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R. S. Burns

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INDEXED BIBLIOGRAPHY ON TRANSPORTATION
AND HANDLING OF RADIOACTIVE MATERIALS

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JUNE 1967

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OAK RIDGE, TENNESSEE
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FOREWORD

THE NUCLEAR SAFETY INFORMATION CENTER WAS ESTABLISHED IN MARCH 1963 AT THE OAK RIDGE NATIONAL LABORATORY UNDER THE SPONSORSHIP OF THE U.S. ATOMIC ENERGY COMMISSION TO SERVE AS A FOCAL POINT FOR THE COLLECTION, STORAGE, EVALUATION, AND DISSEMINATION OF NUCLEAR SAFETY INFORMATION. A SYSTEM OF KEYWORDS IS USED TO INDEX THE INFORMATION CATALOGUED BY THE CENTER. THE TITLE, AUTHORS, INSTALLATION, ABSTRACT AND KEYWORDS FOR EACH DOCUMENT REVIEWED IS RECORDED ON MAGNETIC TAPE AT THE CENTRAL COMPUTER FACILITY IN OAK RIDGE. THE REFERENCES ARE CATALOGUED ACCORDING TO THE FOLLOWING CATEGORIES

1. GENERAL SAFETY CRITERIA
2. SITING OF NUCLEAR FACILITIES
3. TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS
4. AEROSPACE SAFETY
5. ACCIDENT ANALYSIS
6. REACTOR TRANSIENTS, KINETICS, AND STABILITY
7. FISSION PRODUCT RELEASE, TRANSPORT, AND REMOVAL
8. SOURCES OF ENERGY RELEASE UNDER ACCIDENT CONDITIONS
9. NUCLEAR INSTRUMENTATION, CONTROL, AND SAFETY SYSTEMS
10. ELECTRICAL POWER SYSTEMS
11. CONTAINMENT OF NUCLEAR FACILITIES
12. PLANT SAFETY FEATURES
13. RADIOCHEMICAL PLANT SAFETY
14. RADIONUCLIDE RELEASE AND MOVEMENT IN THE ENVIRONMENT
15. ENVIRONMENTAL SURVEYS, MONITORING AND RADIATION EXPOSURE OF MAN
16. METEOROLOGICAL CONSIDERATIONS
17. OPERATIONAL SAFETY AND EXPERIENCE
18. SAFETY ANALYSIS AND DESIGN REPORTS
19. BIBLIOGRAPHIES

THIS BIBLIOGRAPHY WAS SELECTED FROM CATEGORY 3, TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS, OF THE COMPUTER FILES OF NSIC.

COMPUTER PROGRAMS HAVE BEEN DEVELOPED WHICH ENABLE NSIC TO (1) PRODUCE A QUARTERLY INDEXED BIBLIOGRAPHY OF ITS ACCESSIONS (ISSUED WITH ORNL-NSIC REPORT NUMBERS), (2) OPERATE A ROUTINE PROGRAM OF SELECTIVE DISSEMINATION OF INFORMATION (SDI) TO INDIVIDUALS ACCORDING TO THEIR PARTICULAR PROFILE OF INTEREST AND (3) MAKE RETROSPECTIVE SEARCHES OF THE REFERENCES ON THE TAPES.

OTHER SERVICES OF THE CENTER INCLUDE PRINCIPALLY (1) PREPARATION OF STATE-OF-THE-ART REPORTS (ISSUED WITH ORNL-NSIC REPORT NUMBERS), (2) PREPARATION OF THE QUARTERLY TECHNICAL PROGRESS REVIEW, NUCLEAR SAFETY, (3) ANSWERING TECHNICAL INQUIRIES AS TIME IS AVAILABLE, AND (4) COUNSEL AND GUIDANCE ON NUCLEAR SAFETY PROBLEMS.

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INTRODUCTION

THE PAST YEAR HAS SEEN A TREMENDOUS SURGE IN THE PLANNING AND COMMITMENT OF PRIVATE MONIES TO INCREASING THE NUCLEAR-POWERED ELECTRIC GENERATING CAPACITY IN THE UNITED STATES. CURRENT ESTIMATES PLACE OUR INSTALLED NUCLEAR CAPACITY AT AROUND 100,000 KW BY 1980, DOUBLE THE ESTIMATE MADE IN 1962. EACH REACTOR WILL BE PRODUCING LARGE QUANTITIES OF SPENT FUEL WHICH WILL HAVE TO BE TRANSPORTED TO PROCESSING PLANTS, MANY OF WHICH WILL BE LOCATED REMOTELY FROM THE REACTOR SITE. THE U.S. ATOMIC ENERGY COMMISSION HAS FORESEEN POTENTIAL PROBLEMS IN THE AREA OF TRANSPORTATION SAFETY AND HAS FUNDED PROJECTS TO DEFINE AND RESOLVE THEM.

IT IS WITHIN THIS FRAMEWORK THAT ORNL HAS BEEN ASKED TO DEVELOP A CRITERIA AGAINST WHICH NEWLY DESIGNED SHIPPING CONTAINERS MAY BE JUDGED. THE PRIMARY BASIS OF THE CASK CRITERIA, WHICH IS PRESENTLY UNDER DEVELOPMENT, ARE THE AEC REGULATIONS GOVERNING THE TRANSPORTATION OF RADIOACTIVE MATERIAL, DATA DEVELOPED FROM EXPERIMENTAL PROGRAMS, DEFENSIBLE THEORETICAL TREATMENTS, AND GOOD ENGINEERING JUDGMENT.

ONE OF OUR FIRST TASKS WAS TO CARRY OUT A COMPLETE LITERATURE SEARCH IN THE FIELD OF TRANSPORTATION AND STORAGE. THE RESULTING INFORMATION, WHICH IS BEING USED TO FURTHER THE ORNL PROGRAM NEEDS, WAS JUDGED TO BE OF SUCH INTEREST TO ALL PERSONNEL CONCERNED WITH SHIPPING AND STORAGE OF RADIOACTIVE MATERIAL, AS TO WARRANT PUBLICATION.

