, based on characteristics considered acceptable for procurement by the Department of the Army. A project plan was developed. Copper, brass, bronze, galvanized steel plastic, and five different plastic coated glass fiber insect screening materials were obtained from industry. Laboratory examination and evaluation of the screening materials were conducted and new tests and testing techniques were developed. Natural weathering tests were conducted at exposure sites in Arizona, Canada, Florida, Panama and Virginia to test the effects of various climatic conditions on the screening. Repairs and utilities no. 52-21. For supplement see PB 131357s. ERDL R 1327.

Preparation of polymethyl acrylate, by Albert Resnick and Sydney Axelrod. U.S. Picatinny Arsenal. Samuel Feltman Ammunition Laboratories, Dover, N. J. Sep 1956. 14p photo, graphs, tables. Order from OTS. 50 cents. PB 131249

Polymethyl acrylate was synthesized by a free radical mechanism using the emulsion polymerization method. Two separate preparations were undertaken, one to provide a high molecular weight polymer and the other to provide a low molecular weight polymer. The methyl acrylate monomer was purified by distillation. The polymerization was carried out using potassium persulfate as the initiator and theophenol as the polymer chain length regulator. Ordnance Project TB 2-0001B. Dept. of the Army project: 559-01-004. PA TR 2336.

Paints, Varnishes and Lacquers

Effect of corrosion preventives on chromic acid films adsorbed on phosphate coatings, by W. Dennis McHenry and Jodie Doss. U.S. Arsenal, Rock Island, Ill. Oct 1956. 15p tables. Order from OTS. 50 cents. PB 131296

Phosphate steel specimens, rinsed in radioactively (Cr^{51}) tagged chromic acid of various concentrations, were immersed in water and/or water displacing and non-water displacing preservatives. The percent chromic acid removed by the water and/or the preservatives was computed from the before and after immersion activity measurements. Specimens were then subjected to salt fog corrosion tests. Phosphated steel, after removal from the chromic acid rinse, should be air blown dry and immersed in a water-displacing preservative to provide the maximum amount of protection against corrosion. Dept. of the Army project: 593-14-006. Ordnance project: TB4-302D, Report 19. RIAL R 56-3044.

Preparation and application of metal protective base coats containing No. 418 frit, by Dwight G. Bennett and W. J. Plankenhorn. Illinois Engineering Experiment Station. Urbana, Ill. May 1951. 9p. Order from LC. Mi \$1.80, ph \$1.80. PB 125964

This report covers the specifications for the manufacture of no. 418 frit and for the preparation and application of several metal protective base coats containing no. 418 frit as the principal ingredient. Frit composition, mill batch formulas, coating preparation, coating application and firing procedure are given. ATI no. 150789. Unclassified Sep 30, 1955. Contract W33-038-ac-14520. AF TR 6544.

Rapid detection of urea- and melamine-formaldehyde, isocyanate and urethane resins in coatings, by H. M. Swann. U.S. Aberdeen Proving Ground. Coating and Chemical Laboratory, Aberdeen, Md. Jun 1957. 7p. Order from OTS. 50 cents. PB 131292

No specific qualitative tests for the new isocyanate and polyurethane resins have appeared in the literature and no tests for the amino-formaldehyde resins are available that permit detection in less than 8 hours and these are not applicable to coating in general. Specific qualitative tests for urea- and melamine-formaldehyde, isocyanate and polyurethane resins are described, using p-dimethylamino-benzaldehyde as reagent. Ordnance project: TB4-006D. Dept. of the Army project: 593-32-006. APG CCL R 26.

Static electrification of steel cartridge casings with dielectric coatings and the MK47 electric primer, by K. W. Bewig. U.S. Naval Research Laboratory. Oct 1957. 7p diags, table. Order from OTS. 50 cents. PB 131304

Steel cartridge casings are being coated with dry lubricating epoxy phenolic resin and Teflon films which also serve as a protection against corrosion. For several different methods of handling it is shown that, in a dry atmosphere of 11 percent relative humidity, the total induced charge on 50 or more cartridge casings would have to be collected on a single reservoir and discharged under favorable circumstances through an MK47 electric primer in order to cause accidental detonation. In an atmosphere of 55 percent relative humidity, this number increases to more than 375 cartridge casings. The highest value of charge obtained on a single casing with an epoxy phenolic resin coating was 7.9 esu; the comparable figure for a Teflon film was 24.8 esu. These values are to be compared with a charge of 1200 esu at a potential of 1000 volts required to detonate the MK47 electric primer 100 percent of the time. NRL R 5026.

Adsorption of krypton on barium sulphate. Investigation into the heterogeneities of solid surfaces. Final report for the period Nov 1952-Jun 1955 under Contract DA 19-020-ord-2293, by B. Millard, D. Mills and R. Little. New Hampshire. University. Dept. of Chemistry, Durham, N.H. Aug 1955. 23p graphs. Order from LC. Mi \$2.70, ph \$4.80. PB 124902

Adsorption isotherms have been measured for krypton on barium sulphate at -195°C and at -183°C . Isothermic heats of adsorption computed from the two isotherms show that the adsorption of krypton is quite markedly affected by the mode of preparation of the barium sulphate. Crystallization from concentrated solutions of sulphuric acid and barium chloride yields a surface of much higher energy than crystallization from extremely dilute solutions of the same reagents. AD 70008.

Decontamination of fuming nitric acid, by C. M. Tibbels, Murell J. Bessey and P. B. Sheridan. U.S. Chemical Corps. Chemical and Radiological Laboratories, Army Chemical Center, Md. Dec 1954. 119p diagr, graphs, tables. Order from LC. Mi \$6.00, ph \$18.30. PB 126673

The object of the work described in this report was to develop the most satisfactory chemical agents for eliminating the hazards arising from accidental spills of fuming nitric acid. Project 4-17-06-001. CC CRL R 442.

Infrared-absorption studies on barium titanate and related materials, by J. T. Last. Massachusetts Institute of Technology. Laboratory for Insulation Research, Cambridge, Mass. May 1956. 40p diags, graphs, tables. Order from LC. Mi \$3.00, ph \$6.30. PB 126614

The infrared absorption spectrum of BaTiO_3 has been measured for thin single crystals and for powder samples dispersed in pressed KBr disks. Absorption bands occur at 495 and at ca. 340 cm^{-1} for single-crystal samples and at slightly higher frequencies for the pressed disks. The effect of changes of crystal symmetry and structure on the infrared spectrum was investigated. Contract N5 ori-07801. MIT LIR TR 106.

Kinetics of decomposition and oxidation of derivatives of boron hydrides, by James E. Coleman, Joseph A. Lovinger and Robert C. Petry. Ohio State University Research Foundation, Columbus, O. Jun 1955. 34p diags, graphs, tables. Order from LC. Mi \$3.00, ph \$6.30. PB 126601

As a result of this research, it is concluded that the pyrolysis of trimethylborane proceeds at a measurable rate in the temperature range 550°C - 610°C with an increase in pressure, forming dark-colored

solids, low boiling liquids, and gases not condensed by liquid nitrogen. The oxidation of trimethylborane by oxygen at 0°C is nonexplosive at low pressures but proceeds at a rate too fast for convenient measurement, after an induction period. At higher pressures, explosion occurs; the explosion limits depend upon the pressure and the mixture ratio. The oxidation below the explosion limit produces a product of molecular weight corresponding to a mole for mole reaction of oxygen and trimethylborane. This product is a strong oxidizing agent, giving the same tests shown by hydroperoxides. MCC-1023-TR-152.

Line half-widths and intensities from the infrared transmission of thermally excited CO₂, by Henry John Kostkowski. Johns Hopkins University. Laboratory of Astrophysics and Physical Meteorology, Baltimore, Md. Oct 1955. 114p drawing, diags, graphs, tables. Order from LC. Mi \$6.00, ph \$18.30. PB 125942

The infrared absorption spectrum of CO₂ has been obtained from 1250 to 700 cm⁻¹ under various conditions of temperature and pressure using a Model 12C Perkin-Elmer Spectrometer and a 3 meter high temperature absorption cell. The half-width of the spectral lines at the maximum of absorption in the R branch of the 961 cm⁻¹ band was determined together with its variation with temperature for CO₂ self-broadening. Its variation with temperature could not be determined in this experiment. The absolute intensity of various bands in the region from 1250 to 700 cm⁻¹ was obtained and transmission measurements for this region are reported. An IBM (No. 604) electronic computer facilitated some of the calculations. Contract Nonr-248(01).

Metallographic identification and crystal symmetry of titanium hydride. First partial report on hydrogen in titanium, by L. D. Jaffe. U.S. Arsenal, Watertown, Mass. Nov 1954. 5p. Order from LC. Mi \$1.80, ph \$1.80. PB 126038

Specimens of titanium containing varying amounts of hydrogen in the form of titanium hydride, were examined metallographically under polarized and sensitive-tint illumination. X-ray and neutron diffraction studies were also conducted to verify the metallographic results. O.O. project no: TB 4-15. Dept. of the Army project no.: 593-08-021. WAL R 401/245.

Pulsed polarization reversal in BaTiO₃ crystals, by H.H. Wieder. U.S. Naval Ordnance Laboratory, Corona, Calif. Mar 1957. 17p graphs. Order from LC. Mi \$2.40, ph \$3.30. PB 125994

BaTiO₃ single crystals in the tetragonal crystal phase were subjected to experiments for determining additional properties of the polarization reversal process. Repeated pulses of various widths, durations, and repetition rates caused a reversal of the sign of the remanent polarization. For low ampli-

tude, long duration pulses or for the interrupted, short duration multiple pulses used in these experiments, domain nucleation plays a minor role and polarization reversal occurs mainly through the growth of 180° nuclei. Covers work through Nov 1956. NOLC R363. NAVORD 4609.

Stability of hydrazine in liquid ammonia, by John A. Krynitsky and Homer W. Carhart. U.S. Naval Research Laboratory. Sep 1953. 18p diags, graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 126600

Investigations have shown hydrazine to be stable in liquid ammonia solutions under acidic conditions but to undergo decomposition in alkaline media to yield hydrogen and nitrogen in a two-to-one ratio. Kinetic studies have shown the decomposition to proceed through an apparent one-half order reaction having a temperature coefficient per 10°C of somewhat greater than three. Catalytic studies proved steel, rust, platinum, and graphite to exert a promoting activity on the reaction while studies showed pyrex glass to be inert. Calculations for the energy of activation gave values of approximately 13 kilocalories/mole. Temperatures in many experiments were controlled to ±0.1°C with an easily constructed, laboratory-scale cryostat built especially for this purpose. NRL R 4219.

Theoretical calculation of dipole moments and effective charges for HBr and HCl, by A. Thomson and S.S. Penner. California Institute of Technology. Daniel and Florence Guggenheim Jet Propulsion Center, Pasadena, Calif. Jun 1955. 28p diagr, graphs, table. Order from LC. Mi \$2.70, ph \$4.80. PB 124207

Dipole moment and effective charge calculations have been carried out for HBr and HCl by using the same approximations in the atomic orbital and LCAO molecular orbital calculations as were used previously by D.Z. Robinson (J. Chem. Phys. 17, 1022 (1949)). Calculated values of the infrared intensities have been found to be in fair agreement with measured results for a range of values of the s, p-hybridization. Contract Nonr-220(03), NR 015-401, Technical report 17.

Thermal decomposition of germane. I: Kinetics, by Kenzi Tamaru, Michel Boudart and Hugh Taylor. Princeton University. Frick Chemical Laboratory, Princeton, N.J. Jan 1955. 8p. Order from LC. Mi \$1.80, ph \$1.80. PB 125922

Oxygen and arsine are also studied on their effects on decomposition rates. Surface decomposition studies are included. Contract N6 onr-27018.

Thermal decomposition of tin hydride, by Kenzi Tamaru. Princeton University. Frick Chemical Laboratory, Princeton, N.J. 1956. 10p graphs. Order from LC. Mi \$1.80, ph \$1.80. PB 124117

The kinetics of decomposition of tin hydride have been studied by a static method. The decomposition is a first order reaction in respect to tin hydride, being independent of hydrogen pressure, and the activation energy of the reaction is 9.1 kcal/mole between 100° and 35°. Contract N6onr-27018.

X-ray excited states (excitons) and width of valence band in KCl, by L.G. Parratt and E.L. Jossem. Cornell University. Dept. of Physics, Ithaca, N.Y. Jul 1956. 13p graph. Order from LC. Mi \$2.40, ph \$3.30. PB 125020

A combination of (a) Parratt and Jossem's experimental x-ray emission and absorption curves for potassium and chlorine in KCl and (b) Muto and Okuno's recent theoretical calculations on "exciton" structure (one-electron approximation) provides semi-empirical values of the effective dielectric constant and of the effective mass for the potassium 1s first excited state in KCl. AD 95213. Project R-355-20-1. Contract AF 18(600)-300, Technical report no. 6. AF OSR TN 56-337.

Analytical Chemistry

Absorption of inorganic salts by non-ionic resins (a new absorptive mechanism), by J. Kennedy and H. Small. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Nov 1955. 13p graphs, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N.Y. 46 cents. PB 126181

S.O. Code no. 91-3-3-1. 1. Resins - Absorptive properties - Gt. Brit. 2. AERE C/R 1668

Analysis of thorium-cerium binary alloys, by G.W. C. Milner and G.W. Sneddon. Gt. Brit. Ministry of Supply. Atomic Energy Establishment. 1956. 17p graphs, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N.Y. 50 cents. PB 126182

S.O. Code no. 91-3-2-96. Date of manuscript Sep 1955. 1. Atomic power - Research - Gt. Brit. 2. Cerium-thorium alloys - Volumetric analysis - Gt. Brit. 3. AERE C/R 1740

Chemical analysis of surfaces by nuclear methods. Final report, by S. Rubin, T.O. Passell and L. E. Bailey. Stanford Research Institute, Menlo Park, Calif. Sep 1956. 33p diagr, graphs. Order from OTS. \$1.00. PB 131298

Nuclear scattering and nuclear reactions induced by high energy protons and deuterons have been applied to the analysis of solid surfaces. The theory of the scattering method, and analyses of O, Al, Si, S, Ca, Fe, Cu, Ag, Ba, and Pb made by the scattering method are described. Analyses of C, N, O, F, and Na performed using nuclear reactions other

than scattering are also described. The methods are applicable to the detection of all elements to a depth of several microns, with sensitivities in the range of 10^{-8} to 10^{-6} gm/cm². AD 108007. Dept. of the Army project: 5B99-01-004. Ordnance R and D project: TB 2-0001. OOR project: 1466. Contract DA 04-200-ORD-440, Final report. SRI Proj. SU 1430, Final report.

Correction of complex spectra for instrumental resolving power. Part I: Model windows, by L.G. Parratt and C.F. Hempstead. Cornell University. Dept. of Physics, Ithaca, N.Y. Aug 1956. 19p graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 125210

Project: R-355-20-1. AD 96046. 1. Spectrographic analysis - Methods 2. Spectrum analysis - Distortion - Calculation 3. Contract AF 18(600)-300, Technical report 7 4. AF OSR TN 56-388

Determination of halogen in gasoline: The analyses of organo-halogen compounds, by W.D. Garrett and J.A. Krynitsky. U.S. Naval Research Laboratory. Oct 1957. 16p diagrs, graphs, tables. Order from OTS. 50 cents. PB 131327

A rapid method for the quantitative determination of ethylene chloride and bromide in gasoline has been developed. The organic halogen is first converted to the ionic form by the action of sodium in liquid ammonia and the resultant ionic halogen is determined by a potentiometric titration with silver nitrate. When present, interfering materials are effectively removed through oxidation with ammonium persulfate. With minor modifications, the method has been applied successfully to the determination of fluorine, chlorine, bromine, and iodine in a number of organic compounds. The accuracy compares favorably with that of established procedures. NRL R 5030.

Determination of microquantities of dichloroformoxime (U), by Joseph M. Rochkind. U.S. Chemical Corps. Chemical Warfare Laboratories, Army Chemical Center, Md. Nov 1956. 16p tables. Order from LC. Mi \$2.40, ph \$3.30. PB 126029

Methods for sampling and analyzing microquantities of dichloroformoxime are described. Utilizing water as the absorbent and reaction medium, dichloroformoxime is oxidized with iodine to nitrite. The nitrite is then determined colorimetrically with 1-naphthylamine and p-aminoacetophenone. Covers period 19 Dec 1955-27 Jan 1956. CC CWL R 2078.

Direct determination of oxygen and nitrogen in titanium and titanium alloys using bromine trifluoride. Final report, by Hugh J. O'Neill. Armour Research Foundation, Chicago, Ill. Jan 1957. 16p diagr, tables. Order from OTS. 50 cents. PB 131290

The over-all objective of this project was to further the evaluation of the bromine trifluoride method as applied to the determination of residual amounts of oxygen and nitrogen in titanium and titanium alloys. Ordnance project: TB4-15. ARF project: C 093. Covers work from Jun 29-Dec 28, 1956 under Contract DA 11-022-505-ORD-2189. ARF Proj C 093. WAL R 401/232-1.

Distribution of gases in a controlled-velocity test chamber (U), by Albert Deiner. U.S. Chemical Corps. Chemical and Radiological Laboratories, Army Chemical Center, Md. Apr 1956. 20p diagr, graph, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 125084

The gas distribution in the controlled-velocity test chamber has been studied using HCN as a test gas. It was found that, at a velocity of 8 m. p.h. in the sampling section, at least 4 fans had to be placed in the mixing section to achieve adequate mixing. Methods for sampling and analyzing HCN in the field have been developed. The method of analysis is sensitive to 1 mmg. of HCN per milliliter of absorbent and is accurate to +3%. Project 4-08-04-011-01. CC CRL R 547.

Inversion spectrum of ND₃, by Gabriel Herrmann. New York University. College of Engineering. Research Division, New York, N.Y. Jun 1956. 79p graphs, tables. Order from LC. Mi \$4.50, ph \$12.30. PB 125916

The inversion spectrum of the ground vibrational state of ND₃ has been reinvestigated in the frequency region from 1520 Mc to 1600 Mc. In all, 17 rotational fine structures were observed, 8 of which were identified from their hyperfine structure. The semi-empirical formula predicting the lines was revised drastically. Line shapes were brought into agreement with theory by the method of contour fitting. AD 90003. N.Y.U. Report no. 289.6. Thesis - New York University. Contract AF 18 (600)-968. AF OSR TN 56-291.

New complexon for the titration of calcium in the presence of magnesium, by R.W. Schmid and Charles N. Reilly. North Carolina. University. Dept. of Chemistry, Chapel Hill, N.C. Oct 1956. 16p graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 124260

A procedure is proposed which avoids chemical separation of calcium and magnesium by employing a titrant which will selectively complex calcium. Other attempts at separation are briefly covered. Use of mercury electrode for titrating calcium in presence of magnesium allows use of chelating agents, ethyleneglycol-bis-(β -amino-ethylether)-N,N'-tetraacetic acid to be employed to maximum advantage. AD 96218. Report: UNC-Chem no. 8-CNR. Contract AF 18(600)-1160. AF OSR TN 56-409.

New indicator for the complexometric titration of calcium and magnesium, by Gary P. Hildebrand. North Carolina. University. Dept. of Chemistry, Chapel Hill, N.C. Oct 1956. 18p graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 124256

A new indicator named "Calcon" is developed for the purpose. It is the amion formed as a monosulphonated derivative of o, o'-dihydroxyazonaphthalene. AD 96217. Report: UNC-Chem. no. 7-CNR. Contract AF 18(600)-1160. AF OSR TN 56-408.

Rapid identification of nitrogen, phosphorus, silicon and titanium in coating vehicles, by M.H. Swann. U.S. Aberdeen Proving Ground. Coating and Chemical Laboratory, Aberdeen, Md. Jun 1957. 9p table. Order from OTS. 50 cents. PB 131291

A rapid microtechnique was developed for the simultaneous identification of nitrogen, silicon, phosphorus and titanium in coating vehicles. The sample is prepared for test in about 10 minutes and if the stable reagents are prepared in advance, analysis for these elements can be completed in about 15 minutes. This represents considerable saving in time and work. The method also appears to have quantitative application. Ordnance project no: TB4-006D. D.A. project no: 593-32-006. APG CCL R25.

Separation of heavy metals with acid alkyl phosphate and phosphonate resins, by J. Kennedy, R.V. Davies and B.K. Robinson. Gt. Brit. Ministry of Supply. Atomic Energy Establishment. Mar 1956. 6p table. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N.Y. 28 cents. PB 126183

S.O. Code no. 91-3-2-93. 1. Uranium - Extraction - Gt. Brit. 2. AERE C/R 1896

Spectrographic determination of Mo, Be, Fe, Cr and Ni in bismuth and bismuth-uranium alloys, by M.J. Owers and M.S.W. Webb. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Dec 1956. 15p drawings, graphs, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N.Y. 55 cents. PB 126185

S.O. Code no. 91-3-3-2. 1. Bismuth - Spectrographic analysis - Gt. Brit. 2. Bismuth-uranium alloys - Spectrographic analysis - Gt. Brit. 3. AERE C/R 2115

Technical report for the period Jul 1952-Jun 1955 under Contract N8 onr-52010, by Paul Cross, Edward J. Bair, John T. Lund and Glenn A. Crosby. Washington. University. Dept. of Chemistry, Seattle, Wash. Jun 1955. 37p photo, diagrs, graphs, tables. Order from LC. Mi \$3.00, ph \$6.30. PB 124871

AD 70815. Part I is from a thesis submitted by Glenn A. Crosby. - Part II jointly supported by Contract N8 onr-52010 and a grant from the Research Corporation. Contents: I. Chemical modulation, a method for investigating transient molecules, by Edward J. Bair, John T. Lund and Paul C. Cross (Reprinted from The Journal of Chemical Physics, Vol. 21, no. 4, p. 759, Apr 1953). - II. Asymmetric rotor. XII: The infrared spectrum of hydrogen sulfide from 7480 to 7880 cm^{-1} , by Jirard L. Ordway, Paul C. Cross and Edward J. Bair (Reprinted from The Journal of Chemical Physics, Vol. 23, no. 3, p. 541-543, Mar 1955). - III. Analysis of the 6140 cm^{-1} band of HDS, by Glenn A. Crosby, Edward J. Bair and Paul C. Cross. - IV. Detection of free radical absorption spectra by chemical modulation, by Edward J. Bair, John T. Lund and Paul C. Cross.

Miscellaneous Chemicals

Exchange studies with complex ions. Terminal report, by Arthur W. Adamson. University of Southern California. Dept. of Chemistry, Los Angeles, Calif. May 1956. 116p graphs, tables. Order from LC. Mi \$6.00, ph \$18.30.

PB 126630

Investigations covered new compounds and reactions (including $\text{K}_3\text{Co}(\text{CN})_5$, halogenopentacyano complexes of Co (III), Durrant's salt, oxalato complexes of Co (II), and others); kinetics of ligand replacement; redox processes; atom transfer processes; photochemical effects; retention of Br^{80} in complex bromides. Publications are listed resulting from work under this Contract N 6 onr-23809.

Final summary report under Contract no. DA-18-108-CML-5607. A. Stability of fluid jets. B. Structure of gels of aluminum dilaurate in chlorobenzene, by P. Debye and Jerome Daen. Cornell University. Dept. of Chemistry, Ithaca, N. Y. Mar 1956. 68p diagr, graphs, tables. Order from LC. Mi \$3.90, ph \$10.80.

PB 126033

In Part A, work is summarized and extended on the stability of jets. It has been found that inviscid jets are inherently unstable and that under certain conditions, a jet may be stabilized. In Part B, concentrated gels of $\text{Al}(\text{OH})\text{L}_2$ in chlorobenzene have shown a structure consistent with a model consisting of a small number of rod-like micelles which aggregate into spherical masses of about 1200A radius. With increasing soap concentration, the number of microgel spheres increases. Covers work from Dec 1954 to Mar 1956 under Contract DA 18-108-CML-5607.

Solid state properties and catalytic activity. Periodic status report no. 19, for the period 2 Jan-31 Mar 1956 under Contract N6 onr-27018, by Hugh Taylor. Princeton University. Dept. of Chemistry. Mar 1956. 5p. Order from LC. Mi \$1.80, ph \$1.80.

PB 125931

Summarizes activities of research personnel for this period and lists publications resulting from this contract. For reports 9-17 see PB 114084, 115107, 116327, 117473, 118386, 119034, 120035 and 124885.

ELECTRICAL MACHINERY

Electronics

Amplitude and frequency modulation for facsimile transmission and other applications, by A. D. Watt. U.S. Naval Research Laboratory. Sep 1947. 55p photos, diagr, graphs. Order from LC. Mi \$3.60, ph \$9.30. PB 125993

The bandwidth required for the transmission of intelligence by f-m waves is found to be as great or greater than that required by a-m transmission. The spacing of radio-frequency channels, however, is normally not a function of intelligence bandwidth, but is dependent on the rate at which the side band amplitudes decrease outside this band. When modulating functions with discontinuities are employed, the channel spacing required by frequency modulation may be less than that required by amplitude modulation. NRL R 3154.

Analysis of coupled-structure traveling-wave tubes, by N. Rynn. Stanford University. Electronics Laboratories, Stanford, Calif. May 1956. 170p drawings, diagrs, graphs. Order from LC. Mi \$7.80, ph \$25.80. PB 125583

Until now there has been no general method available for predicting the effect of the electron beam on the coupling between the distributed circuit of a traveling-wave tube, and a second transmission system placed adjacent to it and outside the vacuum envelope. This report presents a new, analytical procedure for the purpose with particular attention to the design of couplers and attenuators for traveling-wave tubes. Contract N6 onr-251(07), NR 373-360. SU ERL TR 104.

Circuit analysis of a solenoid-type electromagnetic accelerator, by Richard W. Walker and L. Dale Harris. Utah. University. Dept. of Electrical Engineering, Salt Lake City, Utah. Aug 1956. 49p diagrs, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 125130

Several methods for the acceleration of projectiles by electromagnetic means have been proposed. Perhaps the simplest method is the one wherein a condenser is discharged through a hollow coil which contains a conducting projectile. This system has considerable merit in that it is simple, stages can be cascaded, and predicted performance can easily be verified experimentally. An analytic analysis of this method, based on energy considerations, is

the principal subject of this thesis. AD 96042. Technical report OSR-7. Contract AF 18(600)-1217. AF OSR TN 56-385.

Coaxial electrostatic transducer, by F. V. Hunt, R. L. Fritchard and A. A. Janszen. Harvard University. Acoustics Research Laboratory, Cambridge, Mass. May 1950. 44p drawings, diags, graphs. Order from LC. Mi \$3.30, ph \$7.80. PB 125972

A brief survey is made of the performance capabilities of an electrostatic transducer made in the form of two coaxial cylinders separated by a compressible dielectric. In particular, the possibility of using ordinary coaxial microphone cable as a line hydrophone is examined. Appendix A: Calculation of the internal mechanical impedance and the mechanical radiation impedance for a long radially-vibrating cylinder. Contract N5 ori-76, T.O. X, NR 014-903. HU ARL TM 15.