PREVIOUS LITERATURE SEARCHES HAVE BEEN CARRIED OUT AND PUBLISHED IN FRAGMENTED FORM. THIS REPORT IS THE MOST COMPLETE ISSUED ON THE SUBJECT TO DATE. EACH DOCUMENT IS ABSTRACTED AND INDEXED BY THE AUTHORS NAME AND A SERIES OF KEYWORDS. THIS LATTER METHOD OF REFERENCING SHOULD BE QUITE USEFUL TO PEOPLE DESIRING INFORMATION ABOUT SPECIFIC PARTS OF THE ENTIRE TRANSPORTATION SUBJECT. AN INDEX BY REPORT NUMBER IS ALSO PROVIDED.

THIS REPORT CONTAINS ABSTRACTS OF ARTICLES DEALING WITH SHIPPING CONTAINERS, SHIPPING REGULATIONS, CRITICALITY SAFETY AS RELATED TO SHIPPING AND HANDLING, TRANSPORTATION ACCIDENTS, AND ALL OTHER ITEMS DEALING WITH SAFETY DURING THE TRANSPORTATION AND/OR HANDLING OF RADIOACTIVE MATERIALS. THE TYPE OF DOCUMENTS REFERENCED INCLUDE TOPICAL AND PROGRESS REPORTS, TRANSACTIONS, JOURNAL ARTICLES, LICENSING AND REGULATORY MATERIAL, AND PATENTS.

AS WITH ANY PROJECT OF THIS KIND THERE MAY BE SOME UNINTENTIONAL OMISSIONS, AND FOR THESE WE APOLOGIZE IN ADVANCE. WE WOULD ENCOURAGE ANYONE WHO KNOWS OF ANY APPLICABLE REPORT IN THIS FIELD TO TRANSMIT THIS INFORMATION TO THE NUCLEAR SAFETY INFORMATION CENTER FOR INCLUSION IN OUR COMPUTER FILE AND IN SUBSEQUENT BIBLIOGRAPHIES OF THIS NATURE.

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BATTELLE MEMORIAL INSTITUTE

PARTS AND METHOD OF INDEXING ABSTRACTS

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-03264 REDDI MM
STRUCTURAL INTEGRITY OF SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS. PART II. SOME ASPECTS OF FIRE SIMULATION IN SHIPPING CONTAINER STUDIES
FRANKLIN INSTITUTE LABORATORIES FOR RESEARCH AND DEVELOPMENT, PHILADELPHIA
21 PAGES- FEBRUARY 1964, NYO-2539-1

SIMULATION OF FIRE DAMAGE IN SHIPPING CONTAINERS IS DISCUSSED. MODELING REQUIREMENTS FOR SIMULATING FIRES, HEAT TRANSFER, AND THERMOELASTIC DEFORMATIONS WERE DERIVED. THE RESULTS SHOWED THAT TRUE MODELING OF A FIRE IS NOT POSSIBLE. HOWEVER, IF CONDUCTION AND CONVECTION ARE NEGLECTED AND THERMAL RADIATION ALONE IS CONSIDERED TO BE THE ENERGY TRANSPORT MECHANISM IN THE FIRE, THEN MODELING OF STEADY-STATE THERMO-ELASTIC STRAIN IS SHOWN TO BE POSSIBLE WHEN MODEL AND PROTOTYPE BCUNDARY TEMPERATURES ARE ALIKE.

*SHIPPING CONTAINER + *TEST, PROOF

3-03298 MCKOWN DA
DOSE RATES, ACTIVITY, AND SHIELDING TRANSMISSION FACTORS FOR U 235 FISSION PRODUCTS AFTER SHORT IRRADIATION
LOS ALAMOS SCIENTIFIC LABORATORY
24 PAGES, 13 TABLES- MARCH 6, 1964, LAMS-2963

IN THE HANDLING AND SHIPPING OF FISSION PRODUCTS PRODUCED IN ROVER TESTS THERE OFTEN IS A NEED FOR SOME CONVENIENT BASIS UPON WHICH TO MAKE ROUGH CALCULATIONS OF THE ACTIVITY IN CURIES, THE DOSE RATE, AND THE ATTENUATION OF SHIELDING MATERIALS. THE TABULATIONS GIVEN IN THIS REPORT SHOULD BE USEFUL IN MAKING SUCH CALCULATIONS FOR U 235 FISSION PRODUCTS RESULTING FROM SHORT IRRADIATION TIMES.

*DOSE + *TRANSPORTATION AND HANDLING

3-03432 HORN LH
FIRE TEST OF WOODEN JACKET SHIELD FOR RADIOISOTOPE SHIPPING CONTAINER
UNDERWRITERS LABORATORIES, INC., CHICAGO
33 PAGES, 21 FIGURES, 4 TABLES, MARCH 23, 1964, COO-277

A STANDARD 1 HR FIRE TEST HAS BEEN CONDUCTED UPON A DESIGN SAMPLE OF A WOODEN-JACKET SHIELD FOR RADIOISOTOPE SHIPPING CONTAINERS UNDER CONTROLLED CONDITIONS EQUIVALENT TO SIMILIAR TESTS UPON SAFES, RECORD-PROTECTION CABINETS, ETC., WHICH MAY BE EXPOSED TO FIRES IN BUILDINGS, WAREHOUSES, AND COMPARABLE STRUCTURES. THE SHIELD SUCCESSFULLY WITHSTOOD THE TESTS WITHOUT COLLAPSE AND WITHOUT SUBJECTING THE ENCLOSED LEAD BRICKS TO TEMPERATURES EXCEEDING THEIR MELTING POINT.

*FIRE + *SHIPPING CONTAINER + INTEGRITY

3-03496 OLIVER R. + STUBBS FJ
THE DESIGN OF A RADIOACTIVE WASTE STORE
OXFORD UNIVERSITY RADIATION PROTECTION OFFICE, OXFORD, ENGLAND
3 PAGES, 1 FIGURE- HEALTH PHYSICS, 10(2)- 69-71 (FEBRUARY 1964)

THE METHODS FOR HANDLING RADIOACTIVE WASTE MATERIALS AT OXFORD UNIVERSITY ARE DESCRIBED.