Coupling of resonant cavities by resonant coupling devices, by P. D. Dunn, C. S. Sabel and D. J. Thompson. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment, Dec 1956. 46p drawing, diags, graphs. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. \$1.21. PB 126186

S.O. Code no. 91-3-2-95. 1. Resonators, Cavity - Coupling - Gt. Brit. 2. Coupling systems - Gt. Brit. 3. AERE GP/R 1966

Diffraction by a circular aperture at high frequencies, by Harold Levine. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Jun 1956. 47p table. Order from LC. Mi \$3.30, ph \$7.80. PB 125967

The theory of transmission by a large aperture in a plane screen, initiated elsewhere, is developed with special reference to a hard screen, where the normal derivative of the wave function vanishes. This paper aims to replace the impractical series development at short wave lengths (or high frequencies) by a few terms of an asymptotic expansion in reciprocal powers of the aperture radius divided by wave length. Contract Nonr-225(11), NR 041-086. SU AMSL TR 51.

Electromagnetic waves in periodic structures, by Louis Stark. Massachusetts Institute of Technology. Research Laboratory of Electronics. Dec 1952. 43p diags, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 125013

A few of the properties of electromagnetic waves in periodic structures are considered, with some discussion of propagation in open-boundary structures. Iris-loaded waveguides of standard cross section are then analyzed to obtain an accurate solution for the propagation constant. A measurement performed

on a loaded rectangular waveguide shows the calculation to be quite accurate. An experimental and analytical investigation of the so-called interleaved-fin structure to judge its application as a slow-wave circuit for traveling wave amplifiers is described. Based on a thesis, Massachusetts Institute of Technology, 1952. MIT RLE TR 208.

Environmental requirements guide for electronic parts. U.S. Dept. of Defense. Advisory Group on Electronic Parts. Oct 1957. 11p table. Order from OTS. 50 cents. PB 131423

"Electronic part", as used in this document, includes basic circuit elements such as capacitors, resistors, switches, relays, transformers, crystals, waveguides, etc. It specifically excludes equipments or parts of equipments sometimes referred to as "components".

Instructional television research reports, by L. W. Adams and C. H. S. Murphy. U.S. Naval Training Device Center, Port Washington, N. Y. Jun 1956. 425p photos, diags, graphs, tables. Order from LC. Mi \$11.10, ph \$65.10. PB 126662

SDC Human Engineering Project 20-E-5a. Contents: SDC 476-02-S2. The effectiveness of television instruction in training naval air reservists (PB 119191). - SDC 476-02-S3. A study of learning and retention from television instruction transmitted to Army Field Force Reservists (PB 119192). - SDC 20-TV-1. Learning from kinescopes and films (PB 111223). - SDC 269-7-42. Relative effectiveness of verbal introductions to kinescope recordings and training films (PB 123994). - SDC 20-TV-2. Visual principles for training by television (PB 121931). - SDC 269-7-38. Evaluation of two kinescopes (PB 114191). - SDC 530-01-1. Survey of television utilization in Army training (PB 111251). - Fundamentals of training by television. SDC TR 20-TV-4. NAVEXOS P 1544.

Investigation of emissive materials for electron tubes, by Frederick T. Hill. Raytheon Manufacturing Co. Receiving and Cathode Ray Tube Operations, Newton, Mass. Contract AF 19(604)-1822. Order separate parts described below from LC, giving PB number of each part ordered.

First scientific report for the period 1 Apr-30 Jun 1956. Jun 1956. 33p graphs, tables. Mi \$3.00, ph \$6.30. PB 125153

An investigation of the effects of partial vacuum pressures existing during the exhaust procedure for the manufacture of radio tubes is being conducted. A comparison is made between the exhaust conditions for two commercial type machines. The decomposition of barium carbonate, oxidation of nickel and reactions between metallic reducing impurities

in the cathode sleeve and barium carbonate are studied in detail. A triode structure for evaluating cathode alloys is described. AF CRC TN 56-556.

Second scientific report, Jul 1 to Sep 30, 1956.
Sep 1956. 41p graphs, tables. Mi \$3.30,
ph \$7.80. PB 126100

An investigation of the effects of partial vacuum pressures existing during the exhaust procedure for the manufacture of radio tubes is being conducted by the Standard Diode Laboratory of Raytheon Manufacturing Company. A study of the thermodynamics of the chemical reaction taking place at exhaust has led to the conclusion that the cathode coating may be adversely affected under conditions where the vacuum tube is heated under partial pressure during exhaust. AD 110113. AF CRC TN 56-781.

Ionospheric irregularities causing fading of low-frequency radio waves, by S. A. Bowhill. Pennsylvania State University. Ionosphere Research Laboratory, University Park, Pa. Nov 1956. 142p diags, graphs, tables. Order from LC. Mi \$7.20, ph \$22.80. PB 125998

This report deals with the study of irregularities in the E- region of the ionosphere using low-frequency radio waves. Certain tentative models are examined and evaluated, and suggestions are made for further work. AD 110239. Contract AF 19(604)-1304. PSC IRL SR 89. AF CRC TN 56-878.

Present state of the theory of microwave line shapes, by Edwin K. Gora. Providence College. Dept. of Physics, Providence, R.I. Jun 1956. 56p graphs, table. Order from LC. Mi \$3.60, ph \$9.30. PB 125990

The theory of microwave line shapes is discussed with special emphasis on those of its aspects which may be of importance for a better understanding of atmospheric microwave absorption. The mathematical formulation of this problem is based on a generalization of the Boltzmann equation. The difference between the distribution functions before and after a collision which appears in the so-called collision integral on the right hand side of this equation is replaced by a time average over the duration of the collision. In previous applications of the Boltzmann equation to related problems the collision integral has been replaced by a relaxation term while in this paper an attempt is made to evaluate this integral under simplifying assumptions. Contract AF 19(604)-831, Technical report no. 3. AF CRC TN 56-759.

Propagation of electromagnetic waves along corrugated lines, by Georges G. Weill. California Institute of Technology. Antenna Laboratory,

Pasadena, Calif. Dec 1956. 31p diags, graphs.
Order from LC. Mi \$3.00, ph \$6.30.

PB 126690

The propagation of electromagnetic waves along an infinite "corrugated surface" is investigated by means of integral equations and Fourier transform techniques. Results are obtained which take into account the finite distance between the corrugations. In the E case, results are obtained similar to those previously obtained by R. Hurd. AD 115049. Contract AF 18(600)-1113. CIT AL TR 8. AF OSR TN 57-17.

Radar installation for weather radar research, by Alan C. Bemis and Edwin L. Williams, Jr. Massachusetts Institute of Technology. Dept. of Meteorology, Cambridge, Mass. Jun 1951. 24p photos, diags. Order from LC. Mi \$2.70, ph \$4.80. PB 126118

The project operates a very extensive and diversified establishment which, as far as its equipment is concerned, may be conveniently divided into four groups: (1) The three radar systems and associated instruments (2) Airborne meteorological instruments (3) Ground-based meteorological instruments (4) Coordination equipment to correlate the observations made by groups 1, 2 and 3. Dept. of the Army project: 3-99-05-022. Signal Corps project: 122B-O. Contract W36-039-sc-32038. MIT Met TR 15.

Receiver design for rejecting interference, by Roy A. Paananen. Massachusetts Institute of Technology. Research Laboratory of Electronics, Cambridge, Mass. Sep 1952. 87p photos, maps, diags, graphs, tables. Order from LC. Mi \$4.80, ph \$13.80. PB 125585

This report concerns the application of a wideband, interference-reducing theory to FM broadcast receiver design. In the first part, the space link between the transmitter and receiver is examined, with discussions of FM coverage and expected interference in a given area. This material allows the determination of some of the receiver parameters, such as selectivity and spurious responses. The second part of the report pertains to the receiver itself. Based on a thesis, Massachusetts Institute of Technology. Dept. of the Army project: 3-99-10-022. Signal Corps project: 8-102B-O. Contract DA 36-039-sc-100. MIT RLE TR 245.

Study of the generation and detector of electromagnetic waves in the millimeter wave region. Scientific report no. 4 for the period Mar 1, 1956 to May 31, 1956 under Contract AF 19(604)-1115, by J. H. Rohrbaugh. New York University. Washington Square College of Arts and Science. Physics Dept. Jun 1956. 78p diags, graphs, tables. Order from LC. Mi \$4.50, ph \$12.30. PB 125997

The results of measurements of the complex dielectric constant for cyclohexane, dioxane, and toluene for several frequencies in the range 72 kmc to 168 kmc are compared with theory. An expression is obtained, relating the optical constant to the vibrational modes of ionic crystals. Progress on the new spectrometer is reported. For 1st-3rd scientific reports see PB 116645, 116990, 117767. For Report no. 4 see PB 119237. AF CRC TN 56-587.

Study of the surface structure of quartz crystals, by Seymore S. Brody. U.S. Signal Corps Engineering Laboratories, Fort Monmouth, N.J. Sep 1953. 37p photos, graphs, tables. Order from LC. Mi \$3.00, ph \$6.30. PB 126019

By etching quartz crystals to reduce the lattice and surface irregularities, the stability of the crystals for frequency control is improved. The optimum amount of etching from the standpoint of surface distortion is presented. Signal Corps project no: 142A. Dept. of the Army project no: 3-99-11-021. SCEL ER 1133.

Systems analysis approach to the choice of a long distance navaid, by Sidney Rosenberg. U.S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss Air Force Base, Rome, N.Y. Aug 1956. 46p diags, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 125123

The purpose of this report is to describe and evaluate the various factors involved in selecting an all-weather, general-purpose, enroute type of navigation system for the radio guidance of civil and military aircraft of all types at long distances from ground-based transmitters. An analysis is made of the factors which affect the range, accuracy, reliability, cost, suitability, and operational utilization of available and proposed radio navigational aids for long-range operation. Considerations affecting the "optimum" choice of frequencies are presented based on the most current operational information of radio wave propagation. A brief description is given of the principles involved in several representative continuous wave and pulse types of radial, circular, and hyperbolic position-fixing aids. A comparison is then made of pertinent operational and technical characteristics of these different radio aids leading to the choice of a possible general-purpose system for civil and military applications. AD 97714. Project: 4509. AF RADDC TN 56-279.

Traveling-wave tube limiters, by F.B. Fank and G. Wade. Stanford University. Electronics Laboratories, Stanford, Calif. May 1956. 23p diagr, graphs. Order from LC. Mi \$2.70, ph \$4.80. PB 125581

Good broadband microwave limiters can be built by appropriately modifying conventional traveling-wave tubes. For example, with a single one-watt tube

modified suitably the output power could be held constant to within $\pm 1/2$ db over a range of input power of approximately 20 db. By modifying two such tubes in the proper way and using them in cascade the range of input power for limiting could be increased to greater than 45 db, and this accomplished over a 700 mc frequency range centered at S-band. This was done with commercially available traveling-wave tubes. All the necessary modifications were made from outside the tube envelope. SU ERL TR 372-1.

Wave propagation in non-reciprocal media, by Roger F. Harrington. Syracuse University Research Institute. Electrical Engineering Dept., Syracuse, N.Y. Oct 1956. 21p diagr, graphs, table. Order from LC. Mi \$2.70, ph \$4.80. PB 124954

Report EE368-5610T1. 1. Wave guides, Circular - Propagation constants 2. Wave guides, Circular - Theory 3. Contract AF 18(600)-1529, Interim report 1

Generators, Motors, Transmission

Amplifiers employing potentially unstable elements, by G.S. Bahrs. Stanford University. Electronics Laboratories, Stanford, Calif. May 1956. 108p diags, graphs, tables. Order from LC. Mi \$5.70, ph \$16.80. PB 125586

If an active two-port device possesses sufficient forward gain and internal feedback that there can be found a pair of passive terminations which cause the device to oscillate, then that device is said to be potentially unstable. A stability criterion is developed, by means of which potentially unstable devices may be differentiated from those which will remain stable under all conditions of termination. It is shown that all the common types of vacuum tubes and transistors are potentially unstable over an appreciable portion of their useful frequency range. The structure consisting of an active two-port operating between arbitrary passive source and load admittances is considered. Numerical examples and experimental results are included to demonstrate the usefulness and accuracy of the design theory. Contract N6 onr-251(07), NR 373-360. SU ERL TR 105.

D-C to A-C servo amplifier, by James C. Taylor and William T. White. U.S. Army Ballistic Missile Agency, Huntsville, Ala. May 1956. 18p diags, graph. Order from LC. Mi \$2.40, ph \$3.30. PB 125588

This report describes an amplifier which is sensitive to one or more d-c input signals and delivers a-c power into a load with relatively high efficiency. The circuit basically consists of a magnetic preamplifier driving a transistor power stage. The theory of operation is discussed in considerable detail and

practical design equations are derived. AD 97656. AB MA RR 1R-14.

Design of alignable transistor amplifiers, by J. F. Gibbons. Stanford University. Electronics Laboratories, Stanford, Calif. May 1956. 89p diags, graphs, tables. Order from LC. MI \$4.80, ph \$13.80. PB 125580

A method is presented for designing easily alignable multistage transistor amplifiers when the individual stages are not unilateral. The method consists in first describing the transistor through measurement of its Y parameters at a set of discrete frequencies in the desired amplifier passband. This definition of the device is then used to determine its maximum available gain vs frequency properties, thus providing a criterion of amplifier performance. The sensitivity of the transistor's input admittance to load admittance variations is mathematically defined. Measurement of the characteristics of these amplifiers provides experimental verification of the theory. Contract N6 onr-25(07), NR 373-360. SU ERL TR 106.

Performance of copper-mandrel potentiometers in a-c operational amplifiers, by Hans H. Hosen-thien. U.S. Army Ballistic Missile Agency, Huntsville, Ala. Sep 1956. 35p diags, graphs. Order from OTS. \$1.00. PB 131289

A simple method of phase error compensation is presented for multiturn copper-mandrel potentiometers which are employed as variable feedback resistance elements for the purpose of gain setting of a-c operational amplifiers. A figure of merit of compensation is derived. Practical arrangements of a-c operational amplifiers employing phase-error compensation are discussed. The envelope behavior of the compensated operational amplifier is investigated by means of modulation equivalent transfer matrices. AD 109221. ABMA RR 1 R 16.

Miscellaneous

Alkaline storage batteries: An investigation of nickel oxide positive plate characteristics, by A. L. Pitman and G. W. Work. U.S. Naval Research Laboratory. Dec 1957. 23p graphs, tables. Order from OTS. 75 cents. PB 131329

A study has been made of the positive plate characteristics of the nickel oxides in several different types of cells. It was found that a current efficiency of 95 to 100 percent could be attained if oxygen evolution was avoided during charge. Under such conditions, however, the capacity of the positive plate nickel oxide was reduced one-third. A summary of earlier and present work on the electrode potentials, chemical, and x-ray diffraction analyses shows that the Ni-Ni(OH)₂ and Ni₃O₂(OH)₄-NiOOH couples are well defined, while two other possible nickel oxide couples are not. For related reports see PB 121430 and 121483. NRL R 5031.

Final report under Contract Nonr-433(00) for the period 1 Jul 1951-31 Oct 1955, by W. J. Cunningham. Yale University. Dunham Laboratory of Engineering, New Haven, Conn. Nov 1955. 4p. Order from LC. Mi \$1.80, ph \$1.80.

PB 124275

Lists reports published under the Contract, and summarizes work, which related to operation of a vacuum-tube power amplifier working with a load impedance that might be complex; then to problems involving some fundamental non-linearity; resonant circuits operating in two stable states and the transients produced when the circuit transfers from one state to the other. For reports 7-11 see PB 118343, 118405, 123019, 124754 and 124274.

Fine powder permanent magnets. Final report under Contract Nonr-610(01), covering period Oct 1, 1951 to Apr 30, 1955. Lehigh University. Institute of Research, Bethlehem, Pa. Apr 1955. 58p diags, graphs. Order from LC. Mi \$3.60, ph \$9.30. PB 126688

A summary of work directed toward the production of fine iron powder magnets through thermal reduction of oxides and formates with and without the use of addition agents, by precipitation from liquid solution, and by condensation from the vapor. These experiments did not yield satisfactory permanent magnet materials. For 1st annual report see PB 109910.

FUELS AND LUBRICANTS

Further experiments on the stability of laminar and turbulent hydrogen-air flames at reduced pressures, by Burton Fine. U.S. National Advisory Committee for Aeronautics. Apr 1957. 31p diagr, graphs, tables. Order as TN 3977 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125732

Stability limits for laminar and turbulent hydrogen-air burner flames were measured as a function of pressure, burner diameter, and composition. On the basis of a simple flame model, turbulent flashback involved a smaller effective penetration distance than laminar flashback. No current theoretical treatment predicts the observed pressure and diameter dependence of laminar and turbulent blow-off. For earlier report see NACA TN 3833. NACA TN 3977.

Investigation into the use of heterocyclic compounds as lubricant additives, by George B. Butler, O. Lee Gordon and Louis A. Haynes. Peninsular Chem. Research, Inc., Gainesville, Fla. Feb 1956. 18p. Order from OTS. 50 cents.

PB 131223

A literature survey and synthesis program were carried out in order to prepare various nitrogen and sulfur-selenium-, or oxygen-containing heterocycles for evaluation as antioxidant, anti-wear and extreme pressure additives for lubricants, hydraulic fluids and greases. In addition, a number of organoselenium compounds of the selenide and diselenide types were synthesized, primarily for evaluation as high-temperature oxidation inhibitors. Solubilities of the prepared compounds in various referenced fluids were determined. AD 93138. Project 7340, Task 73404. Covers work from 1 Apr - 30 Sep 1955 under Contract AF 33(616)-2391, Suppl. agreement SI (55-1445). AF WADC TR 55-187, Part 2.

HIGHWAYS AND BRIDGES

Effect of geologic and geographic factors upon soil trafficability, by Parker D. Trask. California University. Institute of Engineering Research. Wave Research Laboratory, Berkeley, Calif. Mar 1955. 17p. Order from LC. Mi \$2.40, ph \$3.30. PB 126129

Presents a geologic view of two problems: (1) the nature of the sediments in the environments and (2) the fundamental causes of soil strength. AD 71432. Dept. of the Army project no: 599-01-004. Ordinance project no: TB2-0001(1158). Contract DA-04-200-ORD-171, T.O. no. 9. UC IER Series 77, Issue no. 4.

Factors influencing ground freezing. National Research Council. 1956. 170p photos, maps, diags, graphs, tables. Order as Pub. 425 from NAS-NRC Publications Office, 2101 Constitution Ave., Washington 25, D.C. \$3.40. PB 126068

Contents: Modification of frost-heaving of soils with additives, by T. William Lambe. - Loss of bearing capacity and vertical displacements of New Jersey soils, by K. A. Turner, Jr. and A. R. Jumikis. - Subsurface temperatures and moisture constants in six New Jersey soils, 1954-1955, by K. A. Turner, Jr. and Alfreds R. Jumikis. - Soil moisture movement during ice segregation, by Edward Penner. - Cold quantities in New Jersey, 1901-1955, by Alfreds R. Jumikis. - Frost penetration below highway and airfield pavements, by Harl P. Aldrich, Jr. - The soil freezing experiment, by Alfreds R. Jumikis. Presented at the 35th annual meeting, Jan 17-20, 1956. HRB Bul 135. NRC 425.

Field of highway safety research and second highway safety research correlation conference, June 5 and 6, 1952. National Research Council. 1956. 101p tables. Order as publication 454 from NAS-NRC Publications Office, 2101 Constitution Ave., Washington 25, D.C. \$1.50. PB 126059

A reprint of two publications of the former Committee on Highway Safety Research. The outline of the field of highway safety research was intended as a brief sketch of the situation after 28 years of research. Human factors in accidents are stressed. NRC 454.

Flexible culverts under high fills. Highway Research Board. 1956. 182p photos, drawings, graphs, tables. Order as HRB Bul 125 from NAS NRC Publications Office, 2101 Constitution Ave., Washington 25, D.C. \$3.30. PB 126067

This bulletin contains 4 papers relative to the subject, as follows: 1. "Load study of flexible pipes under high fills," by John H. Timmers. - 2. "Factors affecting vertical loads on underground ducts due to arching," by Nicholas C. Costes. - 3. Performance study of multi-plate corrugated metal pipe culvert under embankment-North Carolina," by Nicholas C. Costes and Charles E. Proudley. - 4. "Influence of compression and shearing strain in soil foundations on structures under earth embankments," by M.G. Spangler. Presented at the 34th annual meeting, Jan 11-14, 1955. HRB Bul 125. NRC 412.

Right-of-way. Highway Research Board. 1956. 89p photos, drawings, diags, graphs, tables. Order as HRB Bul 140 from NAS-NRC Publications Office, 2101 Constitution Ave., Washington 25, D.C. \$1.60. PB 126070

Contents: Report of Committee on land acquisition and control of highway access and adjacent areas, by David R. Levin. - Regulation of access vs control of access in Oklahoma, by LeRoy Powers. - Expressways, by Joseph L. Intermaggio. - Highway encroachments in New Jersey, by Alexander W. Muir. - Administration of highway protection laws, by Adolf Feifarek. - Limiting access to existing highways, by William E. Duhaime. Presented at the 35th annual meeting, Jan 17-20, 1956. HRB Bul 140. NRC 432.

Secondary road program in North Carolina, by James S. Burch. Highway Research Board. 1957. 30p tables. Order as Publication 439 from NAS-NRC Publications Office, 2101 Constitution Ave., N.W., Washington 25, D.C. 60 cents. PB 126064

The report presents complete vehicle-mile and road use analyses by geographical areas before and after the large paving program, relates traffic transfer and traffic generation to land use, makes comparisons with other states without such a program, and presents similar data on the Federal-aid secondary portion of the system. Presented at the 35th annual meeting, Jan 17-20, 1956. HRB Bul 125. NRC 412.

Studies on vehicular trafficability of snow. Part I, Marvin Diamond. U.S. Army. Corps of Engineers. Snow, Ice and Permafrost Research Estab-

ishment, Wilmette, Ill. Apr 1956. 25p photos, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 124724

Four light snow vehicles of the personnel carrier type were used to test the trafficability of the snow-cover at the Keweenaw Field Station near Houghton, Michigan, in February and March 1955. It was found that the maximum drawbar coefficient, (drawbar pull/vehicle weight) was obtained at a track slip of 20-40%, indicating that drawbar pull is a function of the frictional resistance of the snow. Appendix: Some theoretical considerations on the trafficability of snow, by H. Bader. Progress report on Project 22.5-4.SIPRE 35, Part 1.

INSTRUMENTS

Cost as the measure of efficiency of storage and retrieval systems, by Mortimer Taube. Documentation, Inc., Washington, D.C. Dec 1955. 15p. Order from LC. Mi \$2.40, ph \$3.30. PB 125904

1. Data storage systems - Cost 2. Contract Nonr-1305(00), Technical report no. 13.

Design and operation of an hydraulic analog computer for studies of freezing and thawing of soils. Massachusetts Institute of Technology. Dept. of Civil and Sanitary Engineering. Soil Engineering Division. May 1956. 72p photos, drawings (part fold), diags (part fold), graphs, tables (part fold). Order from LC. Mi \$4.50, ph \$12.30. PB 124952

The design, construction, and operation of the hydraulic analog computer fabricated under contract with the New England Division, Corps of Engineers, U.S. Army, are described. Historical developments in hydraulic analogs are given. The computer and the analogous relationships among parameters in the thermal and fluid flow systems are discussed. Design requirements which include the simulation of freezing and thawing phenomena, as well as the construction and assembly of the computer, are taken up in detail. The programming procedure for the hydraulic analog computer is presented, and a sample problem is solved. DIC Project 5-7155. Technical report 62. Contract DA 19-016-eng-2743.

Electrostatic loudspeakers, by A. A. Janszen, R. L. Pritchard and F. V. Hunt. Harvard University. Acoustics Research Laboratory, Cambridge, Mass. Apr 1950. 109p diags, graphs. Order from LC. Mi \$5.70, ph \$16.80. PB 125992

This report summarizes work on the development of electrostatic loudspeakers carried out since November, 1947, and forms part of a general research program devoted to understanding the behavior of electroacoustic transducers. The phase of the work

reported here was initiated originally to meet the need for a loudspeaker which could produce acoustic signals suitable for use in the study of transient phenomena in microphone arrays. ATI 207794. Appendix A: Evaluation of harmonic distortion. - Appendix B: Effective stiffness of a nonrigid, initially unstretched diaphragm. Contract N5 ori-76, T.O. X, NR 014-903. HU ARL TM 17.

Feasibility of using wholly external ultrasonics to measure fluid flow within thick-walled metal pipes, by V. A. Del Grosso and E. M. Spurlock. U.S. Naval Research Laboratory. Nov 1957. 42p drawings, diags, tables. Order from OTS. \$1.25. PB 131079

A review of the literature concerning flow meters utilizing sound waves disclosed none capable of operation through thick pipe walls. Because there are several applications for such a device, three pulsed ultrasonic systems to measure the flow of a pressurized liquid within a thick-walled pipe, with all equipment external to the pipe, are formulated. Based on elementary principles, the relative advantages and disadvantages of these proposals are indicated. A two-crystal, two plane-parallel plug configuration is described in detail. A block diagram for the electronics system is suggested, including a scheme to minimize the effect of sound speed on the flow indication for the first two configurations. A scheme for the mechanical construction associated with the first two configurations is presented. NRL R 4967.

Investigation of solid-propellant fuel cartridges for fire extinguishment at polar temperatures, by J. K. Musick and J. A. Grand. U.S. Naval Research Laboratory. Oct 1957. 19p photos, drawings, graphs, table. Order from OTS. 50 cents. PB 131275

A two and one-half gallon low-temperature fire extinguisher pressurized by a solid-fuel cartridge has been developed. The new extinguisher is pressurized by a cartridge of nitroguanidine-base fuel and provides fire extinguishment at -65°F equivalent to that provided by conventional extinguishers at room temperature. It has an outward appearance similar to that of ordinary extinguishers and is fired in the conventional manner, that is, by inverting the extinguisher and bumping it on the ground or floor. NRL R 5014.

Logical computer, by Edward A. Jerome, Thomas J. Connor and John P. Flynn. U.S. Naval Medical Research Institute, Bethesda, Md. Apr 1956. 33p diags, tables. Order from LC. Mi \$3.00, ph \$6.30. PB 126021

The design of a logical computer of moderate speed is described and the problem of increasing capacity is considered with respect to the number of elementary argument places available, the number of rules accommodated, and the searching time. The device

described has 12 elementary argument places divided into 3 groups and a feedback control designed to improve its searching efficiency. A building block design has been used throughout so that the apparatus can be enlarged easily and the design, with respect to any of its parts, can be easily changed. NMRI Project NM 000 019.02.01.