*WASTE HANDLING + *WASTE STORAGE

3-03499 LANES S + ROSENBERG T
A COMPUTER PROGRAM FOR CALCULATING NEUTRON INTERACTION BETWEEN CYLINDRICAL STORAGE CONTAINERS
HEALTH AND SAFETY LABORATORY
32 PAGES, 17 FIGURES- FEBRUARY 1963, HASL-126

COMPUTER METHOD AND PROGRAM ARE PRESENTED FOR THE CALCULATION OF NEUTRON INTERACTION BETWEEN CYLINDRICAL STORAGE CONTAINERS HOLDING FISSIONABLE MATERIAL. THE METHOD IS APPLICABLE TO CONTAINER ARRAYS OF EITHER SQUARE OR RECTANGULAR PITCH, UP TO AND INCLUDING A MAXIMUM ARRAY SIZE OF 20 X 20 UNITS. A DESCRIPTION OF THE COMPUTER ANALYSIS OF THIS INTERACTION PROBLEM AND AN EXAMPLE OF ITS APPLICATION TO THE NUCLEAR SAFETY REVIEW OF PROPOSED URANIUM STORAGE SYSTEMS ARE PRESENTED. THE NEUTRON INTERACTION COMBINED WITH THE CRITICALITY CHARACTERISTICS OF THE INDIVIDUAL CONTAINERS DETERMINES THE SAFETY OF THE ARRAY.

*COMPUTER PROGRAM + *CRITICALITY SAFETY + FUEL STORAGE

3-03501 NYSTROM A
TRANSPORTATION OF RADIOACTIVE MATERIALS. PROGRESS OF EQUIPMENT AND INTERNATIONAL REGULATIONS
AKTIEBOLAGET ATOMENERGI, STOCKHOLM
49 PAGES- APRIL 1964, VDDIT-89- A LITERATURE SURVEY

ONE HUNDRED AND EIGHTEEN REFERENCES ON SHIPPING OF RADIOACTIVE MATERIALS WERE COMPILED FROM NUCLEAR SCIENCE ABSTRACTS, 1959 THROUGH MARCH 1964. A COORDINATE SUBJECT INDEX IS INCLUDED.

*LAW + *TRANSPORTATION AND HANDLING + BIBLIOGRAPHY

3-03502 SMITH CW
DROP TEST OF UNBUFFERED 1/4 SIZE MODEL HAPU-1B CASK

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-03502 *CONTINUED*
HANFORD ATOMIC PRODUCTS OPERATION
23 PAGES- JUNE 30, 1963, HW-77962

THE SHIPPING CASK, A 1/4 SIZE MODEL OF THE HAP0-1B CASK, DROPPED 16 FEET ONTO A CANYON CELL COVER BLOCK. THE CENTER OF GRAVITY WAS DIRECTLY ABOVE THE EDGE OF THE CUPOLA CONTAINING THE PROCESS CONNECTIONS. DURING IMPACT, BOLTS HOLDING THE CUPOLA COVER WERE SHEARED OFF ALTHOUGH IT DID NOT FALL OFF. AFTER IMPACT, THE CASK REBOUNDED, FELL OFF THE BLOCK AND LANDED ON THE TOP. THE PROCESS CONNECTION CUPOLA COVER FELL OFF. ALL CLOSURES WERE IN PLACE, ALTHOUGH THE MIDDLE SECONDARY CLOSURE COULD BE MOVED SLIGHTLY. DAMAGE TO CASK TOP, CUPOLA COVER, AND COVER BLOCK ARE SHOWN.

*SHIPPING CONTAINER + *TEST, PROOF

3-03522 A CONTAINER FOR FISSILE CLASS II SHIPMENTS OF DRY URANIUM COMPOUNDS
UNITED STATES ATOMIC ENERGY COMMISSION
4 PAGES, 4 FIGURES, HEALTH AND SAFETY INFORMATION, ISSUE NO. 184, APRIL 13, 1964.

A REVIEW OF SHIPPING PROCEDURES GIVEN IN W. T. MEES AND F. G. WELFARES REPORT Y-KC-28, NUCLEARLY SAFE CONTAINER FOR CLASS II SHIPMENTS OF DRY URANIUM COMPOUNDS, IS GIVEN.

*CONGRESSIONAL ACTIVITY + *SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING

3-03530 WILLIAMS IG
TRANSPORT REGULATIONS- THE NEED FOR COMPATIBILITY
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, AUTHORITY HEALTH AND SAFETY BRANCH
5 PAGES, 5 REFERENCES- ATOM, (94)- 191-195 (AUGUST 1964)- CANADIAN NUCLEAR ASSOCIATION ANNUAL CONFERENCE IN TORONTO, MAY, 1964

REGULATORY PRACTICES FOR SHIPPING RADIOACTIVE MATERIALS IN THE U.K. ARE SUMMARIZED, AND THE HISTORICAL DEVELOPMENT OF INTERNATIONAL TRANSPORT REGULATIONS IS OUTLINED. THIS IS BY WAY OF POINTING UP THE NEED FOR IMMEDIATE, COMPATIBLE, INTERNATIONAL TRANSPORT REGULATIONS.

*CODES AND STANDARDS + *IAEA (INTERNATIONAL ATOMIC ENERGY AGENCY) + *TRANSPORTATION AND HANDLING

3-03548 SALMON R
A COMPUTER CODE (CDC 1604A OR IBM 7090) FOR CALCULATING THE COST OF SHIPPING SPENT REACTOR FUELS AS A FUNCTION OF BURNUP, SPECIFIC POWER, COOLING TIME, FUEL COMPOSITION, AND OTHER VARIABLES
OAK RIDGE NATIONAL LABORATORY
69 PAGES, 14 TABLES, 16 FIGURES, 6 REFERENCES- AUGUST 1964, ORNL-3648

THE CALCULATION OF THE COSTS INCURRED IN SHIPPING IRRADIATED URANIUM-CONTAINING FUEL ELEMENTS IS DISCUSSED. A COMPUTER CODE (MYRA) THAT DESIGNS A CASK AND CALCULATES THE SHIPPING COSTS IS PRESENTED. SHIPPING COSTS WERE CALCULATED FOR TYPICAL REACTOR FUELS. THESE RESULTS ARE USED TO ILLUSTRATE THE EFFECT OF BURNUP, SPECIFIC POWER, AND OTHER VARIABLES. THE CODE INCLUDES CALCULATION OF THE LENGTH OF TIME REQUIRED FOR THE ACCUMULATION OF A REPROCESSING BATCH OF GIVEN SIZE. THIS TAKES INTO ACCOUNT THE SCHEDULING AND BATCH SIZES OF THE DISCHARGE, SHIPPING, AND REPROCESSING OPERATIONS. CRITICALITY CALCULATIONS ARE NOT INCLUDED.

*COMPUTER PROGRAM + *ECONOMICS + *TRANSPORTATION AND HANDLING

3-03553 MEE WT + WELFARE FG
A NUCLEARLY SAFE CONTAINER FOR CLASS II SHIPMENTS OF DRY URANIUM COMPOUNDS
Y-12 PLANT
17 PAGES, 5 FIGURES, 1 TABLE, 3 REFERENCES- NOVEMBER 26, 1963, Y-1460

A SIMPLE, INEXPENSIVE CONTAINER WAS EVALUATED FOR CLASS II COMMERCIAL SHIPMENTS OF DRY, ENRICHED URANIUM MATERIALS. TEST RESULTS AND NUCLEAR SAFETY DETERMINATIONS HAVE BEEN COMPARED TO THE CRITERIA IN PROPOSED REGULATIONS ON TRANSPORTATION BY IAEA AND AEC. THE CONTAINER MEETS REQUIREMENTS FOR U-235 SHIPMENTS, TYPE, FORM, AND QUANTITY OF MATERIALS TO BE SHIPPED. FORTY CONTAINERS, EACH LOADED TO A MAXIMUM OF 20 KG OF URANIUM UP TO 94.0% U-235 AS DRY COMPOUNDS OR METAL, IN AN INNER CONTAINER OF FOUR LITERS OR LESS, CAN BE SHIPPED ACCORDING TO THE PROPOSED REQUIREMENTS.

*CODES AND STANDARDS + *SHIPPING CONTAINER

3-03582 PIQUA-ELK RIVER REACTORS SPENT FUEL SHIPPING CASK
KNAPP MILLS, INC., WILMINGTON, DEL.
70 PAGES- MAY 29, 1964, COO-1028-2

A TEST PROGRAM DESIGNED TO VERIFY THE THERMAL DESIGN AND OBTAIN PERFORMANCE DATA ON THE PIQUA-ELK RIVER SPENT FUEL SHIPPING CASK WAS CARRIED OUT IN FEBRUARY AND MARCH 1964. CASK DESIGN IS BASED ON THE REQUIREMENT TO SHIP 19 PIQUA AND ELK RIVER REACTOR FUEL ASSEMBLIES WHICH HAVE OPERATED AT FULL POWER FOR DESIGN CORE LIFE IN THE HOTTEST REGION OF THE CORE WITHIN 120 DAYS AFTER REACTOR SHUTDOWN. DRY TEST RESULTS SHOW THAT THE CASK MEETS THIS REQUIREMENT WITH SLIGHTLY LOWER MAXIMUM FUEL TEMPERATURES THAN CALCULATED. WET TEST RESULTS SHOW THAT THE CASK HAS ADDITIONAL HEAT DISSIPATING CAPACITY BEYOND THAT REQUIRED.

*SHIPPING CONTAINER + CONTAINMENT, HIGH PRESSURE + CONTAINMENT, LOW PRESSURE + ELK RIVER + PIQUA + REACTOR, BOILING WATER + REACTOR, ORGANIC COOLED

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-03597 KOCH LJ
PLUTONIUM AS A FUEL FOR THE EXPERIMENTAL BREEDER REACTOR II (EBR-II)
ARGONNE NATIONAL LABORATORY
23 PAGES, 15 FIGURES, 1 TABLE, 8 REFERENCES- DECEMBER 1962, HW-75007, PP. 16.1-16.23- PROCEEDINGS
PLUTONIUM AS A POWER REACTOR FUEL, AMERICAN NUCLEAR SOCIETY TOPICAL MEETING, RICHLAND, WASHINGTON,
SEPTEMBER 13-14, 1962.

AMONG MANY THINGS OF NO DIRECT SAFETY IMPLICATION. FUEL HANDLING OF THE EBR II IS DISCUSSED.

*EBR 1 AND 2 (EXPERIMENTAL BREEDER REACTORS) + *FUEL HANDLING

3-03668 LANGHAAR JW + AIKENS AE + RIGSTAD NJ + WALCHLI HE + ZAHN LL
SAFETY ASPECTS OF SPENT FUEL TRANSPORT
E. I. DU PONT DE NEMOURS + CO. + U. S. ATOMIC ENERGY COMMISSION + PHILLIPS PETROLEUM COMPANY, IDAHO FALLS
12 PAGES- UNITED NATIONS THIRD INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY, GENEVA,
AUGUST 31-SEPTEMBER 9, 1964- A/CONF. 28/P/279

THE DEFINITION OF CONDITIONS FOR CASK MALFUNCTION OR ACCIDENT IS CONSIDERED. HANDLING AND
PERFORMANCE OF THE SHIPPING CASKS ARE REVIEWED FOR ACTUAL AND MOCKUP ACCIDENTS.

*ACCIDENT, TRANSPORTATION + *SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING

3-03694 EXPOSURE OF PERSONNEL HANDLING
OAK RIDGE NATIONAL LABORATORY
8 PAGES, 9 FIGURES, 2 TABLES, 11 REFERENCES- ISOTOPES AND RADIATION TECHNOLOGY, 1(1)- 114-121 (FALL 1963)

BATTELLE MEMORIAL INSTITUTE HAS EMBARKED UPON A PROGRAM TO DEVELOP SAFETY PERFORMANCE CRITERIA
FOR SEALED SOURCES. INFORMATION HAS BEEN ACCUMULATED ON SOURCE APPLICATIONS, DESIGNS,
FABRICATION TECHNIQUES, AND TESTING PROCEDURES. EXISTING REGULATIONS, SPECIFICATIONS, AND
PERFORMANCE CRITERIA WERE ALSO SURVEYED, COMPILED, AND EVALUATED. THIS WORK AND THE WORK AT
ORNL ON ACTUAL TESTING OF COMMERCIAL SOURCES WILL BE REPORTED IN MORE DETAIL AT A LATER DATE.
THE RESULTS OF A SURVEY OF PERSONS WORKING WITH RADIOISOTOPES INDICATED EXPOSURE IS PROBABLY
NOT MORE THAN 1250 MREM. K. W. HAFF REVIEWED SOURCE TESTING AND SHIPPING CASK TESTING.