Simple conversion of an analytical balance for automatically recording weight changes, by Clement Campbell and Saul Gordon. U.S. Picatinny Arsenal. Samuel Feltman Laboratories, Dover, N.J. Oct 1956. 15p photos, diags, graphs, table. Order from OTS. 50 cents. PB 131285

A simple conversion of an analytical balance for the continuous automatic recording of weight changes is described. No balance alterations are required. It is based on the hydrostatic principle that changes in the amount of a liquid displaced by a rod suspended into it from one end of a balance beam are proportional to the change in weight of a sample suspended from the other end of the beam. A linear variable differential transformer is used to electronically measure and record the beam deflections, and thus the changes in weight. By using rods of various diameters and liquids of various densities, the sensitivity of the balance can be varied over ranges of micrograms to grams. Ordnance project no: TA 2-9201. Dept. of the Army project no: 504-01-027. PA TR 2371.

Theory and operations of the area integrator, by G. W. Farnsworth and E. A. Mueller. Illinois. State Water Survey. Meteorologic Laboratory, Urbana, Ill. Jan 1956. 47p photos, diags, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 125632

This report describes the area integrator, an electronic device developed to simplify computations of radar-indicated areal mean rainfall from PPI data. Basically, the integrator computes the area over which precipitation is occurring and multiplies this area by the precipitation rate, the product representing the volume of precipitation over the given area. Consecutive one-minute volume computations are totalized to obtain storm mean rainfall. At present the area integrator operates only over a selected 100 square mile watershed which is preset for analysis by the radar operator. However, the instrument can be refined to operate over either larger areas or several selected areas at given time. Dept. of the Army project: 3-99-07-022. Signal Corps project: 172B. Contract DA-039-sc-64723, Research report no. 5.

MACHINERY

Heat flux measurements at the sun image of the California Institute of Technology lens-type solar furnace, by Eugene Loh, Nevin K. Hiester and

Thomas Tietz. Stanford Research Institute, Menlo Park, Calif. Sep 1956. 19p graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 124912

Flux measurements were made at the focus of the CIT lens-type solar furnace using two water-cooled radiometers. Maximum flux values were obtained for three cases. For each of these cases, flux profiles were obtained by traversing the radiometer through the sun image. A maximum flux value of 220 cal/sec/sq cm was recorded with all lenses operating. The direct solar radiation received at the furnace site at this time was about 1.04 cal/min/sq cm. Under these conditions the furnace operating efficiency was found to be 47.2%. The losses of 52.8% are ascribed to transmission losses in the lenses, reflectivity losses at the mirrors, the geometrical imperfection of the individual lenses and mirrors, and lack of perfect superposition of the nineteen images. AD 110383. Report no. 8. Technical report V. For technical reports I-II see PB 124331 and 125051. Contract AF 18(600)-1499. SRI Proj. CU-1410. AF OSR TN 56-587.

Performance characteristics of domestic water heating equipment, by Harold Horowitz. Building Research Advisory Board. May 1956. 42p. Order as publication 444 from NAS-NRC Publications Office, 2101 Constitution Ave., N.W., Washington 25, D.C. \$1.50. PB 125001

A study of existing data to evaluate various opinions and research data on the following five topics related to performance characteristics of domestic water heating equipment: 1. Establishment of criteria which will insure a reasonable service life. 2. Study of data on hot water consumption and determination of equipment capacities which must be provided for adequate service. 3. Study and recommendations on safety devices that should be required and how they should be installed. 4. Study of clearances between equipment and adjacent construction to permit service and replacement. 5. Study of manufacturers' warranties and guarantees. A brief treatment of the use of solar energy for domestic water heating is included. Reprinted by the Building Research Institute, National Research Council. Conducted by the Building Research Advisory Board for the Federal Housing Administration under Contract HA-fh-646, Amendment no. 1. NRC 444.

MATHEMATICS AND STATISTICAL ANALYSIS

Asymptotic expansion of multiple integrals and the method of stationary phase, by Douglas S. Jones and Morris Kline. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research, New York, N.Y. Oct 1956. 45p diags. Order from LC. Mi \$3.30, ph \$7.80. PB 125097

The problem of evaluating the double integral asymptotically is reduced to the problem of evaluating a single Fourier integral asymptotically and known results for the latter case are applied. AD 110140. Contract AF 19(604)-1717. NYU RR EM 100. AF CRC TN 56-799.

Asymptotic theory of solutions of $\Delta u + K^2 u = 0$, by Willard L. Miranker. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research, New York, N. Y. Apr 1957. 50p diagr. Order from LC. Mi \$3.30, ph \$7.80. PB 126039

AD 120486. 1. Asymptotic expansions 2. Mathematical equations and solutions 3. Contract AF 18 (600)-367 4. NYU RR BR 21 5. AF OSR TN 57-130

Bounds for analytic functions in domains with a distinguished boundary surface, by Stefan Bergman. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Dec 1955. 22p. Order from LC. Mi \$2.70, ph \$4.80. PB 124243

Reprinted from Math. Zeitschrift, bd. 63, s. 173-194 (1955). 1. Surfaces (Mathematics) - Theory - Germany 2. Mathematical functions - Germany 3. Contract Nonr-225(11), NR 041-086 4. SU AMSL TR 45

Convenient new form of Onsager's equation for the dielectric constant of polar solutions, by Richard N. Work. Princeton University. Plastics Laboratory, Princeton, N.J. Aug 1956. 14p. Order from LC. Mi \$2.40, ph \$3.30. PB 125012

A modification of Onsager's equation for the dielectric constant of solutions of polar molecules has been developed to express the weighted sum of the squares of the moments of the different polar molecules present in terms of the orientational contribution to the dielectric constant. The squares of the moments are weighted in the sum according to their molar concentration. The new equation is useful in studying factors that are not included in Onsager's treatment of dielectrics, e. g. short range order, and molecular shape. Dept. of the Army project: 3-99-15-022. SIG Corps project: 152B. Contract DA 36-039-sc-70154, Report 3b. PU PL TR 42B.

Expected number of maxima and minima of a stationary random process with non-Gaussian frequency distribution, by Franklin W. Diederich. U.S. National Advisory Committee for Aeronautics. Apr 1957. 21p tables. Order as TN 3960 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125731

A method is presented for correcting the known re-

sults for the expected number of maxima and minima of random process with Gaussian frequency distribution for cases in which the joint frequency-distribution function of the process and its first two derivatives is non-Gaussian. This correction is based on the statistical moments of the process and its first two derivatives and involves certain given functions. NACA TN 3960.

Further contributions to multivariate confidence bounds, by S. N. Roy and R. Gnanadesikan. North Carolina State College. Institute of Statistics, Raleigh, N. C. Aug 1956. 16p. Order from LC. Mi \$2.40, ph \$3.30. PB 125181

In this paper the implications of certain results obtained in earlier papers on confidence bounds on parametric functions connected with multivariate normal populations are fully worked out. This leads to a number of confidence bounds expected to be useful, but hitherto unnoticed, (i) on the characteristic roots of one population dispersion matrix and on roots connected with (ii) two population dispersion matrices, (iii) the regression matrix of a p-set on a q-set and (iv) multivariate linear hypothesis on means, including, in particular, the problem of discriminant analysis. AD 95816. For other reports under this contract see PB 119236, 122408, 125167 and 125609. Contract AF 18(600)-83. AF OSR TN 56-380. NCSC IS M 155.

General analysis of three-category sensitivity experiments, by A. Golub and F. A. Sorensen. U.S. Aberdeen Proving Ground. Ballistic Research Laboratory, Aberdeen, Md. Jan 1956. 11p. Order from LC. Mi \$2.40, ph \$3.30. PB 125930

A method is developed for obtaining estimates of the parameters involved in sensitivity problems where three categories of response are possible. Expressions for the approximate variances of these estimates are also obtained. Dept. of the Army project: 5B0306002. ORD project: TB 3-0007. APG BRL M 961.

Investigation of a nonlinear control system, by I. Flügge-Lotz and C. F. Taylor. U.S. National Advisory Committee for Aeronautics. Apr 1957. 92p diagrs, graphs, tables. Order as TN 3826 from National Advisory Committee for Aeronautics, 1512 "H" Street, N. W., Washington 25, D. C. PB 125735

A discontinuous variation of coefficients of the differential equation describing the linear control system before nonlinear elements are added is studied in detail. The nonlinear feedback is applied to a second-order system. Simulation techniques are used to study performance of the nonlinear control system and to compare it with the linear system for a wide variety of inputs. A preliminary extension of this type of system to higher order systems is presented. NACA TN 3826.

Military evaluation and statistical decision, by J. R. Isbell and F. J. Wagner. U.S. Aberdeen Proving Ground. Ballistic Research Laboratory, Aberdeen, Md. Jun 1956. 32p. Order from LC. Mi \$3.00, ph \$6.30. PB 124730

This is an essay toward a military decision theory analogous to thermodynamics rather than to statistical mechanics. Such a theory would presumably turn on state variables. This paper gives a clear definition of one state variable already recognized and achieves a shadowy recognition of another variable or complex of variables which are so new that they may be meaningless. Dept. of the Army project: 5B035018. ORD project: TB 3-0102. APG BRL M 1014.

Notes on elementary quantum statistics, by R. C. O'Rourke. U.S. Naval Research Laboratory. Oct 1957. 219p. Order from OTS. \$5.50. PB 131125

This report contains the material presented in a series of theoretical physics seminars at the Naval Research Laboratory as a part of the regular theoretical program. The material was also used in a University of Maryland extension course at NRL during 1957. NRL R 4975.

On a problem of Heinz Hopf. Theorem concerning the existence of deformable conformal maps. Asymptotic spots of entire and meromorphic functions, by M. Heins. Brown University, Providence, R.I. Feb 1957. 35p. Order from LC. Mi \$3.00, ph \$6.30. PB 126684

1. Riemann surfaces - Theory
2. Mathematical equations and solutions
3. Contract AF 18(603)-70
4. AF OSR TN 56-577 AD 110 399

Preparation of mutually consistent magnetic charts, by P. Fougere and J. McClay. U.S. Air Force. Air Research and Development Command. Cambridge Research Center. Geophysics Research Directorate. Terrestrial Sciences Laboratory, Bedford, Mass. Jun 1957. 41p diagr, tables. Order from OTS. \$1.25. PB 131477

The total magnetic intensity vector field of the earth satisfies two pertinent conditions: (1) the radial component of the curl vanishes and (2) the square of the magnitude of the vector is equal to the sum of the squares of the spherical components. Each element of the vector is expanded about a point in a quadratic polynomial. The conditions are then used to yield relations among the polynomial coefficients. The independent set of coefficients is then determined by the method of least squares. A hypothetical problem is designed, in which sets of values of the elements on a grid are determined from analytic expressions. The method just developed is applied to find the numerical coefficients. These compare very well with coefficients obtained directly from the analytic expressions. The fit of the resulting set of polynomials to the data is then determined

with excellent results. Finally the techniques developed for quadratic fields are generalized in such a way that fields of any degree of complexity may be handled in a straightforward manner. An appendix gives an extension of the method to yield consistent isoporic charts. AD 117268. AF GRD P55. AF CRC TR 57-225.

Problems involved in introducing long-wave radiative effects into mathematical models, by Lewis D. Kaplan. Princeton University. Institute for Advanced Study, Princeton, N.J. Dec 1955. 8p. Order from LC. Mi \$1.80, ph \$1.80. PB 124236

Paper read at the Study group on the general circulation of the atmosphere held at the Institute for Advanced Study, Princeton, N.J., Oct 26-28, 1955.
1. Mathematical research
2. Radiation - Theory
3. Contract Nonr-1358(01)
4. PU IAS TR 1

Similarity solution for transonic flow past a cone, by Yungchung Shen. California Institute of Technology. Guggenheim Aeronautical Laboratory, Pasadena, Calif. Mar 1956. 50p diagrs, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 125584

The purpose of this investigation is to study the axial supersonic flow around slender cones in the transonic range by applying the expansion procedures and similarity laws for conical transonic flow. The investigation will thus serve to justify the usefulness of the expansion method and it will also determine what range of the transonic similarity parameter will give a good result from the present theory. AD 82517. Appendix: Formulation for transonic equation of second approximation. Contract AF 18(600)-383. AF OSR TN 56-121.

Statistics manual, with examples taken from ordnance development, by Edwin L. Crow, Frances A. Davis and Margaret W. Maxfield. U.S. Naval Ordnance Test Station, China Lake, Calif. 1955. 299p diagrs, graphs, tables. Order from OTS. \$6.00. PB 131483

This manual was prepared for engineers and scientists who wish to use statistical procedures to improve the efficiency of their experiments. Each chapter contains a bibliography. The manual contains the following chapters: 1. Definitions and distributions. - 2. Tests and confidence intervals for means. - 3. Tests and confidence intervals for standard deviations. - 4. Tests of distributions as a whole and allied problems. - 5. Planning of experiments and analysis of variance. - 6. Fitting a function of one or more variables. - 7. Quality-control charts. - 8. Acceptance sampling. NAVORD 3369. NOTS 948.

Tables of the error function and of its first twenty derivatives by the Staff of the Computation

Laboratory. Harvard University. Computation Laboratory. 1952. 302p. tables. Order from OTS. \$2.50. PB 131464

ATI 133652. Annals of the Computation Laboratory of Harvard University, vol. 23. 1. Tables, Mathematical 2. Mathematical equations and solutions 3. Probability - Tables 4. Contract AF33(038)-9461.

Tables of various Mach number functions for specific-heat ratios from 1.28 to 1.38, by The Lewis Laboratory Computing Staff. U.S. National Advisory Committee for Aeronautics. Apr 1957. 76p tables. Order as TN 3981 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125730

Supplements Report 1135 (PB 115573) which superseded NACA TN 1428 (PB 115573). 1. Mach number - Tables 2. Flow, Compressible - Theory 3. NACA TN 3981

METALS AND METAL PRODUCTS

Activation energies for creep of high purity aluminum, by O.D. Sherby, J.L. Lytton and J.E. Dorn. California. University. Institute of Engineering Research. Minerals Research Laboratory, Berkeley, Calif. Apr 1956. 27p graphs, table. Order from LC. Mi \$2.70, ph \$4.80.

PB 125935

Activation energies for creep of high purity aluminum were obtained over the temperature range from 77°K to 880°K by rapidly changing the temperature during creep at constant stress. The experimentally obtained activation energy was shown to be insensitive to stress and strain. From 500°K to 880°K the activation energy for creep was found to be independent of temperature and equal to 35,500 calories per mole which is the same as that for self-diffusion of aluminum. Between 0.25 and 0.40 T_m (250 to 375°K) the activation energy for creep was found to be equal to about 27,500 calories per mole. Below 0.25 T_m , the activation energy for creep was found to decrease rapidly with decreasing temperature. Contract N7 onr-295, T.O. II, NR 031-048, Technical report no. 46. UC IER Series no. 22, Issue no. 46.

Comparison of calculated and experimental values for the optical reflectivity of the liquid alloys Hg-In, Hg-Tl, Ga-In at 25°C., by L.G. Schulz. Institute for the Study of Metals, University of Chicago, Chicago, Ill. Nov 1956. 15p graphs. Order from LC. Mi \$2.40, ph \$3.30.

PB 125900

The optical reflectivity at 25°C. of three liquid alloys (Hg-In), (Hg-Tl), and (Ga-In) was measured in the wavelength range of 0.3 μ to 10 μ . AD 97353. Contract AF 18(600)-1489. AF OSR TN 56-469.

Comparison of the creep-rupture properties of nickel in air and in vacuum, by P. Shahinian and M.R. Achter. U.S. Naval Research Laboratory. Oct 1957. 11p photos, graphs, tables. Order from OTS. 50 cents. PB 131344

In a comparison of the creep-rupture properties of nickel in air and vacuum there is a reversal in relative strengths with variations in stress. At low stresses the properties are better in air; at high stresses they are better in vacuum. In the early stages of the high stress test the specimen in air has the lower creep rate but the one in vacuum is creeping at a lower rate in the final stages. A tentative mechanism involving two competing processes is considered to explain these reversals. NRL R 5036.

Constitutional and aging characteristics of magnesium-thorium and magnesium-thorium ternary alloys, by Albert S. Yamamoto, Edmund J. Klimek and William Rostoker. Armour Research Foundation, Chicago, Ill. Feb 1957. 76p photos, diags, graphs, tables. Order from OTS. \$2.00.

PB 121939

A partial diagram from 0.70 wt. % Th of the binary magnesium-thorium system was constructed. In the magnesium-thorium-zinc ternary system a tentative vertical section diagram at constant 1% Zr was constructed up to 65 wt. % Th. For the magnesium-rich region of the magnesium-thorium-zinc system, two isothermal section diagrams (at 400° and 300°C, respectively), liquidus, solidus and solvus surfaces were determined. Aging characteristics of seven selected alloys were investigated at 350°, 250° and 150°C in terms of room temperature tensile properties; one binary magnesium thorium alloy and three ternary alloys each from the magnesium-thorium-zirconium and magnesium-thorium-zinc systems. AD 118107. Project 7351, Task 70608. Final report under Contract no. AF 33(616)-2571 for the period 15 Jun 1954-31 Jul 1956. AF WADC TR 56-411.

I. Deformation studies of metals at elevated temperatures. II. Iron-chromium-nickel ternary system. III. Substructure studies. Massachusetts Institute of Technology. Dept. of Metallurgy, Cambridge, Mass. Contract N5 ori-07881, NR 039-007. Order separate parts described below from LC, giving PB number of each part ordered.

Periodic status report no. 12 for period May-Jul 1955, by N.J. Grant, P.E. Price, F.C. Monkman and F.B. Cuff. Jul 1955. 7p tables. Mi \$1.80, ph \$1.80. PB 124669

For reports 6-11, see PB 116312, 117129, 117907, 118662, 119213, 124102. 1. Steel, Stainless - Physical properties 2. Steel, Stainless - Strength 3. Alloys, High temperature - Structure 4. Chromium-nickel-iron alloys

Periodic status report no. 13 for period Aug-Oct 1955, by N.J. Grant, F.B. Cuff, P.E. Price and M.B. Happ. Dec 1955. 7p table. Mi \$1.80, ph \$1.80. PB 124595

1. Metals - Deformation 2. Metals - Heat treatment 3. Chromium-iron-nickel alloys

Periodic status report no. 14 for the period 1 Nov 1955-1 Feb 1956, by F.B. Cuff, Jr., P.E. Price, M.B. Happ and N.J. Grant. Feb 1956. 6p. Mi \$1.80, ph \$1.80. PB 125893

1. Metals - Deformation 2. Metals - Heat treatment 3. Chromium-iron-nickel alloys 4. Aluminum - Plastic deformation 5. Aluminum - Structure 6. Aluminum - Thermal properties 7. Alloys, High temperature - Structure

Periodic status report no. 15, for period 1 Feb 1956-1 May 1956, by F.B. Cuff, Jr., P.E. Price, M.B. Happ and N.J. Grant. May 1956. 3p. Mi \$1.80, ph \$1.80. PB 126986

1. Alloys, High temperature - Structure 2. Chromium-iron-nickel alloys 3. Aluminum - Structure

Periodic status report no. 16, for the period 1 May -1 Aug 1956, by F.B. Cuff, Jr., P.E. Price, M.B. Happ and N.J. Grant. Aug 1956. 4p. Mi \$1.80, ph \$1.80. PB 128388

1. Alloys, High temperature - Structure 2. Chromium-iron-nickel alloys 3. Aluminum - Crystal structure

Effect of fiber orientation on ball failures under rolling-contract conditions, by Robert H. Butler, H. Robert Bear and Thomas L. Carter. U.S. National Advisory Committee for Aeronautics. Feb 1957. 35p photos, drawings, graphs, diags, tables. Order as TN 3933 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125665

The rolling-contract fatigue spin rig was used to test balls of a bearing steel at maximum Hertz stresses of 600,000 to 750,000 psi. The effect of fiber orientation was observed with the ball track restricted to passing directly over the poles, coincident with the equator, or randomly around the ball. NACA TN 3933.

Effect of oxygen pressure upon the oxidation rate of cobalt, by Donald W. Bridge, John P. Baur and W. Martin Fassell, Jr. Utah. University. Dept. of Metallurgy, Salt Lake City, Utah. Nov 1955. 20p photos, graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 126195

Cobalt was oxidized from 800°C to 1200°C in oxygen (.013 to 27.2 atm. O₂). The metal oxidized in accordance with the parabolic rate law above 950°C and formed the single oxide, CoO, above 900°C. Pressure increase accelerated the rate of oxidation. At temperatures below 1150°C, the parabolic rate constant eventually ceases to increase with increase of oxygen pressure. Theoretical considerations employing a vacancy saturation mechanism correlated the data. Photomicrographs of the oxide layer are included. Activation energy for the diffusion process is 58,000 cal. Dept. of the Army project no. 599-01-004. ORD R&D Project no. TB2-0001 and TB4-161. Technical report no. 12. Contract DA-04-495-ORD-237. WAL R 370-18-22.

Effect of porosity on mechanical properties of metals and alloys, by Vincent DePierre. U.S. Naval Gun Factory. Engineering Research and Evaluation Division, Washington, D.C. May 1956. 13p photos, graphs. Order from LC. Mi \$2.40, ph \$3.30. PB 126018

A review of published and unpublished literature on the effect of porosity on mechanical properties of metals and alloys was made. Qualitatively, it has been shown that porosity has a deleterious effect on tensile strength, yield strength, elongation, impact strength and fatigue strength of metals and alloys. The little quantitative data available shows tensile strength and ductility values of metals and alloys are seriously lowered by small percentages of porosity. The yield strength of these materials are only slightly affected. Unclassified 1 Jun 1956. NGF TR 26-56.

Electrodeposition of titanium, by Walter E. Reid, Jr., Joseph M. Bish and Abner Brenner. U.S. National Bureau of Standards. Feb 1955. 45p photos, diagr, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 126613

Numerous non aqueous solutions were investigated in an attempt to electrodeposit titanium. Some work was also done with zirconium. Ether solutions containing halides, hydrides, borohydrides, and organo-metallic compounds of titanium were the most promising solutions investigated. A mixed type of bath containing both hydrides and borohydrides yielded titanium-aluminum alloys containing about six percent titanium. Similar baths containing zirconium, instead of titanium, were studied. The zirconium baths gave alloy deposits containing up to 45 percent zirconium. New methods of preparation of titanium and zirconium borohydrides were developed. AD 66658. Project no. 7312, Task no. 73120. Contract AF 33(616)-53-11. AF WADC TR 54-485, Part 1.

Electronic energy bands in potassium, by Joseph Callaway. Miami. University. Dept. of Physics, Coral Gables, Fla. Apr 1956. 38p graphs, tables. Order from LC. Mi \$3.00, ph \$6.30. PB 125925

The method of orthogonalized plane waves is applied to a calculation of electronic energy levels in potassium, using a potential obtained from a self-consistent field. The energies of twenty-four states at four symmetry points in the Brillouin Zone have been obtained. Comparison of higher bands with some other calculations suggests that certain features of band schemes may be reasonably independent of the potential used. Technical report no. 2 under Contract Nonr-840(06). Covers period 1 Apr 1955-1 Apr 1956.

Evaluation of fatigue properties of titanium alloys, by Jerome G. Weinberg and Ivan E. Hanna. Battelle Memorial Institute. Titanium Metallurgical Laboratory, Columbus, O. Jul 1957. 145p graphs, tables. Order from OTS. \$3.75. PB 121631

This report presents a summary and discussion of available fatigue information on titanium and alloys of titanium. The appendix to the report contains in tabular and graphical form most of the existing data on titanium alloys. BMI TML R 77.

Experimental study of the optical properties of metals and the relation of the results to the Drude free electron theory, by L. G. Schulz. Institute for the Study of Metals, University of Chicago, Chicago, Ill. Nov 1956. 87p diags, graphs, tables. Order from LC. Mi \$4.80, ph \$13.80. PB 125899

This paper is concerned primarily with the experimental aspects of the subject; for the most part it deals with results obtained with recently developed methods. The contents are arranged as follows: I, electromagnetic radiation by metals; II, the Drude free electron theory; III, the anomalous skin effect; IV, conclusions suggested by older experimental work; and V, general features of the approach and of the procedures used in recent experiments. Section VI describes experimental methods of making measurements, and Section VII presents recent experimental results. Finally, Section VIII gives conclusions drawn from the experimental results. AD 110335. Contract AF 18(600)-1489. AF OSR TN 56-499.

Foamed metal low density core material for sandwich construction, by Johan Bjorksten, J. C. Elliott and R. J. Roth. Bjorksten Research Laboratories, Inc., Madison, Wis. Contract AF 33(038)-21838. Order separate parts described below from OTS, giving PB number of each part ordered.

Part 1. Jun 1952. 26p photos. Order from OTS. 75 cents. PB 131419

Metallic low density foams were produced from magnesium-aluminum alloys using either titanium or zirconium hydride as the foaming

agent. Incorporation of the melted foaming agent into the molten alloy to be foamed at a temperature slightly above its melting point produces a mixture, which on solidification is a satisfactory metallic foam. A foam with a density of 15 pounds per cubic foot was obtained from the 95% Al-5% Mg alloy. This foam has a nominal cell size of about 1/16 inch. AF WADC TR 52-51, Part 1.

Part 2. Sep 1953. 26p photos, diags. Order from OTS. 75 cents. PB 131466

Progress on the development of an extrusion process for the preparation of metallic low-density foams from Mg-Al alloys is described. Preparation of eutectic-hydride foaming agent and a foamed metal and design of equipment, including mold, crucible, and extruder are discussed. AF WADC TR 52-51, Part 2.

Part 3. May 1954. 24p photos, diagr. Order from OTS. 75 cents. PB 131467

The most important innovations are improved quality of foam through the introduction of air or oxygen into the foamed mixture prior to its solidification and the introduction of aluminum oxide-coated steel, a material with high corrosion resistance towards molten aluminum, magnesium, and their alloys as a new structural material for certain components of the foaming equipment. Covers work performed from 18 Dec 1952-17 Dec 1953. AF WADC TR 52-51, Part 3.

Hydrogen, crack initiation, and delayed failure in steel, by H. H. Johnson, J. G. Morlet and A. R. Troiano. Case Institute of Technology, Cleveland, O. May 1957. 52p photos, drawings, diags, graphs, tables. Order from OTS. \$1.50. PB 131340

Delayed failure in steel with a uniform hydrogen distribution occurs by the controlled initiation and growth of a crack. The static fatigue limit decreased with high hydrogen concentrations or sharp notches. An incubation period for crack initiation was observed. The fracture stress was shown to be constant over a wide range of hydrogen concentrations and applied stresses. These results suggest that crack initiation and propagation are controlled by an interaction between hydrogen concentration and triaxial stress state, and that the incubation period results from the diffusion of hydrogen to the point of crack initiation. This diffusion process was demonstrated to be reversible, indicating that it is stress-included. AD 118252. Project 7351, Task 70645. Contract AF 33(616)-3431. AF WADC TR 57-262.