*SHIPPING CONTAINER + *SOURCE, RADIATION + *TEST, PROOF

3-03964 SMITH DR
NUCLEAR SAFETY CONSIDERATIONS IN THE TRANSPORTATION AND STORAGE OF FISSILE MATERIAL
LOS ALAMOS SCIENTIFIC LABORATORY
3 PAGES- TID-7700- 10TH ANNUAL AEC-CONTRACTOR NUCLEAR MATERIALS MANAGEMENT MEETING, MOUNTAIN VIEW HOTEL,
GATLINBURG, TENNESSEE, OCTOBER 19-21, 1964, PP. 47-49

CRITICALITY SAFETY, TRANSPORTATION AND STORAGE PROBLEMS, PROCEDURES AND CRITERIA FOR HANDLING
AND CONTAINERS ARE DISCUSSED IN A CURSORY MANNER. LASL MAKES 150-200 SHIPMENTS OF FISSILE
MATERIAL OFF-SITE EACH YEAR.

*FUEL STORAGE + *TRANSPORTATION AND HANDLING

3-03986 KUESTER H
TRANSPORTABLE CASE FOR RADIOACTIVE DECAY HEAT PRODUCING MATERIAL, E.G. FOR BURNED-UP FUEL ELEMENTS FROM
NUCLEAR REACTORS
SIEMENS-SCHUCKERTWERKE, GERMANY
ORNL-TR-248 +. MARCH 28, 1963, TRANSLATION OF GERMAN PATENT 1,146,209

THE TRANSPORTABLE CASE DESCRIBED CONSISTS OF AN OUTER SHELL AND A PREFERABLY CYLINDRICALLY
SHAPED SHIELDING WITHIN THE SHELL AND APART FROM IT SO THAT A RING-SHAPED SPACE IS FORMED
BETWEEN THEM THROUGH WHICH A COOLANT MEDIUM IS CIRCULATED BY NATURAL CONVECTION. THE NATURAL
CONVECTION OF THE COOLANT MEDIUM IS ACHIEVED BY PROVIDING CONDUITS AT THE TOP AND AT THE
BOTTOM OF THE SHIELDING WHICH COMMUNICATE THE INTERIOR OF THE SHIELDING CASE WHERE THE
RADIOACTIVE MATERIAL IS CONTAINED WITH THE RING-SHAPED SPACE.

AVAILABILITY - JOHN CRERAR LIBRARY, 35 WEST 33RD STREET, CHICAGO, ILLINOIS, 60616

*SHIPPING CONTAINER

3-04003 BULMER GH + QUINTON A
RECOMMENDATIONS ON THE SAFE HANDLING OF ZIRCONIUM METAL AND ZIRCONIUM ALLOYS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, RISLEY
1963, AHSB (S) R 59- HMSO

THIS REPORT AMPLIFIES RECOMMENDATIONS CONTAINED IN R.S.P.P. NO. 20 ON THE SAFE HANDLING OF
ZIRCONIUM METAL AND ZIRCONIUM ALLOYS. FOLLOWING A SUMMARY OF THE PHYSICAL, CHEMICAL AND TOXIC
PROPERTIES OF ZIRCONIUM, THE DESIGN FEATURES NECESSARY TO ENSURE AN ADEQUATE SAFETY STANDARD
IN THE CONSTRUCTION AND INSTALLATION OF PLANT IN PROCESS AREAS, LABORATORIES AND STORES ARE
GIVEN. WHERE APPROPRIATE, STATUTORY AND NON-STATUTORY REGULATIONS ARE QUOTED AND USED AS A
FRAMEWORK FOR SPECIFYING OPERATIONAL SAFETY REQUIREMENTS FOR BOTH NORMAL AND ACCIDENT
CONDITIONS. SPECIAL CONDITIONS APPLICABLE TO THE STORAGE AND DISPOSAL OF UNIRRADIATED AND
IRRADIATED ZIRCONIUM ARE GIVEN. THE REPORT CONCLUDES WITH RECOMMENDATIONS ON TRANSPORT AND
CONTAINERS.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-04003 *CONTINUED*
*CODES AND STANDARDS + *ZIRCONIUM + ALLOY + CHEMICAL REACTION + CHEMICAL TOXICITY + SHIPPING CONTAINER +
TRANSPORTATION AND HANDLING

3-04035 NEW MOTION PICTURE TRANSPORTATION OF RADIOACTIVE MATERIALS--PART I--THE PROBLEM
U. S. ATOMIC ENERGY COMMISSION
1 PAGE- SAFETY AND FIRE PROTECTION NEWS LETTER, ISSUE NO. 66, OCTOBER 8, 1964- AEC-FL

IN THIS FILM, F. L. BRANNIGAN IDENTIFIES AND DISCUSSES 10 FACTORS WHICH ARE RESPONSIBLE FOR
THE DIFFERENCES IN HAZARD BETWEEN SHIPMENTS OF RADIOACTIVE MATERIALS- 1) RADIOACTIVITY, 2)
SPECIFIC ACTIVITY, 3) DILUTION, 4) PENETRATING OR NONPENETRATING RADIATION, 5) PENETRATION
RADIATION LEVEL UNSHIELDED, 6) RADIOTOXICITY, 7) AVAILABILITY, 8) CONTAMINABILITY, 9) HEAT,
AND 10) CRITICALITY.

*TRANSPORTATION AND HANDLING

3-04039 PENDLEBURY ED + GARRETT PE
THE CALCULATION OF NEUTRON SURFACE MULTIPLICATIONS OF TRANSPORT CONTAINERS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY
26 PAGES, 6 TABLES, 8 REFERENCES- JULY 1964, AWRE O-21/64- MC

IT IS SHOWN THAT THE MOST EFFICIENT WAY TO CALCULATE THE NEUTRON SURFACE MULTIPLICATION OF A
PROPOSED TRANSPORT CONTAINER IS TO SOLVE A SUITABLE ADJOINT PROBLEM. BY THIS MEANS THE
MAXIMUM USEFUL INFORMATION IS OBTAINED FROM A GIVEN AMOUNT OF COMPUTATIONAL EFFORT. A SINGLE
CALCULATION GIVES THE SURFACE MULTIPLICATION AS A FUNCTION OF INCIDENT NEUTRON ENERGY FROM
WHICH THE MAXIMUM SURFACE MULTIPLICATION AND THE INCIDENT NEUTRON ENERGY WHICH PRODUCES IT
ARE IMMEDIATELY OBTAINED AND IT ALSO BECOMES A TRIVIAL MATTER TO STUDY THE EFFECT OF VARYING
THE INCIDENT ENERGY DISTRIBUTION.

*CRITICALITY SAFETY + *SHIPPING CONTAINER

3-04252 DWIGHT DJ
A NEW METHOD FOR LEAK-TESTING SEALED SOURCES OF RADIUM-226 AND THORIUM-228
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, THE RADIOCHEMICAL CENTRE, AMERSHAM, BUCKS.
22 PAGES, 6 FIGURES, 6 REFERENCES- JULY 1964, RCC-R 176- HMSO

A SIMPLE METHOD HAS BEEN DEVELOPED IN WHICH RADON LEAKING FROM RADIUM-226 AND THORIUM-228
SOURCES UNDER VACUUM IS QUANTITATIVELY MEASURED. THE COLLECTION OF RADON IS BY DISSOLUTION
IN AN ORGANIC SOLVENT. MEASUREMENT IS BY LIQUID SCINTILLATION COUNTING, USING AN INTERNAL
PHOSPHOR, ALPHA- AND BETA-PARTICLES BOTH BEING COUNTED WITH HIGH EFFICIENCY. THE PRACTICAL
LIMITS OF LEAK DETECTION ARE- RADON-222, 2×10^{-6} C. PER 24 HOURS AND RADON-220, 2×10^{-5} C. PER 24 HOURS.

*CONTAINMENT, SOURCE + *TEST, LEAK RATE

3-04297 BISHOP NF + EGAN JC + MARSHALL W
EXPERIENCE IN THE TRANSPORT OF IRRADIATED FUEL
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, RISLEY AND WINDSCALE
14 PAGES, 5 FIGURES, 1 TABLE, 1 REFERENCE- IAEA- MAY 1964, A/CONF. 28/P/184- PRESENTED AT THIRD U.N.
INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY, GENEVA, AUGUST 31-SEPTEMBER 9, 1964

CONTAINERS AND PROCEDURES USED FOR THE ROUTINE TRANSPORT OF IRRADIATED FUEL ELEMENTS WITHIN
ENGLAND AND OVERSEAS ARE DESCRIBED.

*SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING

3-04325 MARCUS FR + ASYEE J
TRANSPORT OF IRRADIATED NUCLEAR FUEL ON THE EUROPEAN CONTINENT
EUROCHEMIC, MOL, BELGIUM
18 PAGES, 2 FIGURES, 2 REFERENCES- IAEA- MAY 1964, A/CONF. 28/P/422- PRESENTED AT THIRD U.N. INTERNATIONAL
CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY, GENEVA, AUGUST 31-SEPTEMBER 9, 1964

A DESCRIPTION IS GIVEN OF THE PRESENT STATUS OF IRRADIATED FUEL TRANSPORT IN CONTINENTAL
EUROPE, ITS ADMINISTRATIVE, TECHNICAL, AND ECONOMIC ASPECTS, AND ITS INFLUENCE ON FUEL CYCLE
COSTS.

*TRANSPORTATION AND HANDLING + ECONOMICS + REGULATION, GENERAL + SHIPPING CONTAINER

3-04329 DE STEEL A + VAN MULDER J + DE SCHRYNMAKERS DE DORMAEL T + BONNET G + GARRIC C + TROUSSON M
SHIPPING CASKS FOR THE BR2 AND HFR RESEARCH REACTORS
BUREAU D ETUDES NUCLEAIRES, BRUSSELS + BUREAU D ETUDES INDUSTRIELLES FERNAND COURTOY, BRUSSELS + EURATOM,
BRUSSELS
15 PAGES, 2 FIGURES, 13 REFERENCES- IAEA- MAY 1964, A/CONF. 28/P/448- PRESENTED AT THIRD U.N.
INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY, GENEVA, AUGUST 31-SEPTEMBER 9, 1964

THE STUDY OF CASKS FOR THE SHIPMENT OF SPENT FUEL ELEMENTS FROM THE BR2 AND HFR RESEARCH
REACTORS IS DESCRIBED. THE HFR CASK HAS ALREADY RECEIVED USAEC APPROVAL AND IS ON THE POINT
OF BEING ACCEPTED BY THE COMPETENT AUTHORITY OF THE UNITED KINGDOM- THE BR2 CASK, DESIGNED

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-04329 *CONTINUED*
ACCORDING TO THE SAME PRINCIPLES, IS NOW UNDER EXAMINATION.

*SHIPPING CONTAINER + CRITICALITY SAFETY + LAW + REGULATION, GENERAL + TEST, PROOF

3-04418 HAFF KW
THE SAFETY TESTING PROGRAM AT ORNL
OAK RIDGE NATIONAL LABORATORY
11 PAGES- ABSTRACTED IN ANS TRANSACTIONS- PRESENTED AT ANS MEETING, PHILADELPHIA, JUNE 9-12, 1964

THE SEALED SOURCE SAFETY TESTING PROGRAM, BEGUN AT OAK RIDGE NATIONAL LABORATORY IN 1962, WAS ESTABLISHED TO PROMOTE THE GENERAL SAFETY OF SEALED SOURCES AND TO DERIVE STANDARDS OF DESIGN AND QUALITY CONTROL IN MANUFACTURE TO ENSURE THIS SAFETY. AS A FIRST STEP IN THE ACCOMPLISHMENT OF THIS PURPOSE, A CLASSIFICATION SYSTEM WAS DEVELOPED WHICH CLASSIFIES SOURCES ACCORDING TO ENVIRONMENTAL AND STRUCTURAL REQUIREMENTS INCLUDING TEMPERATURE, THERMAL SHOCK, HUMIDITY, INTERNAL PRESSURE, PUNCTURE, CRUSHING, SHEAR, IMPACT, VIBRATION, AND ABRASION. IN DEVELOPING THIS SYSTEM, TESTS WERE PERFORMED ON ESSENTIALLY ALL TYPES OF COMMERCIALLY AVAILABLE SOURCES INCLUDING RFTA AND GAMMA GAGE SOURCES, MEDICAL SOURCES, RADIOGRAPHY SOURCES, AND NEUTRON SOURCES.