Ordnance work on chromium-base alloys, 1946-1955, by Peter R. Kostig. U.S. Arsenal, Watertown, Mass. Aug 1956. 17p tables. Order from OTS. 50 cents. PB 131229

This report briefly describes highlights of research and development of chromium-base alloys for Ordnance use from 1946 to 1955. It covers air and vacuum melting, ductility, solubility of oxygen and nitrogen, melting point and sigma phase embrittlement of over 50% chromium content alloys. O. O. Projects TR 3-3003, Prevention of erosion in cannon; TB 4-161, Heat resistant materials. D/A Projects 501-01-004 and 593-08-024. AD 107573. WAL R 731/408.

Self-diffusion in germanium, by Harry Letaw, Jr., W. M. Portnoy and L. Slifkin. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory, Urbana, Ill. May 1956. 15p graphs, table. Order from LC. Mi \$2.40, ph \$3.30. PB 125958

An accurate determination of the self-diffusion coefficient in germanium has been obtained. In the temperature range $766-928^{\circ}\text{C}$, it is represented by $D = 7.8 \exp(-68,500/RT) \text{ cm}^2/\text{sec}$. The probable errors in the frequency factor and activation energy are $\pm 3.4 \text{ cm}^2/\text{sec}$ and $\pm 0.96 \text{ kcal/mol}$, respectively. AD 86006. For Technical report no. 1 see PB 123128. Technical note no. 8 under Contract N6 ori-07410, NR 072-161; Technical note no. 2 under Contract AF 18(600)-1310, Task 47502. AF OSR TN 56-129.

Survey of design data on precision investment casting, by Shingo Inouye. U.S. Naval Gun Factory. Engineering Research and Evaluation Division, Washington, D. C. May 1956. 15p tables. Order from LC. Mi \$2.40, ph \$3.30. PB 126017

This report consists of tabulated information on the various properties of investment casting alloys. Data is based on results of a survey of technical literature and represents typical properties of test specimens (mechanical and chemical properties), as well as actual castings, (castability ratings). Mechanical properties are listed as typical properties except where indicated as actual minimum requirements for a given specification. Chemical compositions are given as a range or as maximum values unless otherwise noted. NGF TR T 25-56.

Temperature and stress dependence of the atmosphere effect on Nichrome V, by P. Shahinian and M. R. Achter. U.S. Naval Research Laboratory. Oct 1957. 17p photos, graphs, table. Order from OTS. 50 cents. PB 131339

Creep rupture tests have been performed in vacuum and in air on Nichrome V, a nickel-chromium alloy, at 1100° , 1300° , 1500° , 1700° , and 1900°F at a range of stresses. Although the alloy tends to be stronger in air than vacuum at high temperatures and low strain rates, the reverse is true at low temperatures and high strain rates. At stresses where the vacuum specimen has a longer rupture life, the creep rate of the air specimen may be lower at the start of the test but faster subsequently.

A possible mechanism to explain these reversals involving two competing processes is considered. Comparison of the atmosphere effect on Nichrome and nickel are in accord with the difference in oxidation resistance. NRL R 5037.

Tensile properties of zone-refined iron in the temperature range from 298°K to 4.2°K , by R. L. Smith and J. L. Rutherford. Franklin Institute. Laboratories for Research and Development, Philadelphia, Pa. Sep 1956. 49p photos, diags, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 126111

The tensile properties of zone-refined iron have been evaluated in the temperature range from 298°K to 4.2°K . It has been found that the higher the purity, the lower the flow stresses and the better the low temperature ductility. Yield stresses as low as 3,800 psi have been observed at room temperature and elongations of ten percent have been observed at 4.2°K . The major portion of the ductility at 4.2°K arises from twinning. Deformation by twinning at 4.2°K is not suppressed by pre-straining at room temperature and the twins occur all through the test. Slip traces were observed to initiate at the ends of previously formed twin traces. AD 110304. Interim report no. I-A1878-2. Contract AF 18(600)-1581. AF OSR TN 56-490.

Tests with variable stress ratios in the plastic range by Aris Phillips. Yale University. Dept. of Civil Engineering, New Haven, Conn. Apr 1956. 24p graphs. Order from LC. Mi \$2.70, ph \$4.80. PB 125631

The fundamental assumptions on which the simple incremental theory of plasticity is based, as well as the over-all validity of this theory, is studied for 2S-O aluminum. A modified theory is substantiated by these experiments. Contract Nonr-690(12), NR 064-415, Technical report no. 1.

Titanium production development including metallurgy and alloying, by R. I. Jaffee. Battelle Memorial Institute. Titanium Metallurgy Laboratory, Columbus, O. Aug 1957. 102p photos, diags, graphs, tables. Order from OTS. \$2.75. PB 121632

The past, present, and future of the titanium industry is discussed in terms of costs and quantities of the metal produced. The nature and extent of present titanium ore reserves are described as are the relative merits and disadvantages of the present extractive metallurgical processes being used for primary metal production. Descriptions are given of the various methods in use for the melting, casting, and fabrication of titanium and its alloys. Techniques of descaling, finishing, joining, and machining are also reviewed. The physical, chemical, and mechanical properties of current commercial alloys are summarized. The principles applying to the physical metallurgy of titanium and its alloys are

also described. Presented at the 5th meeting of the Structures and Materials Panel, Advisory Group for Aeronautical Research and Development, 22-26 April, 1957 in Oslo. BMI TML R 78.

X-ray studies of order-disorder in alloys, by B. E. Warren. Massachusetts Institute of Technology, Cambridge, Mass. Oct 1955. 18p diags, graphs, table. Order from LC. Mi \$2.40, ph \$3.30. PB 124118

Paper presented at the Third Congress of Crystallography, Paris, France 27 Jul 1954. Technical report 16 and 17. 1. Alloys, High temperature - Structure 2. Alloys, High temperature - X-ray tests 3. Alloys, Binary - Equilibrium diagrams 4. Gold-copper alloys - Crystal structure 5. Contract N5 ori-78 / XXXII, NR 031-282

METEOROLOGY AND CLIMATOLOGY

Atmospheric scattering of light and the sun's aureole, by Diran Deirmendjian. California. University. Dept. of Meteorology, Los Angeles, Calif. Sep 1956. 83p diags, graphs. Order from LC. Mi \$4.80, ph \$13.80. PB 126109

The problem discussed is concerned with a theoretical interpretation of the marked increase in sky brightness observed on clear days close to the sun's disc. This phenomenon, known as the aureole, is connected with the presence in the normal atmosphere of particles (condensation nuclei) whose diameter is equal to or slightly larger than the wavelength of visible solar radiation. Since it is difficult to obtain detailed information on the amount, size and distribution of these particles by direct sampling, a theoretical investigation of the aureole by considering various aerosol models may provide an indirect and practical method of research. The problem also has bearing on the investigation of urban air pollution and on the detection of invisible clouds of radioactive particles injected into the atmosphere. Scientific report no. 1. Contract AF 19(604)-1303. AF CRC TN 56-871.

Climatological data on the generation and propagation of waves in the North Atlantic, by Pasquale S. DeLeonibus. New York University. College of Engineering. Research Division. Dept. of Meteorology and Oceanography, New York, N. Y. Nov 1955. 18p diags, graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 124120

Chapter 10 of "Ships and waves". Pages numbered 111-128. 1. Waves, Ocean - Generation - Atlantic Ocean 2. Waves, Ocean - Propagation - Atlantic Ocean 3. Waves, Ocean - Movement - Atlantic Ocean 4. Contract Nonr-285(03)

Experiment in low latitude numerical prediction with the barotropic model, by Charles L. Jordan. Chicago. University. Dept. of Meteorology, Chicago, Ill. Sep 1955. 63p diags, graphs, tables. Order from LC. Mi \$3.90, ph \$10.80. PB 125940

500 mb barotropic forecasts were fairly successful. The results showed certain deficiencies. Studies suggest useful results can be obtained by extending numerical predictions into the low altitude regions. Contract N6 ori-02036, NR 082-120.

Geographical distribution of the semidiurnal pressure oscillation at different seasons, by Gloria M. Sepúlveda and B. Haurwitz. New York University. College of Engineering. Research Division. Dept. of Meteorology and Oceanography. Nov 1956. 22p graph, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 125098

From the investigations by Hann and Schou the amplitudes and phases of the 12-hourly pressure oscillation (S_2) were obtained for 136 stations for four months (January, March, July and September). These analyzed data were grouped into latitude zones. It was then assumed that the observed oscillation is due to two component oscillations of the atmosphere; one occurring at the same local time on the circle of latitude (W_2), and the other occurring at the same Greenwich time on the circle of latitude (Z_2). From the observed values, the amplitude and the phase angle of each of these two vibrations were determined for each latitude zone by the method of least squares. Project no. 299. Contract AF 19 (604)-1006, Scientific report no. 6. AF CRC TN 56-866.

Ionosphere propagation studies. Scientific report no. 1-5 for the period 1 Jun-31 Aug 1956, by Leonard C. Edwards. Raytheon Manufacturing Co., Waltham, Mass. Sep 1956. 37p diagr, graphs. Order from LC. Mi \$3.00, ph \$6.30. PB 125937

The report deals with long distance propagation above the MUF, measurements of the absolute gain characteristics of the E/W Rhombic antenna on 22.280 mc, determination of the reflecting layer height through measurements of two-way transmission time, study of variations in signal strength as a function of frequency, and short term fading. For scientific reports 1-1 and 1-2 see PB 122350 and 123408. Contract AF 19(604)-1413. AF CRC TN 56-751.

Radar and synoptic studies of precipitating clouds, by F. H. Ludlam and B. J. Mason. Imperial College of Science and Technology. Dept. of Meteorology. Cloud Physics Research Laboratory, London. Jan 1956. 46p photos, diags, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 125115

The work described in this report falls into two dis-

tinct parts. The first part deals with the radar studies of the structure and development of precipitating clouds. Part two assesses the reliability of the parcel and slice methods of forecasting the vertical development of cumulus clouds. Some information has been obtained on the structure and characteristics of precipitating cloud systems associated with fronts in relation to the temperature and humidity structure of the atmosphere. The modifications now being made to the Mason-Ramanadham automatic raindrop spectrometer are briefly described. Contract AF 61(514)-809, Technical report no. 1. AF CRC TN 56-296.

A. Size distributions generated by Walter Hirschfeld. - B. Distribution with size of aggregate snowflakes, by K.L.S. Gunn and J.S. Marshall. McGill University. MacDonald Physics Laboratory. Stormy Weather Research Group, Montreal, Canada. Sep 1956. 32p graphs, tables. Order from LC. Mi \$3.00, ph \$6.30. PB 124280

Machine calculation on an idealized model of particles in motion relative to each other yield size distributions not in close agreement with those measured for rain. When the effects of some of the simplifications in the original model are considered qualitatively, agreement becomes close enough to demonstrate that a random collision process may play a major part in the early stages of the development of rain distributions. Contract AF 19(122)-217. MW-20. AF CRC TN 56-667.

Studies in synoptic climatology, by William David Sellers. Massachusetts Institute of Technology. Dept. of Meteorology, Cambridge, Mass. Mar 1956. 234p maps, diagr, graphs, tables. Order from LC. Mi \$10.20, ph \$36.30. PB 125909

Contents: Part I. Introduction, by Thomas F. Malone, Robert G. Miller and Don G. Friedman. - Part II. Theory and method of application, by Robert G. Miller and William D. Sellers. - Part III. Studies on the specification and prediction of daily weather: - A. Upper-air as a basis for a synoptic climatology (Summary), by Don G. Friedman (Thesis, Massachusetts Institute of Technology, May 1954). - B. Climatological approach to pressure prediction utilizing orthogonal polynomials (Summary), by Dan Terrance Rogers (Thesis, Massachusetts Institute of Technology, May 1954). - C. Specification of daily precipitation through synoptic climatology (Summary), by Gordon A. Beals. - D. Synoptic climatology as an aid in weather prediction, by Thomas F. Malone and Robert G. Miller. - E. Prediction of daily precipitation by using statistical methods, by William David Sellers. - F. Application of synoptic climatology to the prediction of sea-level circulation patterns, by R.G. Miller and T.F. Malone. - Part IV. Studies on the specification and prediction of five day mean weather: - A. Objective specification of five day mean circulation patterns (Summary), by Hermann Alfred Lintner (Thesis, Massachusetts Institute of Technology, May 1954). - B. Further results on the appli-

cation of synoptic climatology to five day weather prediction, by Elizabeth A. Kelley. - Part V. References. - Part VI. Appendices: - Appendix 1. Circulation indices. - Appendix 2. Prediction operators for 91 point network. Contract N5 ori-07883, T.O. 83, NR 082-102, Final report.

Surface temperatures of animal capsules floating above 80,000 feet, by David G. Simons. U.S. Air Force. Air Research and Development Command. Holloman Air Force Base, New Mex. May 1956. 31p photos, diagrs, graphs, tables. Order from LC. Mi \$3.00, ph \$6.30.

PB 125598

Three Aero Medical Field Laboratory flights were instrumented with thermistors from which surface temperatures of animal capsules were telemetered during balloon flights in the upper stratosphere. The temperatures observed on one 24-hour flight and two 12-hour flights are presented. The highest daytime temperature recorded was 200 degrees F., and the lowest high altitude night temperature was -40 degrees F. AF HADC TR 56-6.

Techniques used for monitoring biological specimens on the 1954 and 1955 Aero Medical Laboratory balloon flights, by C.H. Steinmetz. U.S. Air Force. Air Research and Development Command. Holloman Air Development Center, Holloman Air Force Base, New Mex. Apr 1957. 12p photos, diagrs. Order from LC. Mi \$2.40, ph \$3.30. PB 126196

Research is being conducted into the human factors of space flight regarding radiation hazards of primary cosmic particles. Animal specimens were flown in sealed capsules for 24 hours at altitudes greater than 90,000 feet by means of balloons. Several types of helmets were monitored for cosmic ray particle hits in addition to mouse skins, Artemia (Brine Shrimp) eggs, and tissue cultures. AD 123731. Project no. 7851, Task no. 78500. AF HADC TN 57-1.

Upper trough in two cases of east coastal cyclogenesis, by P. Raethjen. New York University. College of Engineering. Research Division. Dept. of Meteorology and Oceanography. Jan 1956. 66p maps, graphs. Order from LC. Mi \$3.90, ph \$10.80. PB 126114

1. Cyclones - Development 2. Contract Nonr-285 (09), Technical paper no. 4 3. Project SCUD

Vorticity development in the cyclone of 6 November 1953, by Jerome Spar. New York University. College of Engineering. Research Division. Dept. of Meteorology and Oceanography. Jan 1956. 37p maps, diagrs, graphs, tables. Order from LC. Mi \$3.00, ph \$6.30. PB 126104

1. Cyclones - Development 2. Cyclones - Vorti-

MINERALS AND MINERAL PRODUCTS

Alumina-base cermets, by John W. Lindenthal, James G. Stradley and Thomas S. Shevlin. Ohio State University. Engineering Experiment Station, Columbus, O. May 1957. 19p photos, graphs, tables. Order from OTS. 50 cents. PB 131342

Oxide wetting studies upon alumina base cermets have been made by prereacting the alumina with more easily reducible oxides, such as those of chromium, nickel and cobalt. When compounded into cermet compositions, these mixed oxides promoted wetting or reaction with the metallic constituent. Specimens containing 50 volume percent of oxide were produced exhibiting strengths comparable to that of the metal alone. AD 130849. Project 7350, Task 70634. Covers work from 1 Feb 1956-31 Jan 1957 under Contract AF 33(616)-472. For Parts 2-3 see PB 121253 and 121461. AF WADC TR 54-173, Part 4.

Purification of graphite, by P. M. Harris. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Oct 1956. 8p. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N.Y. 32 cents. PB 126188

S.O. Code no. 91-3-3-8. 1. Atomic power - Research - Gt. Brit. 2. Graphite - Purification - Bibliography - Gt. Brit. 3. AERE Inf/Bib 109.

PHOTOGRAPHIC AND OPTICAL GOODS

Growing of crystals, by A.C. Menzies. British Intelligence Objectives Sub-Committee. Nov 1946. 34p photos, drawings, diagrs. Order from LC. Mi \$3.00, ph \$6.30. PB 124792

Investigations cover period 13 Oct-20 Nov 1946. BIOS trip no. 2819. Contents: Part I. Procedure at Professor R. Pohl's Laboratory, Gottingen, for optical crystals. - Part II. Procedure at Steinheil & Son, for optical crystals. - Part III. Procedure at I.G. Fabenindustrie, Ludwigshafen, for optical crystals. - Part IV. Procedure at Marburg University, for optical crystals. - Part V. Procedure at Professor Corren's Laboratory, Gottingen, for piezo-electric crystals. - Part VI. Procedure at Dr. Nacken's Laboratory, Schramberg, for piezo-electric crystals. BIOS FD 824/49. BIOS FR 1579.

Theory of the cylindrical Luneberg lens excited by

a line magnetic current, by C.T. Tai. Ohio State University. Dept. of Electrical Engineering. Antenna Laboratory, Columbus, O. Sep 1956. 11p diagrs, table. Order from LC. Mi \$2.40, ph \$3.30. PB 126687

This report discusses the transverse-magnetic mode of the electromagnetic field which can be associated with a two-dimensional or cylindrical Luneberg lens when it is excited by a line magnetic current. The work is supplemental to the treatment given by Jasik (PB 117451) who considered the transverse-electric mode. Like the spherical case, the mode is again expressible in terms of the generalized confluent hypergeometric function. AD 98815. Report 678-3. Supplement to AF CRC TR 54-121 (PB 117451). Contract AF 19(604)-1725. OSURF Proj. 678-3. AF CRC TN 56-767.

PHYSICS

General

Attenuation of damped free vibrations and the derivation of the damping law from recorded data, by K. Klotter. Stanford University. Division of Engineering Mechanics, Stanford, Calif. Jun 1955. 22p tables. Order from LC. Mi \$2.70, ph \$4.80. PB 124947

Rules and recommendations for deriving the damping law from records, as laid down in Technical Report No. 23, are implemented for the case of "short runs". Furthermore evaluations of actual records are demonstrated and the results compared with information from other sources. Supplement to Technical report 23. Contract N6 onr-251, T.O. 2, NR 041-943. SU ME TR 29.

Resolution of an initial shear flow discontinuity in one-dimensional hydromagnetic flow, by Jack Bazer. New York University. Institute of Mathematical Science. Division of Electromagnetic Research, New York, N.Y. Jun 1956. 124p graphs. Order from LC. Mi \$6.30, ph \$19.80. PB 125038

This report concerns the nonlinear one-dimensional hydromagnetic flow problem of the resolution of an initial shear flow discontinuity in a perfectly conducting, electrically neutral, compressible fluid. The magnetic intensity, fluid velocity, density, pressure and entropy per unit mass, are functions of one space variable. The object of this work is to construct the solution of the nonlinear initial-value problem, to discuss some of the general features of this solution and to provide for each time $t > 0$ the numerical basis for obtaining the waveforms of the variables which characterize the flow. AD 98712. Contract AF 19(604)-926. NYU RR MH-5. AF CRC TN 56-656.

Sources and sinks at the axis of a rotating liquid,
by Robert R. Long. Johns Hopkins University.
Dept. of Civil Engineering, Baltimore, Md. Jun
1955. 16p photos, diagr, graphs. Order from
LC. Mi \$2.40, ph \$3.30. PB 124850

A solution is obtained for the flow of a rotating,
frictionless, incompressible fluid due to a strong
source or sink at the axis of rotation. The type of
motion is controlled by the value of the Rossby num-
ber, Ro , a ratio of inertial and Coriolis forces.
Several experimental photographs are shown. They
contain some of the features of the theory. Tech-
nical report no. 5. Contract Nonr-248(31), NR
082-104.

Vibrational structure of the electronic spectra of
simple molecules. Part IV: Geometry of an ex-
cited state of SO_2 and the Frank-Condon princi-
ple, by M. L. Coffman, J. M. Corgan, C. M.
Loyd and J. B. Coon. Texas Agricultural and
Mechanical College. Dept. of Physics, College
Station, Tex. Aug 1956. 31p diagrs, graphs,
tables. Order from LC. Mi \$3.00, ph \$6.30.
PB 125131

The present investigation indicates that the S-O dis-
tance increases by 0.055 Å and the O-S-O angle
increases by $5^{\circ}34'$ in the excited state associated
with the 3800 Å absorption system. These results
are consistent with qualitative predictions based on
molecular orbital theory. AD 95806. Based on
thesis submitted by M. L. Coffman, A and M Col-
lege, Tex. For Part III see PB 122202. Contract
AF 18(600)-439. AF OSR TN 56-370.

Nuclear

Build-up of uranium isotopes by irradiation of U. 233,
by W. G. Davey. Gt. Brit. Ministry of Supply.
Atomic Energy Research Establishment. Oct
1956. 10p tables. Order from British Informa-
tion Services, 30 Rockefeller Plaza, New York
20, N. Y. 37 cents. PB 126191

S.O. Code no. 91-3-3-4. 1. Atomic power - Re-
search - Gt. Brit. 2. Uranium - Isotopes - Cross
sections - Gt. Brit. 3. Reactors - Criticality - Gt.
Brit. 4. AERE R/M 98

Compound model for V-particles, by R. W. King and
D. C. Peaslee. Purdue University, Lafayette,
Ind. Oct 1956. 15p. Order from LC. Mi \$2.40,
ph \$3.30. PB 125132

AD 95202. 1. Atomic power - Research 2. Parti-
cles, Charged - Motion - Theory 3. Contract AF
18(600)-1579 4. AF OSR TN 56-326

Cyclotron resonance of free electrons in weak mag-
netic fields, by H. C. Torrey and R. S. Codrington.
Rutgers University. Dept. of Physics, New

Brunswick, N.J. n.d. 20p diagrs. Order from
LC. Mi \$2.40, ph \$3.30. PB 124905

It was the purpose of the work described here to in-
vestigate the cyclotron resonance of free electrons
as a means of providing a sensitive indication of
magnetic field changes at low fields. In the experi-
ments described here, the electrons were produced
by a thermionic emitter and in the presence of a
magnetic field were accelerated at resonance by a
radiofrequency electric field. The apparatus and
method is described in detail. For other reports
under this Contract see PB 124907-124908. Contract
N7 onr-45403, Technical report no. 7.

Electromagnetic structure of nucleons, by D. R.
Yennie, M. M. Levy and D. G. Ravenhall. Stan-
ford University. Dept. of Physics, Stanford,
Calif. Nov 1956. 41p diagrs, graphs. Order
from LC. Mi \$3.30, ph \$7.80. PB 125138

The theoretical implications of various experiments
relating to the electromagnetic structure of nucleons
are examined in the light of current field theory. It
is concluded either that the nucleon core is about
three times as large as would be expected from in-
tuitive considerations of meson theory or that there
is some inconsistency in the present field theory.
Project: R-357-40-3. Contract AF 18(600)-545.
SU DP TR 20.

Kinetic energy of relative motion, by Joseph O.
Hirschfelder and John S. Dahler. Wisconsin.
University. Naval Research Laboratory. Dept.
of Chemistry, Madison, Wis. Mar 1956. 4p.
Order from LC. Mi \$1.80, ph \$1.80.

PB 124955

1. Kinetic reactions, Molecular 2. Particles -
Motion - Theory 3. Contract N7 onr-28511 4.
WIS ONR 20

Naval Research Laboratory Research Reactor. Part
III: An eight-decade logarithmic amplifier for
nuclear reactor instrumentation, by G. F. Wall
and M. P. Young. U.S. Naval Research Labora-
tory. Oct 1957. 15p photos, diagrs, graphs.
Order from OTS. 50 cents. PB 131303

The logarithmic amplifier developed at NRL has a
dynamic range of eight decades of current (10^{-11} to
 10^{-3} ampere), good accuracy, a high degree of
stability with changes in heater voltages, and re-
quires no range switching. The amplifier will give
an output which is proportional to the logarithm of its
input current, and the circuit employs a pentode as
the logarithmic element. The amplifier has been
used satisfactorily in a signal channel which provides
power level and period information continuously for
NRL Research Reactor control system. NRL R5025.

Neutron spectrum, thermal utilisation and conver-
sion factor in L. M. F. R., by W. G. Davey. Gt.

Brit. Ministry of Supply. Atomic Energy Research Establishment. Oct 1956. 13p tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N.Y. 46 cents. PB 126190

S.O. Code no. 91-3-3-10. 1. Atomic power - Research - Gt. Brit. 2. Reactors - Conversion factor - Gt. Brit. 3. AERE R/M 97

Note on the potential of plutonium amalgam electrodes, by A.G. White. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Nov 1956. 13p diags, graphs. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N.Y. 46 cents. PB 126184

S.O. Code no. 91-3-3-7. 1. Atomic power - Research - Gt. Brit. 2. Electrodes, Plutonium - Potential - Gt. Brit. 3. Amalgams, Plutonium - Measurement - Gt. Brit. 4. AERE C/R 2099

Study of a proton accelerator, by Michael J. Ozeroff. Yale University. Sloane Physics Laboratory. May 1951. 25p diags, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 126672

The object of this work was to test the operation of a resonant-cavity proton accelerator designed as a high-intensity source of gamma rays and neutrons. Several major problems were involved. The cavity was matched to the power oscillator. The output power and frequency stability of the oscillator were investigated as functions of frequency, and of plate, grid, and cathode line lengths to determine the optimum tuning adjustments of the oscillator. A study was made of the ion-source operation and its dependence on filament type, applied magnetic field, electrode voltages, and gas pressure. A resistive load was placed in parallel with the cavity so as to improve the loading of the oscillator. The control system was largely rebuilt and in many respects modified in order to give more reliable operation and greater protection to both operators and equipment. Contract N7 onr-288, T.O. 3, NR 021-049, Technical report no. 5.

PHYSIOLOGY

Factors stimulating production of hemoglobin and red cells. Annual report for year ending Dec. 31, 1955. California Institute of Technology. Division of Biology, Pasadena, Calif. Mar 1956. 3p. Order from LC. Mi \$1.80, ph \$1.80. PB 125633

1. Polycythemia, Induced 2. Blood-cells - Production 4. Contract Nonr-220(09)

Metabolism of glutathione, glutamine and asparagine.

Annual report for the period 1 Jan 1955-31 Dec 1955 under Contract Nonr-369(00), NR 120-069, by Heinrich Waelsch. New York Psychiatric Institute. Mar 1956. 4p. Order from LC. Mi \$1.80, ph \$1.80. PB 125642

1. Asparagine - Metabolism 2. Glutamine - Metabolism 3. Glutathione - Metabolism

Problems of vision in flight at high altitude, by Thomas C.D. Whiteside. 1957. 169p photos, drawings, graphs, tables. Order as Agardograph 13 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. \$5.00. PB 126061

"Flight at high altitude" refers to flight in the stratosphere or in the upper limits of the troposphere. The problems dealt with do not arise from speed, so the craft may be either balloon, civil transport, or high performance fighter. Agardograph 13.

Reliability and intercorrelations of eight tests of body flexion, by E. Ralph Dusek and Warren H. Teichner. U.S. Army Quartermaster Research and Development Command. Quartermaster Research and Development Center. Environmental Protection Research Division, Natick, Mass. May 1956. 22p photos, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 124969

Eight tests of body flexion were evaluated using soldiers as subjects. They were primarily tests of extent of movement of neck, trunk, shoulder and leg. Six of the tests were found to have sufficient reliability and low intercorrelation to be useful in a battery of tests designed to evaluate the encumbering effects of clothing. Project reference: 7-95-20-0030. QMC EP TR 31.

Selection genetics in man, by Howard Levene. Columbia University. Dept. of Mathematical Statistics and Dept. of Zoology and Institute for the Study of Human Variation. n.d. 15p tables. Order from LC. Mi \$2.40, ph \$3.30. PB 125939

1. Genetics 2. Contract Nonr-266(33), NR 042-034.

PSYCHOLOGY

Adaptability screening of flying personnel: Development of a preliminary screening battery, by Samuel C. Fulkerson. U.S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Aug 1956. 22p tables. Order from LC. Mi \$2.70, ph \$4.80. PB 126031

Earlier studies have investigated the merits of in-

dividual tests for adaptability screening. This report is primarily concerned with the problem of combining a number of these individual tests into a screening battery. AF SAM R 56-84.

Behavior of individuals and personnel systems in the surveillance functions of an air defense direction center. IV: Operational performance criteria, by Jay D. Cohen and Robert K. McKelvey. U.S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Crew Research Laboratory, Randolph Air Force Base, Tex. Sep 1956. 25p diags, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 126624

Observations were collected on the performance of 24 airman operators whose experience in the surveillance section of an Air Defense Center ranged from 10 to 36 months. These operators, selected at random from four teams, were systematically rotated through the four positions in the surveillance section. Each team was observed under normal operational conditions for two 24-minute periods on three successive days. The performance variables studied were selected on the basis of established Air Defense Command standards and tolerances for the various functions involved in maintaining accurate, current, and continuous displays of the air situation. AD 098867. Project no. 7712, Task no. 77207. AF PTRC TN 56-117.

Correlation between articulation scores for speech masked by noise and for speech masked by speech, by James P. Egan, Herbert Gerjuoy and Edward J. Thwing. Indiana University. Hearing and Communication Laboratory, Bloomington, Ind. May 1956. 8p table. Order from LC. Mi \$1.80, ph \$1.80. PB 125045

The research reported must be considered exploratory. Although a rather low correlation was obtained between NMR and SMR (noise-speech masked reception) performances, this result is in part due to the low reliabilities of the tests. The low reliabilities of these articulation tests, which are both restricted to a feasible length and administered with little previous training, set serious limitations on the use of such tests for selection purposes. The product-moment correlation obtained by articulation tests between these two abilities was of the order of .50. Contract AF 18(600)-571. AF CRC TN 56-52.

Design and conduct of human engineering studies, by Alphonse Chapanis. San Diego State College Foundation, San Diego, Calif. Jul 1956. 76p diags, graphs, tables. Order from LC. Mi \$4.50, ph \$12.30. PB 128155

In the course of their research with people, psychologists have built up some principles and guide lines about ways of doing reliable and valid studies on them. The aim of this monograph is to discuss some of the principles from the practical standpoint

of how one goes about doing research involving people. It is written for engineers and other technical specialists who are not primarily psychologists, but who, for one reason or another, are required to do experiments involving men and machines. Prepared for the Joint Services Steering Committee for the "Human Engineering Guide to Equipment Design". Contract Nonr-1268(01), NR 145-075, Technical report no. 14.

Experimental studies of problem solving, edited by Donald W. Taylor and Olga W. McNemar. Stanford University. Dept. of Psychology. Aug 1951. 105p drawings, graphs, tables. Order from LC. Mi \$5.70, ph \$16.80. PB 127117

Contents: Group versus individual achievement in solving arithmetic reasoning and spatial relations problems, by Donald W. Taylor, James E. Whipple and Gloria L. Carey. - Effectiveness of a brief interruption of work as a means of overcoming inappropriate sets in problem solving, by Robert P. Irvine and Donald W. Taylor. - Continuous versus voluntarily spaced work in problem solving, by Donald W. Taylor and David L. LaBerge. - Appraisal of intellectual motivation, by Joanne Van Cleef. - Transfer as a function of breadth of training, by G. Alexander Milton. - The effect of stimulus redundancy on concept formation, by David L. LaBerge. - A possible sex difference in the effect of success and failure on problem solving, by Donald W. Taylor and Gloria L. Carey. - The effect on problem solving of success and failure, by Donald W. Taylor, Kendall S. Way and Robert P. Irvine. - The effect on problem solving of success and failure as a function of level of anxiety, by Ramon J. Rhine and G. Alexander Milton. - Anagram and puzzle series for the study of set, by Olga W. McNemar and Donald W. Taylor. Contract N6 onr-25125, NR 150-149, Technical report no. 10.

Influence of force and amplitude cues on learning and performance in a complex tracking task, by George E. Briggs, Harry P. Bahrack and Paul M. Fitts. U.S. Air Force. Air Research and Development Command. Air Force Personnel and Training Center, Lackland Air Force Base, San Antonio, Tex. Mar 1957. 19p diags, graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 126046

Four groups of male subjects served for 60 training and 30 transfer trials in a study designed to assess the influence of force and amplitude cues from a control column on learning and performance in a two-dimensional compensatory tracking task. Analysis of the scores during the final training trials revealed that both force and amplitude cues significantly affected performance, amplitude cues apparently exerting the greater influence. Thus, whereas particular combinations of force and amplitude characteristics in the control placed restrictions on terminal performance levels, they had little differential effect on the learning of this skill task. AD 098938. Project no. 7716, Task nos. 77292 and 57050. For other report under this Contract see

Speed of target acquisition as functions of knob vs. stick control, positioning vs. velocity relationship and scoring tolerance, by B.G. Andreas, D.P. Murphy and S.D.S. Spragg. Rochester. University. Dept. of Psychology, Rochester, N. Y. Jul 1955. 24p drawings, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80.

PB 125938

This experiment compared the speed of target acquisition of stationary targets (in a situation presenting display and control characteristics analogous to certain radar tasks) as functions of the following variables: (1) two knob controls vs. a miniature X-Y stick control; (2) positioning vs. velocity mode of tracking; and (3) a large vs. a small on-target tolerance. AD 76207. For report no. 2 see PB 124780. Contract AF 30(602)-200, Scientific report no. 3. AF RADC TN 55-376.

Stability of WAF attitudes as measured by WAF attitude survey BE-CE501GX, by Marvin H. Berkeley and Leland D. Brokaw. U.S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, Tex. Jun 1956. 11p tables. Order from LC. Mi \$2.40, ph \$3.30. PB 125124

This study presents a phase in Air Force research and development in the area of attitude assessment. The important problems of morale maintenance and reenlistment encouragement have focused attention upon the content of attitudes and upon methods for their evaluation. The present study investigates differences in WAF attitudes at two stages of Air Force service. Project 7705, Task no. 77113. AF PTRC TN 56-72.

RUBBER AND RUBBER PRODUCTS

Evaluation of coral rubber (cis-polyisoprene), by J.C. Monterroso, A. Wilson and C.B. Griffis. U.S. Army. Quartermaster Research and Development Center. Chemicals and Plastics Division, Natick, Mass. Apr 1957. 15p tables. Order from OTS. 50 cents. PB 131232

Coral Rubber (Cis-polyisoprene) was made available for evaluation. Since this material is chemically similar to natural rubber, a study was made to determine if the physical properties would also resemble those of natural rubber. Both the Coral and the natural rubber were compounded and cured the same way. The Coral Rubber and natural rubber compounds displayed almost the same physical properties. The slight variations in properties at room temperature of the two compounds are probably the

result of experimental variables. The chemical resistance of the two compounds is practically the same. The low-temperature tests indicate a slight superiority of the Coral Rubber over the natural rubber. Project reference: 7-93-15-004. QMC CP TR-1.

Study of the effects of nuclear radiations on elastomeric compounds and compounding materials. B.F. Goodrich Co., Akron, O. Contract AF 33 (616)-2308. Project 1252, Task 73015. Order separate parts described below from OTS, giving PB number of each part ordered.

Part I, by D.L. Loughborough, A.E. Juve, J.R. Beatty and J.W. Born. Aug 1956. 107p photos, diagr, graphs, tables. \$2.75.

PB 121811

Comprehensive study of the effects of nuclear radiation upon elastomeric compounds and compounding ingredients was the main purpose of the development. Two hundred nineteen compounds were selected for study. One hundred ninety were irradiated and tested. Stress-strain and stress relaxation measurements were made, along with special analyses of irradiation products. The investigations exhibit three principal results: (1) a catalog of stress-strain data for many elastomeric formulations has been compiled, (2) a group of inhibitors of radiation deterioration in rubber has been discovered, and (3) evidence has been gathered that the effect of Cobalt 60 gamma irradiation on rubber is different in air than in high vacuum. The rubber compounds which are most resistant to deterioration are cited by recipe. Covers period of work from 1 Jan 1954-1 Jan 1955. AF WADC TR 55-58.

Part II, by John W. Born. Sep 1956. 87p photos, drawing, graphs, tables. \$2.25.

PB 121705

Continuous stress relaxation measurements in air detail the effects of temperatures ranging from 25° through 80°C. on radiation damage to rubber compounds. The order of decreasing resistance to damage is natural rubber, GR-S, Neoprene GN, and Hycar 1002 for gum rubber compounds and GR-S, Hycar 1002, natural rubber, and Neoprene GN among the black compounds. Graphs illustrate these results. Stress relaxation measurements, volume swell measurements, infrared absorption analyses, and mass spectral analyses provided fundamental information about radiation damage. They showed further that heat and radiation damage differ significantly. Covers work from Jan 1955 to Jan 1956. AD 97336. AF WADC TR 55-58, Part 2.

Synthesis of rubber by microorganisms. Bimonthly report for the period 1 Nov-31 Dec 1955 under Contract Nonr-1233(00), NR 330-033. Atlantic Research Corporation, Alexandria, Va. Jan 1956. 20p tables. Order from LC. Mi \$2.40, ph \$3.30. PB 125593

Cultures of the collection of species of Lactaria, which has been in storage for several months, were reactivated. All species survived storage. Each species was screened for contaminants and reestablished in pure culture. The mutants obtained from *G. groveolens*, *L. mucida*, *L. subdulcis* (P), *L. torminosa*, and *L. vellerea* by irradiation with electrons, were reactivated after storage for four months at 12°C compared for variation in response on several media. Constancy of morphological characteristics indicate that the mutants are stable. The mutant derived from *L. subdulcis* (P) by irradiation is being cultivated on the shaker to obtain mycelia for rubber extraction. Growth rate in shaker cultures is similar to that of the parent strain.

STRUCTURAL ENGINEERING

Bending vibrations of a twisted rotating beam, by Walter P. Targoff. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. Aug 1956. 33p diagsr, graphs, table. Order from OTS. \$1.00. PB 131234

A method of computing the natural modes and frequencies of a twisted rotating beam is developed. Some numerical results are given and compared with experimental data. A high degree of accuracy is shown. A discussion of the conceptual philosophy of the method is included. AD 97176. Project 3346, Task 33048. Contract AF 33(616)-250. AF WADC TR 56-27.

Bursting strength of unstiffened pressure cylinders with slits, by Roger W. Peters and Paul Kuhn. U.S. National Advisory Committee for Aeronautics. Apr 1957. 21p photos, graphs, tables. Order as TN 3993 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125723

Internal-pressure tests were made on aluminum-alloy unstiffened cylinders with precut slits to study the effect of slit length and curvature on the hoop stress developed at the bursting pressure. The results are predicted with good accuracy by applying a curvature correction to the method presented in NACA TN 3816 (PB 123707) for computing the strength of flat plates with cracks. In this investigation cylinders were pressurized with air and oil. The results indicate that the pressurizing medium has a negligible effect on the bursting pressure. NACA TN 3993.

Crack-extension-force near a riveted stiffener, by J.P. Romualdi, J.T. Frasier and G.R. Irwin. U.S. Naval Research Laboratory. Oct 1957. 22p diagsr, graphs, table. Order from OTS. 75 cents. PB 131036

Knowledge of the characteristic value of the crack-extension-force for onset and arrest of rapid fracturing should, conceptually, permit direct calculation of the load-bearing capacity of structural components from the viewpoint of fracture fail-safe design. This possibility is illustrated by two examples of calculation of the crack-extension-force in the presence of rivet force. The results indicate that in both cases the riveted stiffeners serve as effective crack arresters. The calculations were checked experimentally, and satisfactory agreement was obtained. NRL R 4956.

Cracking of concrete face brick and the development of data necessary for the establishment of criteria for its manufacture and installation, by Robert M. Dillon. Building Research Advisory Board. May 1956. 31p. Order as Publication 447 from NAS-NRC Publications Office, 2101 Constitution Ave., N.W., Washington 25, D.C. \$1.50. PB 125003

Reprinted by the Building Research Institute. 1. Bricks, Concrete - Cracking 2. Bricks, Concrete - Specifications 3. Contract HA-fh-646, Amendment no. 1 4. NRC 447

Effect of an interface on transient temperature distribution in composite aircraft joints, by Martin E. Barzelay and George F. Holloway. U.S. National Advisory Committee for Aeronautics. Apr 1957. 51p photos, drawings, diagsr, graphs, tables. Order as TN 3824 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125733

Geometrically related structural joints representing typical skin-stringer cross sections were tested under radiant heating to simulate the effects of aerodynamic heating. Temperature histories for 15 2024-T fabricated specimens and an equal number of integral control specimens were recorded for two different constant heat inputs, ranging from approximately 5 to 40 Btu/(sq ft)(sec). Interface conductance values were computed for each of the 15 fabricated specimens. A maximum temperature rise of 450°F was attained in the specimens in 8 to 40 seconds of heating. There was no restraint or external loading applied. NACA TN 3824.

Response of elastoplastic structures to transient loads, by H.H. Bleich. Columbia University. Dept. of Civil Engineering and Engineering Mechanics. Feb 1956. 10p diagsr, graph. Order from LC. Mi \$1.80, ph \$1.80. PB 125932

Reprinted from Transactions of the New York Academy of Sciences, Ser. II, Vol. 18, no. 2, pp. 135-

143, Dec 1955. CU 16-56-ONR-266(08)-CE. 1. Loads, Structural - Theory 2. Structural materials - Elasticity 3. Plastic deformation - Theory 4. Contract Nonr-266(08), Technical report no. 16

Uncoupled torsional vibrations of a thin, twisted rotating beam, by W.G. Brady and Walter P. Targoff. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. Jun 1957. 34p diagrs, graph, table. Order from OTS. \$1.00. PB 131237

A method of computing the natural uncoupled torsional modes and frequencies of a thin, twisted, rotating beam is developed which accounts for the non-linear effects of static torsional deflection on the torsional stiffness of the beam. Comparison is made of analytical results with experimental data, excellent agreement being shown. AD 130786. Project 3346, Task 33048. Contract AF 33(616)-3190. AF WADC TR 56-501.

Vapor barrier materials for use with slab-on-ground construction and as ground cover in crawl spaces, by William S. Brown. Building Research Advisory Board. May 1956. 29p. Order as Publication 445 from NAS-NRC Publications Office, 2101 Constitution Ave., N.W., Washington 25, D.C. \$1.50. PB 125002

Reprinted by the Building Research Institute, National Research Council. 1. Building materials - Moisture proofing 2. Houses - Insulation 3. Houses - Foundations 4. Vapor barriers 5. Contract HA-hf-646, Amendment no. 1 6. NRC 445

Windows and glass in the exterior of buildings. National Research Council. Division of Engineering and Industrial Research. Building Research Institute. 1957. 189p photos, drawings, tables. Order as Publication 478 from NAS-NRC Publications Office, 2101 Constitution Ave., N.W., Washington 25, D.C. \$5.00. PB 126065

A research correlation conference conducted Nov. 14 and 15, 1956 at the Chamber of Commerce of the U.S. in Washington, D.C. 1. Glass - Uses 2. NRC 478

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

Cargo handling in helicopters, by Clark Henderson, W. Grant Ireson, Robert K. Mitchell and Peter D. Tilton. Stanford Research Institute, Menlo Park, Calif. Mar 1957. 179p drawings, diagrs, tables. Order from OTS. \$4.50. PB 131195

This report analyzes the problems of loading, restraining and discharging supplies when transported in helicopters for support of Army units. The objectives of the research were to study the application of existing and possible new techniques and devices for cargo handling, cargo restraint and weight and balance in helicopters. The effects of helicopter missions and operational environment upon cargo handling are considered as well as techniques and devices for handling unit loads as internal and external cargo. Current and possible future methods of cargo restraint (tiedown) are discussed. Data from studies, experiments, and operational experience have been collected and used. AD118165. Project 6126, Task 61210. Contract AF 33(616)-3127. AF WADC TR 57-144.

Instruments

Ground simulator studies of the effects of valve friction, stick friction, flexibility, and backlash on power control system quality, by B. Porter Brown. U.S. National Advisory Committee for Aeronautics. Apr 1957. 45p photo, drawing, graphs. Order as TN 3998 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125726

Ground simulator tests were made to study the effects of various ratios of valve friction to stick friction on power control system quality. Boundaries are determined for good, tolerable, and unsatisfactory ranges of valve and stick friction for a rigid control system and a system with flexibility between the source of stick friction and the valve. The effect of various friction ratios with flexibility between the pilot and the source of stick friction is presented. The effect of backlash with various friction ratios is also presented. NACA TN 3998.

Engines and Propellers

Exploratory study of ground proximity effects on thrust of annular and circular nozzles, by Uwe H. von Glahn. U.S. National Advisory Committee for Aeronautics. Apr 1957. 48p photos, drawings, graphs, diagr, tables. Order as TN 3982 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125725

1. Nozzles - Thrust - Ground effect 2. Thrust measurements 3. NACA TN 3982

Factors influencing operating limits of high flux axial compressors, by Frank L. Wattendorf, Hans von Ohain and Maurice Lawson. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aeronautical Research Laboratory, Wright-Patterson Air Force Base, Dayton, O., and Advisory Group for Aeronautical Research and Development. Apr

1957. 27p diagrs, graphs. Order from OTS.
75 cents. PB 131388

In a paper presented at the Seventh International Congress for Applied Mechanics at Istanbul, the senior author discussed three dimensional flow distortion for axial flow compressor stages with combination of high mass flow and high stage pressure ratio. In particular, the alleviating effect of preliminary high output inducer stages was shown. The treatment was limited to a single stage operating at the design point. In the present paper, the treatment of the above mentioned compressor type is extended to include staging and matching considerations of multi-stage compressors with goal of obtaining wide operational ranges with favorable efficiency. To accomplish this the flow coefficient fluctuations in the first and last stages are first derived as function of the corrected speed range. Then the stage-wise design blade loading distribution is deduced from the standpoint of obtaining a wide operating range with minimum sacrifice in efficiency. AD 118206. Project 3066, Task 70181. AF WADC TR 57-233.

Hydrogen-oxygen explosions in exhaust ducting, by Paul M. Ordín. U.S. National Advisory Committee for Aeronautics. Apr 1957. 31p photos, drawings, diagrs, graphs, tables. Order as TN 3935 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125727

An investigation was undertaken to determine the detonation combustion pressure of hydrogen-oxygen mixtures at a pressure of 1 atmosphere in a 2-foot-diameter duct. Water sprays distributed through sections of the duct did not prevent a detonation but did reduce the peak pressures. NACA TN 3935.

Investigation of a full-scale, cascade-type thrust reverser, by Robert C. Kohl and Joseph S. Algrant. U.S. National Advisory Committee for Aeronautics. Apr 1957. 53p photos, drawings, graphs. Order as TN 3975 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125729

1. Thrust reversers - Design 2. Thrust reversers - Performance 3. NACA TN 3975

New experimental approach to the analysis of compressor performance: Application of the Bomelburg spark method to the measurement of directional velocity traverses at the outlet of an impeller, by Josef Herzog. Maryland. University. Institute for Fluid Dynamics and Applied Mathematics, College Park, Md. Jan 1957. 17p photos, diagrs, graphs. Order from LC. Mi \$2.40, ph \$3.30. PB 125107

Transverse measurements of the direction and magnitude of the instantaneous absolute velocity extending across the blade channel at the outlet of a rotat-

ing aircraft supercharger impeller were made by means of the electric spark technique. The results give insight into the qualitative nature of the flow. Further experience is required to determine the attainable accuracy of the method. AD 115035. Project 17500-408. Contract AF 18(602)-92. UM BN 90. AF OSR TN 57-3.

Structural and vibrational characteristics of WADC S-2 model propeller blades, by Marshall O. Burquest and James E. Carpenter. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. Jun 1957. 98p photo, graphs, tables. Order from OTS. \$2.50. PB 131370

The test blades were instrumented with wire resistance strain gages and were rotated, at various positive and negative blade angle settings, up to speeds of 8000 rpm. The blades were vibrated in the fundamental bending mode, second bending mode, and the first torsion mode at various pitch angles and rotational speeds, and the strain gage signals were recorded. Experimental data were also obtained of the steady strains produced by centrifugal force as well as of the blade damping for the various vibratory test conditions. Concurrently with the experimental program, the blade vibratory characteristics were analytically determined for several combinations of blade angle setting and rotational speed. Excellent correlation was obtained between the experimental and analytical results. AD 130785. Project no. 3546, Task no. 33048. Contract AF 33(616)-3190. AF WADC TR 56-28.

Training and Training Devices

Construction of spatial orientation items by means of a cyclorama, by Frederick B. Davis. U.S. Air Force. Air Research and Development Command. Air Force Personnel and Training Center. Personnel Research Laboratory, Lackland Air Force Base, Tex. Jun 1956. 20p drawings, diagrs, table. Order from LC. Mi \$2.40, ph \$3.30. PB 125125

A cyclorama was designed and constructed to represent the visual field of an observer in a Piper Cub at an altitude of 250 feet. Key points and lines in the terrain were projected on the walls of a cyclorama to guide the artist in making the perspective drawing. A special camera mount, scaled for precise angular adjustment, provided for rotary motion in three dimensions about the fixed point of the observer. Two spatial orientation tests were constructed from cyclorama photographs. Test scores from a sample of 1043 Pre-Flight trainees provided comparison of score distributions of the new and old forms. Project 7701, Task 77046. Contract AF 18(600)-388. AF PTRC TN 56-61.

Evaluation of training devices for B-47 fuel, hydraulic, and rudder power control systems, by Robert A. Swanson and Lewis E. Aukes. U.S. Air Force

Air Research and Development Command. Air Force Personnel and Training Research Center. Training Aids Research Laboratory, Chanute Air Force Base, Ill. Jan 1956. 51p diags, tables. Order from LC. Mi \$3.60, ph \$9.30.

PB 125128

In this study an attempt was made to help resolve some of the differences of opinion regarding the instructional value of various devices in specific areas of instruction. The combinations used in this study were characterized as animated panels, charts, cutaway trainers, nonoperating trainers, operating trainers, and symbolic diagrams. Devices with these labels were prepared to provide as complete information as possible for each of three B-47 systems. The relative effectiveness of these devices was then measured in a situation comparable to that in which they were ordinarily used. Project 7714, Task 77241. AF PTRC TN 56-2.

Pedestal sight gunnery skills, a review of research by Mymon Goldstein and Douglas S. Ellis. U.S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Armament Systems Personnel Research Laboratory, Lowry Air Force Base, Colo. Feb 1956. 36p photo, diagr, graphs. Order from LC. Mi \$3.00, ph \$6.30. PB 125127

The research was aimed at developing and evaluating proficiency measures, training methods, and selection procedures, and was based on experimental investigations of the way that individuals performed the sight manipulation task. In the course of this work, several research devices were developed. These devices permitted the sighting task to be performed under controlled conditions, and yielded scores descriptive of the adequacy of gunner behavior. Project 7708, Task 77141. AF PTRC TN 56-31.

Role conflict and instructor effectiveness at the Air Command and Staff School, by Jacob W. Getzels and Egon G. Guba. U.S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Officer Education Research Laboratory, Maxwell Air Force Base, Ala. Feb 1956. 108p tables. Order from LC. Mi \$5.70, ph \$16.80.

PB 125126

This report deals specifically with role conflict, defined as the possible inconsistency among the roles an individual is required to fill in the performance of his functions at that institution. His role as an officer, for example, may be in conflict with his role as an instructor. Evidence for such conflicts is here studied in relation to teaching effectiveness. Project 7730, Task 77306. Contract AF 18(600)-5. AF PTRC TN 56-41.

Studies in air technical training, by Harley W. Mowry, Wilse B. Webb and Everett A. Garvin. Washington University. Dept. of Psychology, St.

Louis, Mo. Dec 1955. 41p tables. Order from LC. Mi \$3.30, ph \$7.80. PB 126102

This is a series of six reports on: 1. Remedial school and the needs of failing trainees. 2. The effect of accumulative retesting of total retention of course material II. 3. Actual and ideal job activities of instructional supervisors. 4. Facilitation of learning by the classroom communicator. 5. The predictability of two diagnostic tests used in naval air technical training. 6. The readability of materials in naval air technical training. Contract Nonr-816(02), Technical report no. 2.