*SHIPPING CONTAINER + *TEST, PROOF + CODES AND STANDARDS

3-04612 ASPINAL KJ + FAIRBAIRN A
THE CLASSIFICATION OF RADIONUCLIDES FOR TRANSPORT PURPOSES AND THE DERIVATION OF ACTIVITY LIMITS IN RELATION TO PACKAGE REQUIREMENTS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL
81 PAGES- HMSO- MAY 1963, AHS6(RP)R-23

ASSESSMENTS OF THE LIKELY INTAKE OF RADIOACTIVE MATERIAL AFTER A TRANSPORT ACCIDENT CAUSING SERIOUS DAMAGE TO A PACKAGE ARE COMBINED WITH CALCULATED RADIATION DOSES FOR UNIT INTAKE OF SOME 280 RADIONUCLIDES. A THEORETICAL SAFE LIMIT FOR THE RADIOACTIVE CONTENT OF TRANSPORT PACKAGES IS THUS DERIVED FOR EACH NUCLIDE. THESE DATA ARE USED TO PROPOSE A CLASSIFICATION OF NUCLIDES BY EFFECTIVE TOXICITY AND APPROPRIATE PACKAGE LIMITS. THE LIMITS SUGGESTED FOR 3 PRINCIPAL TOXICITY GROUPS TRANSPORTED IN TYPE A PACKAGING ARE- GROUP I, 1 MC- GROUP II, 50 MC- AND GROUP III, 2.5 C. A NEW GROUP OF LOW-TOXICITY MATERIALS IS PROPOSED WITH A PACKAGE LIMIT OF 20 Curies FOR TYPE A PACKAGING. PROPOSALS ARE MADE FOR A NUMBER OF SPECIAL FORMS OF RADIOACTIVE MATERIALS, SUCH AS LOW SPECIFIC ACTIVITY, NOBLE GASES, AND LUMINESCENT COMPOUNDS. THE RECOMMENDATIONS ARE SUMMARIZED.

*ACCIDENT, TRANSPORTATION + ACCIDENT ANALYSIS + CODES AND STANDARDS + SHIPPING CONTAINER

3-04614 SHIPPING EXPERIENCE INVOLVING RADIOACTIVE MATERIALS
U. S. ATOMIC ENERGY COMMISSION
2 PAGES- AEC-DOS- HEALTH AND SAFETY INFORMATION, ISSUE NO. 154, JANUARY 7, 1963

A RECENT INCIDENT INVOLVING THE LEAKAGE OF CONTAMINATED WATER FROM A RADIOACTIVE MATERIAL SHIPMENT POINTS OUT THE NEED FOR ATTENTION TO DETAIL IN CONTAINER DESIGN, AND ALSO PROVIDES A TYPICAL EXAMPLE OF THE WORKINGS OF THE AEC'S RADIOLOGICAL ASSISTANCE PLANT. THE INCIDENT OCCURRED ON A SHIPMENT MADE BETWEEN TWO AEC FACILITIES. A ROUTINE SURVEY BY THE RECEIVING SITE PERSONNEL DETECTED THAT A TRAILER AND ITS LOAD, A RADIOACTIVE MATERIALS SHIPPING CASK WHICH CONTAINED 5,000 CURIES OF IRRADIATED EXPERIMENTS, WERE CONTAMINATED. THIS TRAILER AND CASK HAD JUST ARRIVED, CONCLUDING A ROUTINE COMMERCIAL SHIPMENT. THE CASK, PROPERLY PALLETED AND SECURED FOR SHIPMENT, WAS FOUND TO BE CONTAMINATED AT ONE END. THE TRAILER BED AND FRAME DIRECTLY BENEATH THE CASK WERE ALSO CONTAMINATED. THE CONTAMINANT WAS FOUND TO BE WATER, CONTAINING PRINCIPALLY IODINE 131, WHICH HAD LEAKED FROM THE CASK.

*ACCIDENT, TRANSPORTATION + ACCIDENT, GENERAL + IODINE + MONITOR, RADIATION, EMERGENCY

3-04617 ATTA GJ + BRANSTETTER EE + HARKPIDER MT + MULLIKIN HC
CHEMICAL TECHNOLOGY - A STUDY OF SHIPPING COSTS OF URANIUM FUEL ELEMENTS
OAK RIDGE NATIONAL LABORATORY
1 PAGE- OTS- MARCH 1964, ORNL-3567, P. 9 (MATHEMATICS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1963)

THE SPENT FUEL ELEMENTS REMOVED FROM NUCLEAR REACTORS ORDINARILY WILL BE SHIPPED TO A FUEL REPROCESSING PLANT FOR RECOVERY OF THE REMAINING FISSIONABLE MATERIAL OR TO A DISPOSAL PLANT FOR THE DISPOSITION OF RADIOACTIVE FISSION PRODUCTS. BECAUSE OF THEIR HIGH GAMMA RADIOACTIVITY, THE SPENT FUEL ELEMENTS MUST BE CONTAINED DURING SHIPMENT IN HEAVILY SHIELDED, SEALED CASKS. A TYPICAL CASK CONSISTS OF A STEEL INNER SHELL, A LAYER OF LEAD SHIELDING, AND A HEAVY STEEL OUTER SHELL TO PROVIDE THE NECESSARY STRUCTURAL STRENGTH. THE FUEL ELEMENTS ARE CONTAINED IN A BOX-LIKE ARRAY INSIDE THE INNER SHELL AND ARE SEPARATED FROM EACH OTHER BY DIVIDER PLATES.