Aerodynamics

Aerodynamic theory and its application to flutter, by I. E. Garrick. U.S. National Advisory Committee for Aeronautics. Apr 1956. 38p diags, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" Street, N. W., Washington 25, D. C. PB 124250

Prepared for Structures and Materials Panel of Advisory Group for Aeronautical Research and Development. 1. Aerodynamics - Theory 2. Wings - Flutter - Analysis

Effects of fuselage nose length and a canopy on the static longitudinal and lateral stability characteristics of 45° sweptback airplane models having fuselages with square cross sections, by Byron M. Jaquet and H. S. Fletcher. U.S. National Advisory Committee for Aeronautics. Apr 1957. 47p photos, drawing, diagr, graphs, tables. Order as TN 3961 from National Advisory Committee for Aeronautics, 1512 "H" Street, N. W., Washington 25, D. C. PB 125721

1. Stability, Longitudinal - Static tests 2. Stability, Lateral - Static tests 3. Stability, Directional - Static tests 4. Airplanes - Stability - Effect of canopy 5. Airplanes - Stability - Effect of fuselage 6. NACA TN 3961

An experimental hydrodynamic investigation of the inception of vortex ventilation, by John A. Ram- sen. U.S. National Advisory Committee for Aeronautics. Apr. 1957. 31p photos, diagr, graphs. Order as TN 3903 from National Advisory Committee for Aeronautics, 1512 "H" Street, N. W., Washington 25, D. C. PB 125722

1. Hydrodynamics - Research 2. Vortex motion - Photographic analysis 3. Airplanes - Stalling 4. Wings, Rectangular - Lift 5. Wings - Boundary layer 6. NACA TN 3903

Incompressible flutter characteristics of representative aircraft wings, by C. H. Wilts. U.S. National Advisory Committee for Aeronautics. Apr 1957. 121p diags, graphs, tables. Order as

TN 3780 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125734

1. Wings - Flutter - Calculations
2. Analogs, Electric
3. NACA TN 3780

The linearized subsonic flow about symmetrical nonlifting wing-body combinations, by John B. McDevitt. U.S. National Advisory Committee for Aeronautics. Apr 1957. 67p drawings, diags, graphs. Order as TN 3964 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125724

1. Bodies of revolution - Aerodynamics
2. Airplanes - Aerodynamics
3. Flow, Subsonic - Theory
4. Wings - Aerodynamics - Theory
5. NACA TN 3964

Measurement and assessment of repeated loads on airplane components, by Philip Donely. U.S. National Advisory Committee for Aeronautics. Apr 1956. 36p graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. Free. PB 124249

Presented at the third meeting of the Structures and Materials Panel of the Advisory Group for Aeronautical Research and Development. 1. Gust loads - Theory 2. Loads, Aerodynamic - Theory

Wind-tunnel tests of a swept-wing semispan model with circulation control, by Richard E. Wallace, R.J. Bondie, Jr. and J.L. Stalter. Wichita. University. School of Engineering, Wichita, Kan. Aug 1953. 180p photos, drawings, fold graphs. Order from LC. Mi \$8.10, ph \$27.30. PB 125929

The results of using aileron circulation control, together with nose camber, on a semispan, reflection plane, quarter-scale model swept wing with slotted flap and aileron, drooped nose and circulation control are presented. Test data are given as force and moment curves, pressure distributions and wake-flow pictures. Circulation control was applied only over the outboard section of the wing by ejecting air over the aileron upper surface. The series of tests evaluated primarily the aileron effectiveness both with and without circulation control for several combinations of the leading-edge section settings. Additional variables of quantity coefficient, velocity, and Reynolds number were investigated. Aerodynamic report no. 101. Parts of the report will not reproduce well. 17 pages of text. Contract Nonr-201(01).

Rockets and Jet Propulsion

Effect of solid admixtures on the velocity of motion of a free dusty air jet (K voprosu o vliyanií tverdykh primecei na skorost' dvizheniya svobodnoi pylevozdushnoi strui), by A.P. Chernov. Apr 1957. 7p graph. Order as TM 1430 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125655

Translated from Zhurnal Tekhnicheskoi Fiziki, vol. 26, no. 5, 1956, p. 1060-1063. 1. Jets, Air - Supersonic - Flow - Russia 2. Flow, Jet mixing - Velocity distribution - Russia 3. Flow, Jet mixing - Theory - Russia 4. Particles - Motion - Theory - Russia 5. NACA TM 1430

Evaluation of designs and materials for high speed-high temperature shaft seals for turbojet engine applications, by Ernest J. Taschenberg. Koppers Co., Inc., Pittsburgh, Pa. May 1956. 73p photos, drawing, diags, tables. Order from OTS. \$2.00. PB 121992

With the constant upward trend in operating conditions in aircraft turbojet engines, it has been necessary to re-design engine rubbing shaft seals and find new materials to meet these conditions. This program was initiated to facilitate the development of a shaft seal which would operate satisfactorily under extended conditions of speed, temperature and pressure. Since shaft seals necessarily involve rubbing surfaces, a large number of materials were investigated to determine those having promising wear characteristics at room temperature and at high temperature. The subject of shaft seal design was reviewed with respect to the adaptability of such new materials to the several designs incorporating these materials. AD 110636. Project 3066, Task 30366. Contract AF 33(616)-3004. AF WADC TR 56-267.

Steady nuclear combustion in rockets (Stationäre kernverbrennung in raketén), by Eugen Säger. Translated by S. Reiss. Apr 1957. 39p diagr, graphs, table. Order as TM 1405 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125654

Translated from Astronautica Acta, vol. 1, fasc. 2, 1955, p. 61-88. 1. Gases - Thermodynamic properties - Germany 2. Nuclear power - Production - Germany 3. Rocket motors - Nuclear propulsion - Germany 4. Jet propulsion, Nuclear - Germany 5. NACA TM 1405

Marine Transportation

Analyses of cores from ranges: Able, Baker, Charlie and Dog, Narragansett Bay, 1955, by Charles V. Mulholland and Frank T. Dietz.

Rhode Island. University. Narragansett Marine Laboratory, Kingston, R.I. Apr 1956. 50p map, diagr, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 125927

In the summer of 1955, 22 cores were taken from the bottom of Narragansett Bay along four ranges where sound transmission experiments were to be carried out. The purpose of the work was to complement sound transmission measurements with pertinent information about the near surface sediments. The material in these cores was subsequently analyzed for particle size distribution, moisture content, wet and dry density, organic carbon content, and porosity. Reference no. 56-8: Acoustics project. Contract Nonr-396 (04), NR 240-002, Technical report no. 3.

Analysis of air-sea surface boundary layer temperature records (1930-1935) at fourteen fixed stations on the Gulf of Mexico, by U. Grant Whitehouse and Allan N. Brown. Texas. Agricultural and Mechanical College. Dept. of Oceanography, College Station, Tex. Mar 1956. 51p map, diagrs, graphs, tables. Order from LC. Mi \$3.60, ph \$9.30. PB 125910

A & M project 24; Reference 56-14T. 1. Boundary layer, Sea-air - Temperature 2. Contract N7 onr-48702, NR 083-036

Cargo ship loading, an analysis of cargo loading in selected U.S. ports. Maritime Cargo Transportation Conference, 1956. 1957. 48p drawings, graphs, tables. Order as Publication 474 from NAS-NRC Publications Office, 2101 Constitution Ave., N.W., Washington 25, D.C. \$1.50. PB 126062

The loading study analyzes in detail the loading process in various U.S. ports and shows the extent to which the present break-bulk system is operating below its capability. It also identifies and evaluates the gains in productivity which can be achieved by certain technical improvements which do not involve a change in the basic system. The results are intended to provide a quantitative basis for future comparisons of the existing break-bulk loading system with unconventional loading systems under consideration by the maritime industry. The importance of the human relations problem became very apparent when attempts were made to isolate and identify the causes of observed inefficiencies in the current utilization of machinery and manpower. Part of a program undertaken at request of Departments of Defense and Commerce. Contract N7 onr-29151. NRC 474.

Damping characteristics of the solitary wave, by Arthur T. Ippen, Gershon Kulin and Mir A. Raza. Massachusetts Institute of Technology. Dept. of Civil and Sanitary Engineering. Hydrodynamics Laboratory. Apr 1955. 51p photo, drawing, diagr, graphs. Order from LC. Mi \$3.60,

ph \$9.30. Limited supply available from Massachusetts Institute of Technology, Cambridge, Mass. \$1.00. PB 125087

This report presents the results of an investigation of the damping of solitary waves in water of constant depth. The damping was studied principally by direct observation of the decrease in amplitude of waves as they proceeded up and down a 32-foot Lucite tank. Also reported is a preliminary investigation of the damping process by direct measurement of boundary layer velocities with a specially designed differential gage. Results of near-bottom velocity observations with a differential gage verified the existence of a boundary layer increasing in thickness from front to rear of the wave. Contract N5 ori-07837, NR 062-068. MIT HL TR 16.

Hydrofoil research craft. Technical report no. 2: Detailed analysis of hydrofoil model data. Gibbs & Cox, Inc., New York, N.Y. Oct 1951. 77f diagrs, fold graphs. Order from LC. Mi \$4.50, enl pr \$13.80. PB 129376

Data from tests of model hydrofoils is analyzed to determine the experimental hydrodynamic characteristics. The method of analysis is discussed and comparison is made between theory and experiment for single foil configurations. Agreement is good except in the critical speed region where the effect of shallow water is different from that indicated by the theory. Analysis of tandem foil tests is also made, and good agreement is found between test results and theory. The effect of tank depth is discussed and some observations on wave patterns are given. Recommendations for future testing are made. Unclassified 10 June 1954. Appendix: Description of waves generated by a hydrofoil. Contract Nonr-507(00), Technical report no. 2.

Oceanographic survey of the Gulf of Mexico: Physical and meteorological data, cruises 54-2, 54-9 and 54-10 of the A. A. Jakkula. Texas. Agricultural and Mechanical College. Dept. of Oceanography, College Station, Tex. Mar 1956. 88p maps, tables. Order from LC. Mi \$4.80, ph \$13.80. PB 125911

A & M project 24, Reference 56-7D. Data report no. 4. NE 120219-5. 1. Oceans - Depths - Measurements 2. Oceanography - Records 3. Oceanography - Gulf of Mexico 4. Sea water - Salinity - Measurement 5. Sea water - Temperature - Measurement 6. Sea water - Chemical analysis 7. Contract N7 onr-48702, NR 083-036

Shoaling and breaking characteristics of the solitary wave, by Arthur T. Ippen and Gershon Kulin. Massachusetts Institute of Technology. Dept. of Civil and Sanitary Engineering. Hydrodynamics Laboratory. Apr 1955. 68p diagrs, graphs, tables. Order from LC. Mi \$3.90, ph \$10.80. Limited supply available from Massachusetts Institute of Technology, Cambridge, Mass. \$1.00. PB 125086

General conclusions may be stated as follows: 1. Available theory for the solitary wave in water of constant depth does not adequately describe either the shoaling behavior or the breaking conditions of the solitary wave on a sloping bottom, even for relatively small slopes. Experimental results deviate increasingly from the theoretical curves as the beach is made steeper. 2. The experimentally determined breaking characteristics of the solitary wave cannot at present be reconciled with available results on long-period oscillatory waves. Contract N5 ori-07837, NR 062-068. MIT HL TR 15.

Short time prediction of sea surface height: Prediction of a degenerate stochastic process, by Louis J. Cote. New York University. College of Engineering. Research Division. Dept. of Meteorology and Oceanography, New York, N.Y. Nov 1955. 5p. Order from LC. Mi \$1.80, ph \$1.80. PB 124284

Pages numbered 73-77, from Chapter 6 from "Ships and waves". 1. Waves, Ocean - Surface elevation 2. Waves, Ocean - Forecasting 3. Contract Nonr-285(17)

WATER SUPPLY, SANITATION AND PUBLIC HEALTH

Removal of radioactive material from water by serial coagulation, by ion exchange, and by charcoal absorption (Salty Dog VII), by William J. Lacy, Ronnie R. Rollins and Lester M. Lawless. U.S. Engineer Research and Development Laboratories, Fort Belvoir, Va. Jun 1956. 21p graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 128495

This report covers experiments conducted at the ERDL Oak Ridge Test Station on the removal of radioactive materials from water by serial coagulation, by ion exchange, and by charcoal adsorption. In the tests performed, the highest removal was obtained with silver 110 (89.2%) and cerium 144-praseodymium 144(88.8%). The lowest removal was with sodium 24 (38.3%). Pretreatment of contaminated water with dimethylglyoxime effectively increases the removal of radioisotopes by granular bone charcoal. In the tests performed, the addition of dimethylglyoxime resulted in removals of over 98 percent for strontium 89, barium 140 - lanthanum 140, zirconium 95 - niobium 95, calcium 45, yttrium 91, silver 110, and cerium 144 - praseodymium 144. Project 8-75-07-214. ERDL R 1451.

MISCELLANEOUS

Benthonic productivity project. Annual progress report for 1 Jan - 31 Dec 1955, under Contract

Nonr-396(03), NR 163-100, by David M. Pratt. Rhode Island. University. Narragansett Marine Laboratory, Kingston, R.I. Jan 1956. 4p. Order from LC. Mi \$1.80, ph \$1.80. PB 126174

A study of the more important environmental factors governing the production and distribution of living matter in the Narragansett Bay area. Reference no. 56-2. For annual report for 1954 see PB 119184. For Final report see PB 124006.

Changing geographic functions of selected European ports. Final report under Contract Nonr 404(04) for the period 1 July 1952 - 30 Jun 1955, by Guido G. Weigend. Rutgers University. Dept. of Geography, New Brunswick, N.J. Jun 1955. 11p. Order from LC. Mi \$2.40, ph \$3.30. PB 126135

The project involved the detailed study and analysis of four ports: Bordeaux, Bayonne, and La Rochelle-La-Pallice in France, and Hamburg in Germany. Objectives were: (a) to determine and analyze functions of the ports selected; (b) to ascertain how the functions of those ports have changed and why; (c) to analyze the interrelationships of port and hinterland on the one hand, of port and maritime organization and foreland on the other; and (d) to determine how functional changes in port, hinterland, or foreland affect these relational patterns. In the first phase of the project, field work was also concerned with determining the potential changes in the function of the hinterland should the major port cease to operate, to study the role of potential alternate ports, their feeder lines into the interior, their individual and combined functions and capacities.

Norwegian collaboration in the economic development of Arctic Finland, by Trevor Lloyd. Dartmouth College, Hanover, N.H. Jan 1956. 12p maps. Order from LC. Mi \$2.40, ph \$3.30. PB 126176

A report of interchange trade between Norway and Finland since 1920.

Optimization in new item production, by W. W. Cooper and A. Charnes. Carnegie Institute of Technology, Pittsburgh, Pa. Jan 1952. 24p graphs. Order from LC. Mi \$2.70, ph \$4.80. PB 124271

The general problem with which this paper is concerned is the determination of optimum steady-state levels of production when confronted with an unknown structure of costs. For this purpose three types of structure which have been commonly employed both in theoretical and empirical work were studied. Paper presented at the 3d annual GWU-ONR Logistics Conference, 2-8 Jan 1952. Includes discussion of paper, by Mr. Shubik.

Physical geography of the Queen Elizabeth Islands, Canada, by Andrew Taylor. American Geographical Society, New York. Contract Nonr-1070 (00). Order separate parts described below from LC, giving PB number of each part ordered.

Vol. I: Introduction; Geology. Jun 1956. 162p photos, maps. Mi \$7.80, ph \$25.80. PB 126574

The Queen Elizabeth Islands lie north of the 74th parallel between the mainland of Canada and Greenland. These volumes describe the geology and glaciology and other physical attributes of the area. The interpretation of some 30,000 aerial photographs was a major portion of the work. The principal object became the welding together of these interpretations of aerial surveys with observations made in the field, abstracted from the narratives and reports of explorers.

Vol. II: Glaciology. Jun 1956. 133p photos, maps, table. Mi \$6.90, ph \$21.30. PB 127201

Vol. III: Ellesmere Island: Grant land. Jun 1956. 137p photos, maps. Mi \$6.90, ph \$21.30. PB 126584

Vol. IV: Ellesmere Island: Grinnell and Sverdrup lands. Jun 1956. 120p photos, map. Mi \$6.00, ph \$18.30. PB 127322

Vol. V: Ellesmere Island: Lincoln land. Jun 1956. 58p photos, map. Mi \$3.60, ph \$9.30. PB 127317

Vol. VI: Devon Island. Jun 1956. 122p maps, photos. Mi \$6.30, ph \$19.80. PB 127318

Vol. VII: Cornwallis and Bathurst Islands. Jun 1956. 98p photos, map. Mi \$5.40, ph \$15.30. PB 127319

Vol. VIII: Melville Island. Jun 1956. 92p photos, map. Mi \$5.40, ph \$15.30. PB 127321

Vol. IX: Prince Patrick, Stefansson, Findlay and Ringnes Islands. Jun 1956. 121p map, photos. Mi \$6.30, ph \$19.80. PB 127313

Vol. X: Axel Heiberg Island. Jun 1956. 72p photos, map. Mi \$4.50, ph \$12.30. PB 127314

Vol. XI: Bibliography. Jun 1956. 32p. Mi \$3.00, ph \$6.30. PB 127316

Vol. XII: Maps. Jun 1956. 85p fold. maps. Mi \$4.80, ph \$13.80. PB 125999

Maps only. No text.

Proceedings of a Conference on Orientation in Animals, Feb 6 and 7, 1953. U.S. Office of Naval Research. 1953. 312p diagrs, graphs, tables (1 fold). Order from LC. Mi \$11.10, ph \$50.10. PB 126645

Experiences encountered in the operation of high-altitude, high-speed aircraft have pointed out the necessity for understanding the phenomena of space orientation, especially as it affects pilots' abilities to operate their aircraft effectively. This is a report of a conference to consider basic mechanisms in animal orientation as applied to: Invertebrate animals; Aquatic animals; Flying vertebrates; Terrestrial vertebrates; Summary, appraisal, and discussion.

Report of NRL progress. U.S. Naval Research Laboratory. Dec 1957. 60p. Order from OTS. \$1.25. Also available at annual subscription rate of \$10.00 a year in the U.S.A., foreign rate of \$13.00 a year. PB 131488

Contents: Articles: Transparent cathodoluminescent glass screens, by J.H. Schulman and R.J. Ginther. - Small, transistorized, digital computer elements, by F.C. Hallberg, H.H. Levy and C.J. Creveling. - The polarization of nuclei, by A. Stolovy, F.E. Jablonski and M.E. Bishop. - Scientific program: Problems accepted. - Problem notes: Astronomy and astrophysics: Fundamentals in noise source calibrations at microwave frequencies. . . . True free-air temperature probe of the axial-flow vortex type under investigation with the Laboratory's transonic whirling arm facility. - Chemistry: Corrosion of metals in tropical environments. . . . Toxic agent vapor source for demonstrating CW and BW detection equipment. - Electricity: Insulation conductivity measurements. - Mathematics: Numerical solution of Burnett equations for monatomic gases. - Mechanics: Slow fracture propagation in Plexiglass II studied with new grips and accessories designed and built at NRL for conducting toughness tests. . . . New statistical model of strength. . . . Measurement of the elastic constant (C₄₄) of pure lead. - Metallurgy and ceramics: Ultrasonic inspection of titanium. . . . The determination of low amounts of carbon in high-purity metals. . . . Initial effects of nuclear radiation on the magnetic properties of a ferrite. . . . Atomic size effect and alloying behavior in liquid metals. . . . Effects of environment on the high-temperature properties of metals. . . . Small heats of metal effectively stream degassed with only moderate losses in temperature. . . . Effect of boiler water additions on the corrosion rate of steel at 600°F. - Nuclear and atomic physics:

Resonance fluorescence studies with the NRL 22-Bev betatron. . . Photo-alpha particle reactions. - Optics: Evaluation of luminous materials for night replenishment operations at sea. - Radio: Prototype model of new submarine rescue buoy operates on international vhf distress frequency. . . A new property of the turnstile waveguide junction. . . Automatic data reduction system-amplitude-distribution and correlation analyses. . . The dielectric plate array - a new endfire antenna. - Solid-state physics: Small oven for high-temperature optical measurements of dielectric materials. . . Magnetostriction of a specimen with high saturation. - Sound: Study of a controlled acoustical experiment in a water tank at 213 kc. . . Signal analysis techniques offer gains in detection probability. . . Digital data recorder for sonar signal processing. - Published reports. - Papers by NRL staff members. - Patents. - Index of articles.

Studies on movements and concentrations of fishes by sonic methods, by Arthur D. Hasler, James R. Villemonte and James J. Tibbles. Wisconsin University. Dept. of Zoology, Madison, Wis. Nov 1955. 19p photo, diagr, graphs. Order from LC. Mi \$2.40, ph \$3.30. PB 124272

Cruises on Lake Mendoba with a 40 ft launch equipped with modern echo-sounding instruments and electronic equipment indicated that this gear is effective for locating fish in the shallow waters of the lake. Contract Nonr 176(00), NR 165-902, Final report.

Theoretical studies of national power. Final report for the periods Feb 1953-Aug 1954 and Feb 1955-30 Nov 1955, by Stephen B. Jones. Yale University, New Haven, Conn. Nov 1955. 9p. Order from LC. Mi \$1.80, ph \$1.80. PB 124276

Contains short account of work under the project, and abstracts of reports published as result of this research.

ATOMIC ENERGY COMMISSION REPORTS

Reports may be purchased in accordance with instructions on the inside front cover of the U. S. GOVERNMENT RESEARCH REPORTS. As PB numbers are not indicated, order by series and number. These reports may also be consulted at any AEC Depository Library. A list of these libraries may be obtained from the U. S. Department of Commerce, Office of Technical Services, Washington 25, D. C.

Reproduction in whole or part of any report listed herein is encouraged by the U. S. Atomic Energy Commission, subject to the approval of authors or originating sites. General inquiries from the industrial press about AEC-developed information should be directed to the Industrial Information Branch, Atomic Energy Commission, Washington 25, D. C.

Biology and Medicine

Calculation of maximum permissible concentration in air, MPC_(air), for Ru¹⁰⁶ particles, by W. J. Bair. Hanford Atomic Products Operation, Richland, Washington, Oct. 1957. Contract W-31-109-Eng-52. 11p. Order from OTS. 50 cents. HW-52287

Some effects of radiations on cell proliferation, by Cornelius A. Tobias. University of California, Radiation Lab., Berkeley, Calif. August 1957. Contract W-7405-Eng-48. 11p. Order from OTS. 50 cents. UCRL-3735

Transport of bivalent cations into the yeast cell in relation to potassium and phosphate uptake, by Aser Rothstein. University of Rochester, New York. August 1957. Contract W-7401-Eng-49. 20p. Order from OTS. 75 cents. UR-502

Chemistry—General

The U isotope effect and other features in the absorption and fluorescence spectra of uranyl compounds. Final report, by G. H. Dieke. Johns Hopkins Univ., Baltimore. March 1945. Decl. Feb. 12, 1957. Contract W-7405-Eng-50. Subcontract No. 36. 174p. Order from LC. Mi \$8.10, ph \$27.30. A-3227

Explosive limits of mixtures of fluorine (216) with fluorocarbons, hydrocarbons, and water vapor, by J. K. Fox, D. S. Voss, and J. P. Brusie. Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn. Sept. 1945. Decl. Feb. 12, 1957. 7p. Order from LC. Mi \$1.80, ph \$1.80. A-3602

An improved continuous ether extractor for the determination of uranium in dissolver solutions, by R. W. Bane and K. J. Jensen. Argonne National Lab., Lemont, Ill. August 1953. Decl. with

deletions Feb. 11, 1957. Contract W-31-109-Eng-38. 6p. Order from LC. Mi \$1.80, ph \$1.80. ANL-5109(Del.)

Argonne plutonium hexafluoride program, by John G. Malm and Bernard Weinstock. Argonne National Lab., Lemont, Ill. Sept. 1954. Decl. with deletions Feb. 13, 1957. Contract W-31-109-Eng-38. 14p. Order from LC. Mi \$2.40, ph \$3.30. ANL-5366(Del.)

Separation of molybdenum hexafluoride from uranium hexafluoride--simple distillation of uranium hexafluoride--molybdenum hexafluoride mixtures. Interim report, by L. Trevorrow. Argonne National Lab., Lemont, Ill. August 1956. Decl. Mar. 9, 1957. Contract W-31-109-Eng-38. 6p. Order from LC. Mi \$1.80, ph \$1.80. ANL-RCV-SL-1094

Summary of experiments on the inhibition of corrosion by the pertechnetate ion, by G. H. Cartledge. Oak Ridge National Lab., Tenn. February 1953. Decl. Feb. 14, 1957. Contract W-7405-Eng-26. 10p. Order from LC. Mi \$1.80, ph \$1.80. CF-53-2-234

Adsorption of H₂O by ThO₂ at high temperatures, by D. M. Richardson. Oak Ridge National Lab., Tenn. Jan. 1956. Contract W-7405-Eng-26. 10p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-1-109

Statistical quality control quarterly report for the analytical chemistry division, July through September, 1956, by M. T. Kelley. Oak Ridge National Lab., Tenn. Contract W-7405-Eng-26. 80p. Order from LC. Mi \$4.50, ph \$12.30. CF-56-10-12

Spontaneous decomposition of trichloroethylene, by G. F. Yost. Hanford Atomic Products Operation, Richland, Wash. July 1957. Contract W-31-109-Eng-52. 5p. Order from OTS. 50 cents. HW-39945 SUP 1

Absorption spectra of plutonium and impurity ions in nitric acid solution, by M. N. Myers. Hanford Atomic Products Operation. Richland, Wash. July 1956. Decl. November 25, 1957. Contract W-31-109-Eng-52. 21p. Order from OTS. 75 cents. HW-44744

Observations on the mechanisms and kinetics of aqueous aluminum corrosion, by R. L. Dillon and V. H. Troutner. Hanford Atomic Products Operation. Richland, Wash. September 1957. Contract W-31-109-Eng-52. 30p. Order from OTS. \$1.00. HW-51849

Analytical program for processing aluminum-uranium reactor fuel elements, by Ralph C. Shank and James E. Rein. Phillips Petroleum Co. Idaho Falls, Idaho. August 1957. Contract AT-10-1-205. 18p. Order from OTS. 75 cents. IDO-14412

Analytical program for processing zirconium-uranium reactor fuel elements, by James E. Rein and Ralph C. Shank. Phillips Petroleum Co. Idaho Falls, Idaho. August 1957. Contract AT-10-1-205. 25p. Order from OTS. \$1.00. IDO-14413

Vapor pressure tables for liquid uranium hexafluoride, by A. A. Brooks and P. Wood. Union Carbide Nuclear Co., a division of Union Carbide Corp. Oak Ridge, Tenn. November 1957. Contract W-7405-Eng-26. 7p. Order from OTS. 50 cents. K-722, Add. 1

Exchange reaction between substituted benzyl iodides and potassium iodide. VIII. p-methylbenzyl iodide. IX. p-carbomethoxybenzyl iodide, by Milton Kahn and J. L. Riebsomer. University of New Mexico. Albuquerque, N. M. November 1957. (Subcontract with Los Alamos Scientific Lab.) 18p. Order from OTS. 75 cents. LA-2075 UNM

The preparation of C¹⁴-pyrimethamine, by Arthur Murray III. Los Alamos Scientific Laboratory of the University of California. Los Alamos, N. M. November 1957. Contract W-7405-Eng-36. 9p. Order from OTS. 50 cents. LA-2145

An estimate of the vapor pressures of thorium and protactinium, by E. W. Murbach. Atomic International, a division of North American Aviation, Inc. Canoga Park, Calif. November 1957. Contract AT-11-1-Gen-8. 14p. Order from OTS. 50 cents. NAA-SR-1988

Semiannual progress report for period January 1957 through June 1957. New Brunswick Lab. Oct. 1957. 22p. Order from OTS. 75 cents. NBL-139

Evolution of enzymes and the photosynthetic apparatus, by Melvin Calvin. University of California. Radiation Lab., Berkeley, Calif. August 1957. Contract W-7405-Eng-48. 12p. Order from OTS. 50 cents. UCRL-3915

Determination of lithium hydride and lithium hydroxide in commercial-grade lithium hydride, by Jack W. Frazer, Carl W. Schoenfelder, and Robert L. Tromp. University of California. Radiation Lab., Livermore Site. Livermore, Calif. July 1957. Contract W-7405-Eng-48. 9p. Order from OTS. 50 cents. UCRL-4944

A rapid determination of micro quantities of mercury in urine and water using the mercurimeter, by W. T. McBryde and Fred Williams. Union Carbide Nuclear Co., a division of Union Carbide Corp. Oak Ridge, Tenn. November 1957. Contract W-7405-Eng-26. 11p. Order from OTS. 50 cents. Y-1178

Chemistry—Radiation and Radiochemistry

Quarterly technical activities report through December 17, 1953. Monsanto Chemical Co. Mound Lab. Miamisburg, Ohio. December 31, 1953. Decl. April 3, 1957. Contract AT-33-1-Gen-53. 15p. Order from OTS. 50 cents. MLM-929(Del. 1)

Chemistry—Separation Processes for Plutonium and Uranium

Isolation and purification of neptunium-237 obtained from Hanford wastes, by J. C. Hindman and others. Argonne National Lab., Lemont, Ill. May 1953. Decl. with deletions Feb. 6, 1957. Contract W-31-109-Eng-38. 18p. Order from LC. Mi \$2.40, ph \$3.30. ANL-5037(Del.)

Chemical Engineering Division summary report - July, August, and September 1955. Argonne National Lab., Lemont, Ill. Nov. 1955. Decl. with deletions Feb. 5, 1957. Contract W-31-109-Eng-38. 117p. Order from LC. Mi \$6.00, ph \$18.30. ANL-5494(Del.)

Transfer of plutonium hexafluoride in the vapor phase, by M. D. Adams, R. K. Steunenber, and R. C. Vogel. Argonne National Lab., Lemont, Ill. October 1957. Contract W-31-109-Eng-38. 14p. Order from OTS. 50 cents. ANL-5796

Plutonium isolation flowsheet, by E. B. Sheldon. Oak Ridge National Lab., Tenn. June 1951. Decl. Feb. 20, 1957. Contract W-7405-Eng-26. 7p. Order from LC. Mi \$2.40, ph \$3.30. CF-51-6-15

Homogeneous reactor chemical processing. Quarterly report for period ending March 31, 1952, by D. E. Ferguson. Oak Ridge National Lab., Tenn. March 1952. Decl. Feb. 20, 1957. Contract W-7405-Eng-26. 23p. Order from LC. Mi \$2.70, ph \$4.80. CF-52-3-215

Economics of chemical processing for a uranium-233 breeder, by Don E. Ferguson and John P. Sanders. Oak Ridge National Lab., Tenn. June 1953. Decl. Mar. 12, 1957. Contract W-7405-Eng-26. 25p. Order from LC. Mi \$2.70, ph \$4.80. CF-53-6-173

Estimation of radiation intensity to be expected in HR chemical processing, by H. O. Weeren. Oak Ridge National Lab., Tenn. Sep. 1954. Decl. Mar. 12, 1957. Contract W-7405-Eng-26. 12p. Order from LC. Mi \$2.40, ph \$3.30. CF-54-9-106

Unit operations status report for January, 1955, by W. K. Elster. Oak Ridge National Lab., Tenn. Jan. 1955. Decl. Mar. 7, 1957. Contract W-7405-Eng-26. 50p. Order from LC. Mi \$3.30, ph \$7.80. CF-55-1-194(Del.)

HRP-CP: Design calculations for the entrainment separators (S-2 and S-3) for the HRT core processing plant, by William L. Carter. Oak Ridge National Lab., Tenn. May 1956. Contract W-7405-Eng-26. 25p. Order from LC. Mi \$2.70, ph \$4.80. CF-56-5-58

Thorex pilot plant, summary of equipment failures during run HD-15, by J. H. Walker. Oak Ridge National Lab., Tenn. August 1956. Contract W-7405-Eng-26. 11p. Order from LC. Mi \$2.40, ph \$3.30. CF-56-8-176

PHE quarterly progress report - April-June, 1957, by D. I. Sizer and others. Atomics International, a division of North American Aviation, Inc. Canoga Park, Calif. September 1957. Contract AT-11-1-Gen-8. 49p. Order from OTS. \$1.50. NAA-SR-2030

Use of the Higgins continuous ion exchange contactor in recovering uranium from aqueous slurries, by I. R. Higgins. Oak Ridge National Lab., Tenn. October 1956. Decl. September 1, 1957. Contract W-7405-Eng-26. 55p. Order from OTS. \$1.50. ORNL-1918

Summary report: AEC reference fuel-processing plant. Division of Civilian Application, Washington, D. C. October 1957. 32p. Order from OTS. \$1.00. WASH-743

Controlled Thermonuclear Processes

Stability of the pinch, by Marshall Rosenbluth. Los Alamos Scientific Laboratory of the Univ. of California. Los Alamos, N. Mexico. June 1956. Decl. Nov. 12, 1957. Contract W-7405-Eng-36. 35p. Order from OTS. \$1.00. LA-2030

Criticality Studies

Hazards summary report on the oxide critical experiments, by W. C. Redman, J. A. Thie, and L. R. Dates. Argonne National Lab., Lemont, Ill. April 1957. Contract W-31-109-Eng-38. 89p. Order from OTS. \$2.25. ANL-5715

Health and Safety

Reactor Safety Conference. Jointly sponsored by American Nuclear Society, Atomic Industrial Forum and U. S. Atomic Energy Commission. New York City. October 31, 1957. 43p. Order from OTS. 75 cents. TID-7549 (Pt. 1)

The industrial hygiene and toxicology of mercury, by Charles J. Spiegl. Rochester University, New York. January 1957. Contract W-7401-Eng-49. 26p. Order from OTS. 75 cents. UR-469

PWR reactivity accidents, by M. J. Galper. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. June 1957. Contract AT-11-1-Gen-14. 27p. Order from OTS. 75 cents. WAPD-SC-542

Technical photography, documentary. Project 39.4a, by S. A. Anthony and Robert Crook. U. S. Atomic Energy Commission. Washington, D. C. and Los Alamos Scientific Lab., Los Alamos, New Mexico. May 1957. 30p. Order from OTS. 30 cents. WT-1169

Instruments

Testing techniques used in the quality selection of RCA 6810 multiplier phototubes, by Frederick A. Kirsten. California. Univ., Berkeley, Radiation Lab. October 1956. Contract W-7405-Eng-48. 18p. Order from LC. Mi \$2.40, ph \$3.30. UCRL-3430 (Rev.)

The fault diverter-a protective device for high-power electron tubes, by Bob H. Smith. California. Univ., Berkeley, Radiation Lab. August 1957. Contract W-7405-Eng-48. 21p. Order from OTS. 75 cents. UCRL-3701 (Rev.)

An analytical method for correcting the magnetic field of a cyclotron, by James A. Baker and Warren Fenton Stubbins. California Univ. Berkeley. Radiation Lab. August 1957. Contract W-7405-Eng-48. 22p. Order from OTS. 75 cents.
UCRL-3907

Calibration of Mark I fission counter and BF₃ counter, by William Baer. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pa. Jan. 1952. Decl. Mar. 7, 1957. Contract AT-11-1-Gen-14. 15p. Order from LC. Mi \$2.40, ph \$3.30.
WAPD-RM-106

Metallurgy and Ceramics

Metallurgy division quarterly report - January, February, and March 1955. Argonne National Lab., Lemont, Ill. September 1955. Decl. with deletions Feb. 12, 1957. Contract W-31-109-Eng-38. 59p. Order from LC. Mi \$3.90, ph \$10.80.
ANL-5439 (Del.)

A shielded metallograph for remote metallography, by F. L. Brown and others. Argonne National Lab. Lemont, Illinois. October 1957. Contract W-31-109-Eng-38. 33p. Order from OTS. \$1.00.
ANL-5635

Manufacture of the ThO₂-UO₂ ceramic fuel pellets for BORAX-IV, by J. H. Handwerk, C. L. Hoenig, and R. C. Lied. (Final report--Metallurgy program 7.6.6). Argonne National Lab., Lemont, Ill. August 1957. Contract W-31-109-Eng-38. 20p. Order from OTS. 75 cents.
ANL-5678

A study of mechanical-electrolytic polishing on uranium metallographic specimens, by Floyd L. Brown. (Program 6.1.3). Argonne National Lab. Lemont, Ill. January 1957. Contract W-31-109-Eng-38. 19p. Order from OTS. 75 cents.
ANL-5752

The problem of oxidation of uranium in ZPR-6, by R. C. Vogel. Argonne National Lab., Lemont, Ill. November 1956. Decl. Mar. 9, 1957. Contract W-31-109-Eng-38. 2p. Order from LC. Mi \$1.80, ph \$1.80.
ANL-RCV-SL-1120

Progress report for October 1 to October 31, 1948. (Section A. - Fin tube project. Section B. - G. E. washer project). Brush Beryllium Co., Cleveland, Ohio. June 1949. Decl. Mar. 25, 1957. Contract AT-30-Gen-155. 31p. Order from LC. Mi \$2.70, ph \$4.80.
B&C-30

Rolling of uranium, by H. A. Saller, J. R. Keeler, and R. J. Donley. Battelle Memorial Inst., Columbus,

Ohio. December 1952. Decl. with deletions Feb. 12, 1957. Contract W-7405-Eng-92. 38p. Order from LC. Mi \$3.00, ph \$6.30.
BMI-800 (Del.)

Properties of uranium containing minor additions of chromium, silicon, or titanium, by Henry A. Saller, Frank A. Rough, and Walston Chubb. Battelle Memorial Inst., Columbus, Ohio. Jan. 1956. Decl. with deletions Feb. 12, 1957. Contract W-7405-Eng-92. 28p. Order from LC. Mi \$2.70, ph \$4.80.
BMI-1068 (Del.)

Progress relating to civilian applications during July 1956, by Russell W. Dayton and Clyde R. Tipton, Jr. Battelle Memorial Inst., Columbus, Ohio. August 1956. Decl. with deletions Feb. 12, 1957. Contract W-7405-Eng-92. 41p. Order from LC. Mi \$3.30, ph \$7.80.
BMI-1121 (Del.)

Fabrication of dispersed uranium fuel elements using powder-metallurgy techniques, by Stan J. Paprocki, Donald L. Keller, and George W. Cunningham. Battelle Memorial Inst. Columbus, Ohio. May 1957. Decl. Nov. 12, 1957. Contract W-7405-Eng-92. 44p. Order from OTS. \$1.25.
BMI-1184

High-strength materials for pressurized-water in-pile tubes, by Ward F. Simmons and others. Battelle Memorial Inst. Columbus, Ohio. Sept. 1957. Contract W-7405-Eng-92. 56p. Order from OTS. \$1.75.
BMI-1224

Control of particle size in aluminum-uranium alloys, by H. A. Saller, J. R. Keeler and N. S. Eddy. Battelle Memorial Inst., Columbus, Ohio. November 1949. Decl. Nov. 21, 1957. Contract W-7405-Eng-92. 18p. Order from OTS. 50 cents.
BMI-T-16

Fabrication of extruded uranium aluminum rods for CP-3 reactor, by C. E. Center. Oak Ridge National Lab., Tenn. May 1950. Decl. Feb. 14, 1957. Contract W-7405-Eng-26. 8p. Order from LC. Mi \$1.80, ph \$1.80. CF-50-5-102

Summary of laboratory corrosion tests: HI-3 and HI-4, corrosion of 63S aluminum, in contact with lead, by tap water and demineralized water, by E. L. Compere. Oak Ridge National Lab., Tenn. February 1956. Contract W-7405-Eng-26. 5p. Order from LC. Mi \$1.80, ph \$1.80.
CF-56-2-40

HRP dynamic corrosion studies: Summary of run J-76. 0.025 M sulfuric acid at 150°C, by J. C. Griess, R. S. Greeley, and S. R. Buxton. Oak Ridge National Lab., Tenn. Feb. 1956. Contract W-7405-Eng-26. 5p. Order from LC. Mi \$1.80, ph \$1.80.
CF-56-2-100

Linear thermal expansion of four different compositions of Be + BeO, by J. E. Barton and S. D. Fulkerson. Oak Ridge National Lab., Tenn. November 1956. Contract W-7405-Eng-26. 14p. Order from LC. Mi \$2.40, ph \$3.30.

CF-56-11-59

Thermal stresses in clad spheres, by G. W. Brown. California Research and Development Co., Livermore, Calif. November 1952. Decl. Feb. 14, 1957. 12p. Order from LC. Mi \$2.40, ph \$3.30.

CRD-R-2

Progress report on metallurgy of tuballoy to University of Chicago. Battelle Memorial Inst., Columbus, Ohio. November 1943. Decl. April 1, 1957. Contract W-7405-Eng-92. 26p. Order from LC. Mi \$2.70, ph \$4.80.

CT-1104

Progress report on the properties of alloys, by H. W. Russell, H. R. Nelson, and L. H. Grenell. Batelle Memorial Inst., Columbus, Ohio. May 1945. Decl. Feb. 18, 1957. Contract W-7405-Eng-92. 28p. Order from LC. Mi \$2.70, ph \$4.80.

CT-2983

Alloys of uranium and silicon. I. The uranium-silicon phase diagram, by B. D. Cullity. Massachusetts Institute of Tech., Cambridge. June 1945. Decl. Feb. 16, 1957. Contract W-7405-Eng-175. 30p. Order from LC. Mi \$2.70, ph \$4.80.

CT-3310

Supplementary report on the preparation of large magnesia crucibles, (Supplement to report CT-3373), by F. Cunningham, K. Lundell, and A. Zais. Massachusetts Institute of Tech., Cambridge. April 1946. Decl. Feb. 18, 1957. Contract W-7405-Eng-175. 21p. Order from LC. Mi \$2.70, ph \$4.80.

CT-3491

A martensitic reaction for uranium, by A. L. Beament and W. P. Wallace. Hanford Atomic Products Operation. Richland, Wash. June 1957. Contract W-31-109-Eng-52. 28p. Order from OTS. 75 cents.

HW-51084 (Rev.)

Fabrication of a titanium tube heat exchanger, by R. W. Wirta. Hanford Atomic Products Operation. Richland, Wash. August 1957. Contract W-31-109-Eng-52. 28p. Order from OTS. 75 cents.

HW-51998

Tabulation, bibliography, and structure of binary intermetallic compounds. III. Compounds of copper, silver and gold, by H. H. Klepfer

and others. Ames Laboratory at Iowa State College, Ames, Iowa. September 1957. Contract W-7405-Eng-82. 47p. Order from OTS. \$1.25.

ISC-906

Electrowinning of uranium from its oxides. I. Laboratory studies, by L. W. Niedrach and B. E. Dearing. General Electric Co. Knolls Atomic Power Lab., Schenectady, New York. April 1957. Contract W-31-109-Eng-52. 51p. Order from OTS. \$ 1.50.

KAPL-1761

Bubble stirring in a low temperature model of a fused salt electrolysis cell, by R. E. Coffman and L. W. Niedrach. General Electric Co. Knolls Atomic Power Laboratory. Schenectady, N. Y. June 1957. Contract W-31-109-Eng-52. 21p. Order from OTS. 75 cents.

KAPL-1762

Fast oxide breeder - fuel irradiation experiments, by W. M. Cashin. General Electric Co. Knolls Atomic Power Laboratory. Schenectady, N. Y. August 1957. Contract W-31-109-Eng-52. 19p. Order from OTS. 50 cents.

KAPL-1784

Diffusion bonding of SAR, prototype instrumented fuel element transition joints, by S. A. Toftegaard. Knolls Atomic Power Lab., Schenectady, N. Y. March 1957. Contract W-31-109-Eng-52. 10p. Order from LC. Mi \$1.80, ph \$1.80.

KAPL-M-SAT-3

Casting of magnesium oxide in aqueous slips, by S. D. Stoddard, D. T. Doll, and J. M. Taub. Los Alamos Scientific Laboratory of the University of California. Los Alamos, N. Mex. November 1957. Contract W-7405-Eng-36. 44p. Order from OTS. \$1.25.

LA-1846

Development and properties of uranium-base alloys corrosion resistant in high temperature water.

Part II - Alloys with protective cladding, by I. Cohen and others. Westinghouse Electric Corp. Pittsburgh. September 1955. Decl. Nov. 14, 1957. Contract AT-11-1-Gen-14. 159p. Order from OTS. \$4.00.

WAPD-127 Part II.

Effects of irradiation on bulk UO₂, by J. D. Eichenberg and others. Westinghouse Electric Corp. Pittsburgh, Pa. October 1957. Contract AT-11-1-Gen-14. 191p. Order from OTS. \$5.00

WAPD-183

Properties of UO₂, by J. Belle and B. Lustman. Westinghouse Electric Corp., Pittsburg, Pa. Sept. 1957. Contract AT-11-1-Gen-14. 139p. Order from OTS. \$3.75.

WAPD-184

Weight-shape conversion tables for Zircaloy-2, by J. G. Goodwin. Westinghouse Electric Corp. Pittsburgh, Pa. May 1956. Contract AT-11-1-Gen-14. 10p. Order from OTS. 50 cents. WAPD-TM-86

Particle Accelerators and High-Voltage Machines

MTA project accelerator quarterly progress report for September through November 1952. California Research and Development Co. Livermore Research Lab., Livermore, Calif. Dec. 1953. Decl. Mar. 2, 1957. Contract AT-11-1-74. 34p. Order from LC. Mi \$3.00, ph \$6.30. LRL-53

J-16 cyclotron research report. California Univ., Berkeley. Radiation Lab. and California Research and Development Co., Livermore, Calif. September 1951. Decl. Feb. 28, 1957. 54p. Order from LC. Mi \$3.60, ph \$9.30. LWS-12008

Effects of reflector material and lattice thickness on uranium-water lattices, by W. H. Harker. California Research and Development Co., Livermore, Calif. March 1952. Decl. with deletions Feb. 27, 1957. 38p. Order from LC. Mi \$3.00, ph \$6.30. LWS-24317 (Del.)

Design considerations for the water-cooled clad uranium plate, primary and secondary targets of the A-12, by J. E. Mahlmeister and Karl Bernstein. California Research and Development Co., Livermore, Calif. October 1952. Decl. Feb. 26, 1957. 21p. Order from LC. Mi \$2.70, ph \$4.80. LWS-24610

Neutron spectra from a uranium target bombarded with 190 Mev deuterons, by A. V. Shelton. California Research and Development Co., Livermore, Calif. February 1953. Decl. Feb. 27, 1957. 12p. Order from LC. Mi \$2.40, ph \$3.30. LWS-24730

Deuteron and neutron induced activities in NaK coolants, by S. J. Horn. California Research and Development Co., Livermore, Calif. February 1954. Decl. Feb. 26, 1957. 26p. Order from LC. Mi \$2.70, ph \$4.80. LWS-30103

MTA, A-12 development, drift tubes--RF and beam geometry. Comparison of A12 to A-24, by A. Schelberg and S. Kitchen. California Univ., Berkeley, Radiation Lab. November 1952. Decl. Mar. 7, 1957. 4p. Order from LC. Mi \$1.80, ph \$1.80. UCRL-2021

Energy spectrum of deuterons stripped from He³ and the resultant neutron yield, by F. L. Adelman. California Univ., Berkeley. Radiation Lab. March 1953. Decl. Mar. 7, 1957. 7p. Order from LC. Mi \$1.80, ph \$1.80. UCRL-2150

Monthly progress report No. 120 - March 15, 1953 to April 15, 1953. California Univ., Berkeley. Radiation Lab. May 1953. Decl. Mar. 6, 1957. Contract W-7405-Eng-48. 18p. Order from LC. Mi \$2.40, ph \$3.30. UCRL-2200

MTA quarterly progress report - March, April, and May 1953. California Univ., Berkeley. Radiation Lab. August 1953. Decl. Mar. 4, 1957. Contract W-7405-Eng-48. 19p. Order from LC. Mi \$2.40, ph \$3.30. UCRL-2318

MTA progress report - June through November, 1953. California Univ., Berkeley. Radiation Lab. February 1954. Decl. Mar. 25, 1957. Contract W-7405-Eng-48. 46p. Order from LC. Mi \$3.30, ph \$7.80. UCRL-2474

Summary of recent external neutron-yield measurements by the MnSO₄ tank method, by Walter E. Crandall and George P. Millburn. California Univ., Berkeley. Radiation Lab. September 1954. Decl. Mar. 7, 1957. Contract W-7405-Eng-48. 9p. Order from LC. Mi \$1.80, ph \$1.80. UCRL-2705

Millimicrosecond coincidence circuit for high speed counting, by William A. Wenzel. California Univ., Berkeley. Radiation Lab. October 1957. Contract W-7405-Eng-48. 14p. Order from OTS. 75 cents. UCRL-8000

Physics and Mathematics

A table of Wigner 9j coefficients for integral and half-integral values of the parameters, by Kenneth Smith and John W. Stevenson. Argonne National Lab., Lemont, Ill. September 1957. Contract W-31-109-Eng-38. 298p. Order from OTS. \$6.00. ANL-5776

Handbook of constants for selected pile materials. Argonne National Lab., Lemont, Ill. October 1947. Decl. Feb. 13, 1957. Contract W-31-109-Eng-38. 87p. Order from LC. Mi \$4.80, ph \$13.80. ANL-WHZ-122

Elementary particles and weak interactions, by T. D. Lee and C. N. Yang. Brookhaven National Lab., Upton, N. Y. October 1957. 65p. Order from OTS. \$2.00. BNL-443 (T-91)

Gamma energy-absorption coefficient, by Lloyd G. Alexander. Oak Ridge National Lab., Tenn. August 1956. Contract W-7405-Eng-26. 9p. Order from LC. Mi \$1.80, ph \$1.80.

CF-56-8-219

Atmospheric pressure system for determining resuspension velocity of thorium oxide slurries in round horizontal pipes, by D. G. Thomas. Oak Ridge National Lab., Tenn. October 1956. Contract W-7405-Eng-26. 13p. Order from LC. Mi \$2.40, ph \$3.30.

CF-56-10-136

Fast flux distribution in an empty process tube for various sizes of graphite reactor lattice, by J. Martin Tobin. Hanford Atomic Products Operation. Richland, Wash. August 1957. Contract W-31-109-Eng-52. 20p. Order from OTS. 75 cents.

HW-51751

Thermal utilization, thermal flux, and lattice cell shape, by H. Neumann. Hanford Atomic Products Operation. Richland, Wash. August 1957. Contract W-31-109-Eng-52. 47p. Order from OTS. \$1.50.

HW-52048

Minimum risk specification limits, by F. H. Tingey and J. A. Merrill. Phillips Petroleum Co. Idaho Operations Office. Idaho Falls, Idaho. July 1957. Contract AT-10-1-205. 43p. Order from OTS. \$1.25.

IDO-16396

Debye characteristic temperatures table and bibliography, by M. W. Holm. Phillips Petroleum Co. Idaho Operations Office. Idaho Falls, Idaho. August 1957. Contract AT-10-1-205. 29p. Order from OTS. \$1.00.

IDO-16399

Calculation of MTR fuel charges, by H. L. McMurry, G. A. Cazier, and R. W. Goin. Phillips Petroleum Co. Idaho Operations Office. Idaho Falls, Idaho. September 1957. Contract AT-10-1-205. 28p. Order from OTS. \$1.00.

IDO-16401

Nuclear constants and technical references related to plutonium fuel systems, by B. W. Johnson. Phillips Petroleum Co. Idaho Operations Office. Idaho Falls, Idaho. September 1957. Contract AT-10-1-205. 8p. Order from OTS. 50 cents.

IDO-16403

Extrapolated charge life from ingrowth of Xe^{135} , by H. L. McMurry and G. A. Cazier. Phillips Petroleum Co. Idaho Operations Office. Idaho Falls, Idaho. October 1957. Contract AT-10-1-205. 13p. Order from OTS. 75 cents.

IDO-16413

A note on exact and approximate equilibrium time for a square plant, (Addendum), by D. W. Burton. Union Carbide Nuclear Company, division of Union Carbide Corporation. Oak Ridge, Tenn. November 1957. Contract W-7405-Eng-26. 7p. Order from OTS. 50 cents. K-1330, Addendum

Explicit numerical solution of parabolic differential equations, by D. W. Burton. Union Carbide Nuclear Company, division of Union Carbide Corp. Oak Ridge, Tenn. November 1957. Contract W-7405-Eng-26. 28p. Order from OTS. \$1.00.

K-1358

Flow redistribution in a matrix due to boiling, by J. Perry Fraser. Knolls Atomic Power Lab., Schenectady, N. Y. March 1957. Contract W-31-109-Eng-52. 18p. Order from LC. Mi \$2.40, ph \$3.30.

KAPL-M-RES-37

Use of IBM 650 in reduction of foil counting data, by W. B. Leng and A. L. Dodson. Knolls Atomic Power Lab., Schenectady, N. Y. April 1957. Contract W-31-109-Eng-52. 45p. Order from LC. Mi \$3.30, ph \$7.80.

KAPL-M-WBL-1

Particle-in-cell method for hydrodynamic calculations, by Martha W. Evans and Francis H. Harlow. Appendix II by Eleazer Bromberg. Los Alamos Scientific Lab. of the Univ. of California. Los Alamos, N. Mexico. (This report supersedes LAMS-1956 and LAMS-2082, which are now obsolete). November 1957. Contract W-7405-Eng-36. 73p. Order from OTS. \$2.00.

LA-2139

Absolute thermal neutron determination. Part III. Absolute thermal neutron flux, by Moses A. Greenfield, Roscoe L. Koontz, and Alan A. Jarrett. Atomics International, a division of North American Aviation, Inc. Canoga Park, Calif. November 1957. Contract AT-11-1-Gen-8. 13p. Order from OTS. 50 cents.

NAA-SR-1137 (Part III)

The neutron velocity spectrum in a heavy moderator, by E. Richard Cohen. Atomics International, a division of North American Aviation, Inc. Canoga Park, Calif. October 1957. Contract AT-11-1-Gen-8. 39p. Order from OTS. \$1.25.

NAA-SR-1940

Thermal diffusion length in D_2O , by E. R. Cohen. North American Aviation, Inc. Downey, Calif. May 1951. Decl. Mar. 27, 1957. Contract AT-11-1-Gen-8. 14p. Order from LC. Mi \$2.40, ph \$3.30.

NAA-SR-Memo-35

HTR-breeding gain, by C. Roderick. North American Aviation, Inc. Downey, Calif. July 1951. Decl. Feb. 28, 1957. Contract AT-11-1-Gen-8. 16p. Order from LC. Mi \$2.40, ph \$3.30.

NAA-SR-Memo-38

Neutron absorption and radioactivity of commercial sodium and lead exposed to a neutron flux, by C. H. Robbins. North American Aviation, Inc. Downey, Calif. September 1951. Decl. Feb. 27, 1957. 12p. Order from LC. Mi \$2.40, ph \$3.30.

NAA-SR-Memo-100

Thermal stresses in a long composite circular uranium rod, by J. Brandstatter. North American Aviation, Inc. Downey, Calif. January 1952. Decl. Feb. 27, 1957. 7p. Order from LC. Mi \$1.80, ph \$1.80.

NAA-SR-Memo-181

Bevatron operation and development. XII, November, December 1956, January 1957, by Walter D. Hartsough. California University, Berkeley, Radiation Lab. August 1957. Contract W-7405-Eng-48. 18p. Order from OTS. 50 cents.

UCRL-3913

Physics division quarterly report - May, June, July 1957. California University, Berkeley, Radiation Lab. August 1957. Contract W-7405-Eng-48. 58p. Order from OTS. \$1.75.

UCRL-3914

Σ^+ production by Λ^0 hyperons, by Frank S. Crawford, Jr. and others. California University, Berkeley, Radiation Lab. August 1957. Contract W-7405-Eng-48. 12p. Order from OTS. 50 cents.

UCRL-3924

Electromagnetic structure of the nucleon in local-field theory, by Geoffrey F. Chew and others. California University, Berkeley, Radiation Lab. September 1957. Contract W-7405-Eng-48. 35p. Order from OTS. \$1.00.

UCRL-3929

The numerical solution of the time-dependent transport equation in finite cylindrical geometry, by Joseph Fleck. California University, Berkeley, Radiation Lab. August 1957. Contract W-7405-Eng-48. 27p. Order from OTS. \$1.00.

UCRL-4940

Angular correlations in the production and decay of spin-3/2 hyperons, by Richard Spitzer and Henry P. Stapp. California University, Berkeley, Radiation Lab. October 1957. Contract W-7405-Eng-48. 5p. Order from OTS. 50 cents.

UCRL-8005

The Bettis technical review - Vol. 1, No. 4. Reactor physics and mathematics. Westinghouse Electric Corp. Bettis Plant. Pittsburgh, Pa. October 1957. Contract AT-11-1-Gen-14, and appropriate NObs-contracts. 117p. Order from OTS. \$3.25.

WAPD-BT-4

Radiation synthesis of ammonia in a high temperature loop, by Y. Solomon, K. H. Vogel, and P. Cohen. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pa. October 1954. Decl. March 14, 1957. Contract AT-11-1-Gen-14. 36p. Order from LC. Mi \$3.00, ph \$6.30.

WAPD-CP-657

Effect of fins or spacers on heat transfer, local boiling and plate stresses in a system with water flowing turbulently between parallel plates, by J. T. Stiefel. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pa. January 6, 1950. Decl. Mar. 25, 1957. 29p. Order from LC. Mi \$2.70, ph \$4.80.

WAPD-EM-2

Numerical computations for the determination of temperature distribution in spherical pellets, by Ruth E. Goodman. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pa. February 1954. Decl. Mar. 7, 1957. Contract AT-11-1-Gen-14. 19p. Order from LC. Mi \$2.40, ph \$3.30.

WAPD-RM-222

WANDA - A one-dimensional few-group diffusion equation code for the IBM-704. Addendum by Orville J. Marlowe and Ely M. Gelbard. Westinghouse Electric Corp. Bettis Plant-Pittsburgh, Pa. September 1957. Contract AT-11-1-Gen-14. 5p. Order from OTS. 50 cents.

WAPD-TM-28-Addendum

Progress Reports

Quarterly progress report - April 1 - June 30, 1957. Brookhaven National Laboratory. Associated Universities, Inc. Upton, New York. 43p. Order from OTS. \$1.50.

BNL-455 (S-36)

Quarterly report to the Atomic Energy Commission, for the period July 1, 1957 to September 30, 1957. Midwestern Universities Research Association. Madison, Wisconsin. October 1, 1957. 8p. Order from OTS. 50 cents.

MURA No. 374

Radiation Effects on Materials

Chemistry division, Section C-II summary report for April, May, and June 1948. Argonne National Lab., Lemont, Ill. Feb. 10, 1949. Decl. with deletions Feb. 12, 1957. Contract W-31-109-Eng-38. 60p. Order from LC. Mi \$3.60, ph \$9.30.

ANL-4232 (Del.)

Chemistry division, Section C-II summary report for July, August, and September 1952, by J. R. Gilbreath and O. C. Simpson, comps. Argonne National Lab., Lemont, Ill. January 1953. Decl. with deletions Feb. 12, 1957. Contract W-31-109-Eng-38. 75p. Order from LC. Mi \$4.50, ph \$12.30. ANL-5000 (Del.)

Chemistry division summary report for January to June 1953, by J. R. Gilbreath, D. W. Osborne, and A. F. Martin, comps. Argonne National Lab., Lemont, Ill. March 1955. Decl. with deletions Feb. 11, 1957. Contract W-31-109-Eng-38. 47p. Order from LC. Mi \$3.30, ph \$7.80. ANL-5411 (Del.)

Stored energy in BNL reactor graphite, by J. Chernick. Brookhaven National Lab., Upton, N. Y. February 1953. Decl. with deletions Feb. 12, 1957. Contract AT-30-2-Gen-16. 13p. Order from LC. Mi \$2.40, ph \$3.30. BNL-1895 (Del.)

Life expectancy of organic gasket material at the transition-precursor position within the Mark I accelerator shielding, by S. G. Zizzo and W. E. Browning, Jr. California Research and Development Co., Livermore, Calif. Jan. 15, 1953. Decl. Feb. 28, 1957. 6p. Order from LC. Mi \$1.80, ph \$1.80. LWS-22505

NAA graphite summary to November 1, 1951, by R. L. Carter. North American Aviation, Inc. Downey, Calif. November 1951. Decl. Feb. 27, 1957. Contract AT-11-1-Gen-8. 13p. Order from LC. Mi \$2.40, ph \$3.30. NAA-SR-Memo-129

Physics of Solids Institute quarterly progress report for period ending April 30, 1951, by D. S. Billington and J. T. Howe, eds. Oak Ridge National Lab., Tenn. November 1951. Decl. Mar. 5, 1957. Contract W-7405-Eng-26. 122p. Order from LC. Mi \$6.30, ph \$19.80. ORNL-1095

Radioactive Waste

Waste and disposal system, by J. E. Kuster. Oak Ridge National Lab., Tenn. October 1956. Contract W-7405-Eng-26. 11p. Order from LC. Mi \$2.40, ph \$3.30. CF-56-10-15

HRT waste tank evaporator sampler, by J. E. Kuster and C. A. Burchsted. Oak Ridge National Lab., Tenn. October 1956. Contract W-7405-Eng-26. 4p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-10-16

The coupled aspects of a fast-thermal critical: ZPR-V, by B. J. Toppel and others. Argonne National Lab., Lemont, Ill. October 1957. Contract W-31-109-Eng-38. 20p. Order from OTS. 75 cents. ANL-5775

Hazard summary report on the experimental boiling water reactor (EBWR), by J. M. West and others. Argonne National Lab., Lemont, Ill. 1957. Contract W-31-109-Eng-38. 237p. Order from OTS. \$5.50. ANL-5781

Design and operation of a sodium-to-lithium-to-air heat transfer system, by A. R. Crocker and others. General Electric Company. Aircraft Nuclear Propulsion Department. Cincinnati, Ohio. Work carried out during period - Sept. 1949 to June 1953. Published August 1957. 195p. Order from OTS. \$5.00. APEX-327

Conversion ratio as a function of radius in a thorium breeder, by M. Tobias. Oak Ridge National Lab., Tenn. January 1953. Decl. Feb. 14, 1957. Contract W-7405-Eng-26. 8p. Order from LC. Mi \$1.80, ph \$1.80. CF-53-1-323

ORR project progress report No. 20, by J. P. Gill and T. E. Cole. Oak Ridge National Lab., Tenn. November 1956. Contract W-7405-Eng-26. 10p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-11-105

Instrument and electrical standard practices for MTR and ETR. Edited by L. H. Jones. Phillips Petroleum Co. Idaho Operations Office. Idaho Falls, Idaho. August 1957. Contract AT-10-1-205. 40p. Order from OTS. \$1.50. IDO-16395

Parameters of high flux testing reactors, by R. J. Howerton, G. H. Hanson, and W. P. Conner. Phillips Petroleum Co. Idaho Operations Office. Idaho Falls, Idaho. August 1957. Contract AT-10-1-205. 33p. Order from OTS. \$1.50. IDO-16406

Low frequency induction heating design for the organic moderated reactor experiment, by R. B. Hall and A. M. Elmore. Atomics International, a division of North American Aviation, Inc. Canoga Park, California. November 1957. Contract AT-04-3-88. 30p. Order from OTS. 75 cents. NAA-SR-2005

Flattened vs uniformly loaded core, by A. Benton. North American Aviation, Inc., Downey, Calif. January 1952. Decl. Mar. 22, 1957. Contract AT-11-1-Gen-8. 7p. Order from LC. Mi \$1.80, ph \$1.80. NAA-SR-Memo-203

Additional preliminary calculations of flux distributions in converter reactor cells, by A. Benton. North American Aviation, Inc., Downey, Calif. March 1952. Decl. Mar. 4, 1957. Contract AT-11-1-Gen-8. 13p. Order from LC. Mi \$2.40, ph \$3.30. NAA-SR-Memo-266

Use of thorium for flux measurements in the converter reactor mock-up, by D. H. Martin. North American Aviation, Inc., Downey, Calif. October 1952. Decl. Feb. 27, 1957. Contract AT-11-1-Gen-8. 8p. Order from LC. Mi \$1.80, ph \$1.80. NAA-SR-Memo-488

UPR instrumentation, by F. L. Fillmore and E. Matlin. North American Aviation, Inc. Downey, Calif. March 1953. Decl. Mar. 1, 1957. 24p. Order from LC. Mi \$3.00, ph \$6.30. NAA-SR-Memo-640

Filling R area storage tank with heavy water, by C. L. Howard and E. C. Bertsche. E. I. du Pont de Nemours & Co. Savannah River Lab. Augusta, Ga. June 1954. Decl. Mar. 7, 1957. Contract AT-07-2-1. (DPSP-54-25-18). 11p. Order from LC. Mi \$2.40, ph \$3.30. TID-5371

Noise level of external hydraulic systems. NYX test No. 1,2,5., by Bruce Longtin. E. I. du Pont de Nemours & Co. Atomic Energy Div., Wilmington, Delaware. April 1953. Decl. Mar. 7, 1957. Contract AT-07-2-1. (DPXN-208). 21p. Order from LC. Mi \$2.70, ph \$4.80. TID-5392

Pressure drop for short flat plate fuel elements, by J. E. Zerbe and H. S. Jacket. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pa. November 1953. Decl. Mar. 8, 1957. Contract AT-11-1-Gen-14. 13p. Order from LC. Mi \$2.40, ph \$3.30. WAPD-ReC(A)-35

Reactors—Power

Reactor Engineering Division report for period March 1, 1948 thru November 30, 1948. Argonne National Lab., Lemont, Ill. February 1949. Decl. Mar. 28, 1957. Contract W-31-109-Eng-38. 66p. Order from LC. Mi \$3.90, ph \$10.80. ANL-4238

Experimental breeder reactor project. Report for period February 1, 1950 through March 31, 1951, by R. A. Cameron and others. Argonne National Lab., Lemont, Ill. April 1951. Decl. Jan. 17, 1957. Contract W-31-109-Eng-38. 59p. Order from LC. Mi \$3.80, ph \$9.30. ANL-4554

Performance and potential of natural circulation boiling reactors, by W. S. Flinn and M. Petrick. Argonne National Lab., Lemont, Ill. October 1957. Contract W-31-109-Eng-38. 45p. Order from OTS. \$1.25. ANL-5720

Supplementary model studies of flow distribution in the core of the PWR reactor, by Lawrence J. Flanagan and Herbert R. Hazard. Battelle Memorial Inst., Columbus, Ohio. October 1957. Contract W-7405-Eng-92. 35p. Order from OTS. \$1.25. BMI-1229

LMFR progress letter for February 1956, by F. T. Miles. Brookhaven National Lab., Upton, N. Y. March 1956. Decl. Feb. 18, 1957. 3p. Order from LC. Mi \$1.80, ph \$1.80. BNL-2739

Cooling tower reactor, by J. P. Sanders and P. N. Haubenreich. Oak Ridge National Lab., Tenn. October 1953. Decl. Mar. 21, 1957. Contract W-7405-Eng-26. 21p. Order from LC. Mi \$2.70, ph \$4.80. CF-53-10-185

Abrasion test of thoria pellets, by I. Spiewak and J. A. Hafford. Oak Ridge National Lab., Tenn. March 1954. Decl. Feb. 14, 1957. Contract W-7405-Eng-26. 7p. Order from LC. Mi \$1.80, ph \$1.80. CF-54-3-44

HRT process flowsheets. Revision 1, by F. C. Zapp. Oak Ridge National Lab., Tenn. August 1955. Decl. Mar. 16, 1957. Contract W-7405-Eng-26. 28p. Order from LC. Mi \$2.70, ph \$4.80. CF-55-5-156 (Rev. 1)

Breeding ratio and chemical processing method, by Paul R. Kasten. Oak Ridge National Lab., Tenn. September 1955. Decl. Feb. 16, 1957. Contract W-7405-Eng-26. 15p. Order from LC. Mi \$2.40, ph \$3.30. CF-55-9-4

HRT corrosion sample holders, by F. C. Zapp. Oak Ridge National Lab., Tenn. February 1956. Contract W-7405-Eng-26. 4p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-2-35

- HRP-CP: Instrument interlocks for the HRT Chemical Processing Plant, by William L. Carter. Oak Ridge National Lab., Tenn. February 1956. Contract W-7405-Eng-26. 6p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-2-99
- Feedwater pump tests. Experiment No. V A-3, by W. D. Burch and B. H. Hamling. Oak Ridge National Lab., Tenn. February 1956. Contract W-7405-Eng-26. 8p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-2-159
- Pressure drop calibration of fuel heat exchanger. HRT report No. 1 A(4)a, by J. R. Engel. Oak Ridge National Lab., Tenn. March 1956. Contract W-7405-Eng-26. 9p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-3-14
- HRP-CP: Design of condensers H-1 and H-2 for HRT Chemical Processing Plant, by William L. Carter. Oak Ridge National Lab., Tenn. March 1956. Contract W-7405-Eng-26. 17p. Order from LC. Mi \$2.40, ph \$3.30. CF-56-3-138
- Hydraulic test of ORR dummy fuel element, by E. S. Bettis. Oak Ridge National Lab., Tenn. April 1956. Contract W-7405-Eng-26. 9p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-4-27
- Air-cooled condenser steam system. HRT engineering test procedure V 5, by J. L. Gory and H. E. Williamson. Oak Ridge National Lab., Tenn. April 1956. Contract W-7405-Eng-26. 8p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-4-98
- Procedure for performance test of turbine condenser and associated equipment. HRT test V A 2, a, b, c, by J. O. Kolb and R. E. Brooksbank. Oak Ridge National Lab., Tenn. April 1956. Contract W-7405-Eng-26. 7p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-4-140
- HRT cooling water system evaluation--results of HRT engineering tests VI A-2, 3, 4, 5, B-1 a, b and B-3, by R. E. Brooksbank. Oak Ridge National Lab., Tenn. April 1956. Contract W-7405-Eng-26. 5p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-4-194
- HRT modified pressurizer design, by Carlyle Michelson. Oak Ridge National Lab., Tenn. May 1956. Contract W-7405-Eng-26. 27p. Order from LC. Mi \$2.70, ph \$4.80. CF-56-5-165
- Efficiency of fuel system entrainment separator during normal operation. HRT report 11 A (7c)b. Work period: Sept. 27, 1955 - Nov. 25, 1955. By Paul N. Haubenreich and others. May 1956. Contract W-7405-Eng-26. 5p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-5-167
- Feed pump and purge water flow measurements, by P. H. Harley. Oak Ridge National Lab., Tenn. May 1956. Contract W-7405-Eng-26. 5p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-5-169
- Pressure shell stress analysis HRR, by M. C. Lawrence. Oak Ridge National Lab., Tenn. May 1956. Contract W-7405-Eng-26. 12p. Order from LC. Mi \$2.40, ph \$3.30. CF-56-5-188
- Gaseous radioactivity from HRT fuel storage tanks, by R. F. Aven. Oak Ridge National Lab., Tenn. June 1956. Contract W-7405-Eng-26. 20p. Order from LC. Mi \$2.40, ph \$3.30. CF-56-6-142
- Design section monthly report for September 1956, by W. R. Gall and M. I. Lundin. Oak Ridge National Lab., Tenn. September 1956. Contract W-7405-Eng-26. 8p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-9-111
- Heat-power cycles and prime movers for nuclear power plants, by R. C. Robertson. Oak Ridge National Lab., Tenn. October 1956. Contract W-7405-Eng-26. 88p. Order from LC. Mi \$4.80, ph \$13.80. CF-56-10-77
- Effect of HRT-CP cooling water requirements on the reactor circulating loop, by R. E. Brooksbank. Oak Ridge National Lab., Tenn. November 1956. Contract W-7405-Eng-26. 5p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-11-57
- HRT source handling facilities, by C. A. Burchsted and C. L. Segaser. Oak Ridge National Lab., Tenn. November 1956. Contract W-7405-Eng-26. 5p. Order from LC. Mi \$1.80, ph \$1.80. CF-56-11-58
- Shippingport Atomic Power Station organization and training, by C. F. Jones. Shippingport Atomic Power Station. Shippingport, Pa. May 1957. Contract AT-11-1-292. 68p. Order from OTS. \$1.75. DL-S-191

Summary of performance calculations for PuP, by C. Trilling and E. Weisner. North American Aviation, Inc., Downey, Calif. September 1951. Decl. Feb. 28, 1957. Contract AT-11-1-Gen-8. (Supersedes NAA-SR-Memo-67). 7p. Order from LC. Mi \$1.80, ph \$1.80.

NAA-SR-Memo-92

Proposal for the first UO₂ HT-1 test, by J. H. Bach. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pa. May 1955. Decl. Mar. 5, 1957. 11p. Order from LC. Mi \$2.40, ph \$3.30.

WAPD-FE-770

Description of the Shippingport Atomic Power Station. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. June 1957. Contract AT-11-1-Gen-14. 144p. Order from OTS. \$3.75.

WAPD-PWR-970

Selection and application of materials for the PWR reactor plant, by H. Mason. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. July 1957. Contract AT-11-1-Gen-14. 37p. Order from OTS. \$1.00.

WAPD-PWR-971

Shippingport Atomic Power Station inspection and test program, by A. L. Bethel and others. Westinghouse Electric Corp. July 1957. Contract AT-11-1-Gen-14. 51p. Order from OTS. \$1.50.

WAPD-PWR-972

Development of Shippingport Atomic Power Station operating procedures, by Reuel F. Stratton. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. May 1957. Contract AT-11-1-Gen-14. 44p. Order from OTS. \$1.25.

WAPD-PWR-973

Pressure vessel and piping codes applicable to the PWR reactor plant, by J. F. Dobinsky, M. B. Andrew and T. R. Moffette. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. May 1957. Contract AT-11-1-Gen-14. 16p. Order from OTS. 50 cents.

WAPD-PWR-974

PWR hazards summary report. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. September 1957. Contract AT-11-1-Gen-14. 135p. Order from OTS. \$3.75.

WAPD-SC-541

Zirconium-water reaction data and application to PWR loss-of-coolant accident, by B. Lustman. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. May 1957. Contract AT-11-1-Gen-14. 47p. Order from OTS. \$1.25.

WAPD-SC-543

PWR loss-of-coolant accident-core meltdown calculations, by L. M. Swartz, A. W. Lemmon, Jr. and L. E. Hulbert. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. May 1957. Contract AT-11-1-Gen-14. 86p. Order from OTS. \$2.25.

WAPD-SC-544

Hydrogen flammability data and application to PWR loss-of-coolant accident, by Dr. Z. M. Shapiro and T. R. Moffette. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. September 1957. Contract AT-11-1-Gen-14. 26p. Order from OTS. 75 cents.

WAPD-SC-545

Safeguards aspects of PWR reactor coolant chemistry, by Dr. W. T. Lindsay and members of the PWR Chemistry Section. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. n. d. Contract AT-11-1-Gen-14. 23p. Order from OTS. 75 cents.

WAPD-SC-546

Description of the Shippingport Atomic Power Station site and surrounding area, by R. J. McAllister, W. B. Wirth, and T. B. Harris, Jr. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. June 1957. Contract AT-11-1-Gen-14. 39p. Order from OTS. \$1.00.

WAPD-SC-547

Hazards to the area surrounding PWR due to atmospheric diffusion of radioactivity, by R. F. Valentine. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. September 1957. Contract AT-11-1-Gen-14. 85p. Order from OTS. \$2.25.

WAPD-SC-548

PWR plant container sizing criteria, studies of transient temperature and pressure in plant container following primary coolant system rupture, by R. M. Rome and T. R. Moffette. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. June 1957. Contract AT-11-1-Gen-14. 38p. Order from OTS. \$1.00.

WAPD-SC-549

Effect of length-to-diameter ratio on burnout heat flux for rectangular, vertical Zircaloy-2 channels, by R. A. DeBortoli, H. S. Jacket, and J. D. Roarty. Westinghouse Electric Corp. Atomic Power Div. Pittsburgh, Pa. March 1955. Decl. Mar. 7, 1957. 7p. Order from LC. Mi \$1.80, ph \$1.80.

WAPD-TH-50

Stable Isotope Separation

Analysis of vent gases from the fractionation unit, by D. A. McCaulay and W. L. Rittschof. Standard Oil Co. of Indiana, Chicago. July 1945. Decl. Feb. 12, 1957. Contract W-7418-Eng-41. 20p. Order from LC. Mi \$2.40, ph \$3.30. A-2352

U. S. DEPARTMENT OF COMMERCE FIELD OFFICES

SERVE THE BUSINESS COMMUNITY

The Department of Commerce maintains Field Offices to enable the business community to avail itself locally of Government facilities designed to promote commerce. Working closely with various units in the Department and, when necessary, with other Government agencies, the Field Offices provide business services to manufacturers, wholesalers, retailers, trade publications, trade associations, advertising agencies, research groups, financial institutions, and exporters and importers.

Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field offices act as official sales agents of the Superintendent of Documents, and maintain an extensive business reference library containing periodicals, directories, publications and reports from official as well as private sources.

Among the many services which businessmen have found of value are:

GENERAL

- Management and business aids
- Establishing a new business

BASIC ECONOMIC DATA

- Census data, with national and often State and regional breakdowns, on manufacturing, wholesaling, retailing, service industries, employment and unemployment, population, housing, agriculture
- Basic records of national income and product, regional trends, balance of payments, foreign aid

MARKETING AND DISTRIBUTION

- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

COOPERATIVE OFFICES

To make the services of the Department of Commerce more widely available, agreements have been entered into with more than 750 Chambers of Commerce, Manufacturers Associations, and similar business groups under which these organizations have become official Cooperative Offices of the Department. If specific information is not on hand in the Cooperative Office, your problem will be referred to the nearest Departmental field office.

Department Field Offices

ALBUQUERQUE, N. MEX., Post Office Bldg.

ATLANTA 3, GA., 66 Luckie Street NW.

BOSTON 9, MASS., Post Office and Courthouse

BUFFALO 3, N. Y., 117 Ellicott Street

CHARLESTON 4, S. C., Sergeant Jasper Bldg., West End
Broad Street

CHEYENNE, WYO., Federal Office Bldg.

CHICAGO 6, ILL., 226 West Jackson Blvd.

CINCINNATI 2, OHIO, Post Office and Courthouse

CLEVELAND 14, OHIO, 1100 Chester Avenue

DALLAS, TEX., 500 South Ervay Street

DENVER 2, COLO., New Custom House

DETROIT 26, MICH., Federal Bldg.

GREENSBORO, N. C., Post Office Bldg.

HOUSTON 2, TEX., 430 Lamar Avenue

JACKSONVILLE 1, FLA., Federal Bldg.

KANSAS CITY 6, MO., Federal Office Bldg.

LOS ANGELES 15, CALIF., 1031 South Broadway

MEMPHIS 3, TENN., 22 North Front Street

MIAMI 32, FLA., 300 NE. First Avenue

MINNEAPOLIS 1, MINN., Metropolitan Bldg.

NEW ORLEANS 12, LA., 333 St. Charles Avenue

NEW YORK 17, N. Y., 110 E. 45th Street

PHILADELPHIA 7, PA., 1015 Chestnut Street

PHOENIX, ARIZ., 137 N. Second Avenue

PITTSBURGH 22, PA., 107 Sixth Street

PORTLAND 4, OREG., Old U. S. Courthouse

RENO, NEV., 1479 Wells Avenue

RICHMOND 19, VA., 1103 East Main Street

ST. LOUIS 1, MO., New Federal Bldg.

SALT LAKE CITY 1, UTAH, 222 S. W. Temple Street

SAN FRANCISCO 11, CALIF., 555 Battery Street

SAVANNAH, GA., U. S. Courthouse and Post Office Bldg.

SEATTLE 4, WASH., Federal Office Bldg.

For local telephone listing, consult section devoted to U. S. Government

OFFICIAL BUSINESS

LIBRARY OF CONGRESS

Bibliographies of Foreign
Technical Literature

MONTHLY LIST OF RUSSIAN ACCESSIONS

A record of technical and other publications in the Russian language issued in and outside the Soviet Union currently received by the Library of Congress and a group of cooperating libraries. For sale by Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., \$9 a year (\$2 additional for foreign mailing).

EAST EUROPEAN ACCESSIONS LIST

A monthly record of technical and other monographic publications issued after 1944 and periodical publications issued after 1950 currently received by the Library of Congress and certain other American libraries. Publications in the languages of Albania, Bulgaria, Czechoslovakia, Estonia, Hungary, Latvia, Lithuania, Poland, Rumania, and Yugoslavia are included. For sale by Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., \$10 a year (\$2.50 additional for foreign mailing).