*ECONOMICS + *SHIPPING CONTAINER

3-04681 1964 COMPILATION OF UNITED STATES NUCLEAR STANDARDS
AMERICAN STANDARDS ASSOCIATION, SUBCOMMITTEE N6.9
49 PAGES- AUGUST 1, 1964- SOURCE

EARLY IN 1963 THE AMERICAN STANDARDS ASSOCIATION SECTIONAL COMMITTEE N6, REACTOR SAFETY,

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-04681 *CONTINUED*

STANDARDS, ESTABLISHED THE SUBCOMMITTEE N6.9 TO MAINTAIN AN INDEXED CATALOG OF STANDARDS OF INTEREST TO THE NUCLEAR INDUSTRY FOR BOTH THE UNITED STATES AND FOREIGN COUNTRIES WITH PRINCIPAL EMPHASIS ON THE FORMER. IN ADDITION TO COMPILING AND MAINTAINING THE AFOREMENTIONED CATALOG, THE SUBCOMMITTEE WAS ALSO ASKED TO DIRECT THE PARENT COMMITTEES ATTENTION TO AREAS OF DUPLICATION AND TO THOSE WHICH LACK COVERAGE. IN ORDER TO FULFILL ITS DESIGNATED FUNCTION THE SUBCOMMITTEE HAS FIRST COMPILED AND EXAMINED THE UNITED STATES NUCLEAR STANDARDS, THE RESULTS OF WHICH ARE REPORTED HEREIN.

*ADMINISTRATIVE CONTROLS AND PRACTICES + *CODES AND STANDARDS + LAW + TRANSPORTATION AND HANDLING

3-04815 SPIERS FW
THE TRANSPORT OF RADIOACTIVE MATERIALS
LEEDS UNIVERSITY

5 PAGES- 1964, AHSB(A)R-8- SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL, BOURNEMOUTH, APRIL 13-15, 1964, UNITED KINGDOM ATOMIC ENERGY AUTHORITY, PP. 7-11- HMSO

THIS INTRODUCTORY ADDRESS BRIEFLY DISCUSSES THE HISTORY OF TRANSPORTATION REGULATIONS (MAXIMUM PERMISSIBLE DOSE AND PREMISES UNDERLYING THEM) AND THE EARLY HISTORY OF RADIATION PROTECTION.

*TRANSPORTATION AND HANDLING + MAXIMUM PERMISSIBLE DOSE (MPD) + REGULATION, GENERAL + UNITED KINGDOM

3-04816 MORLEY F
INTRODUCTION TO RADIOACTIVITY AND ASSOCIATED HAZARDS WITH PARTICULAR REFERENCE TO TRANSPORT. (A) HEALTH PHYSICS ASPECTS

UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HEALTH AND SAFETY BRANCH
5 PAGES- 1964, AHSB(A)R-8- PP. 13-17, SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL, BOURNEMOUTH, APRIL 13-15, 1964- HMSO

THIS PAPER OUTLINES IN PRINCIPLE THE PHYSICAL METHODS WHICH ARE AVAILABLE TO RESTRICT RADIATION EXPOSURE WITHIN THE NECESSARY LIMITS.

*TRANSPORTATION AND HANDLING + DOSE + SOURCE, RADIATION + UNITED KINGDOM

3-04817 DUNCAN KP
INTRODUCTION TO RADIOACTIVITY AND ASSOCIATED HAZARDS WITH PARTICULAR REFERENCE TO TRANSPORT. (B) MEDICAL ASPECTS

UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HEALTH AND SAFETY BRANCH
5 PAGES, 1964, AHSB(A)R-8- PP. 19-24, SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL, BOURNEMOUTH, APRIL 13-15, 1964- HMSO

THIS PAPER OUTLINES THE EFFECTS AND THE MECHANISMS OF RADIOLOGICAL DAMAGE WHICH ARE OF THE MOST RELEVANCE TO POSSIBLE TRANSPORT SITUATIONS. NO ACCOUNT HAS BEEN TAKEN OF THE GENETIC EFFECT OF RADIATION BECAUSE THIS IS NOT A MATTER OF INDIVIDUAL EXPOSURE BUT OF CONTROLLING EXPOSURE LEVELS OF LARGE GROUPS OF PEOPLE. REFERENCE HAS BEEN MADE TO THE RELEVANT EARLY AND LATE EFFECTS OF EXTERNAL RADIATION AND OF UPTAKE INTO THE BODY OF RADIOACTIVE MATERIALS, AND THE CONCEPT OF MAXIMUM PERMISSIBLE LEVELS HAS BEEN DISCUSSED TOGETHER WITH SOME OF THE SOURCES OF INFORMATION ON WHICH THEY ARE BASED.

*BIOMEDICAL + *TRANSPORTATION AND HANDLING + DOSE + FIRE + MAXIMUM PERMISSIBLE DOSE (MPD) + UNITED KINGDOM

3-04818 WILLIAMS IG
ATOMIC ENERGY LEGISLATION IN THE UNITED KINGDOM WITH PARTICULAR REFERENCE TO TRANSPORT
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HEALTH AND SAFETY BRANCH
6 PAGES, 1964, AHSB(A)R-8- PP. 25-30, SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL, BOURNEMOUTH, APRIL 13-15, 1964- HMSO

THE PATTERN THAT HAS GROWN UP IN THIS COUNTRY IS COMPLEX, INVOLVING MANY DEPARTMENTS AND REQUIRING A BALANCE BETWEEN LEGAL COMPULSION AND VOLUNTARY ACCEPTANCE OF CODES OF PRACTICE BASED ON CONSULTATION. A MEASURE OF UNIFORMITY IN STANDARDS OF RADIATION PROTECTION IS ENSURED BY THE COMMON STARTING POINT OF I.C.R.P. RECOMMENDATIONS, INTERPRETED FOR THIS COUNTRY BY THE MEDICAL RESEARCH COUNCIL, AND THE RADIOACTIVE SUBSTANCES ADVISORY COMMITTEE PLAYS AN IMPORTANT PART IN REVIEWING IN DETAIL THE VARIOUS REGULATORY MEASURES PROPOSED.

*LAW + *TRANSPORTATION AND HANDLING + LIABILITY + REGULATION, GENERAL + UNITED KINGDOM

3-04819 WEST R
THE NATURE AND EXTENT OF RADIOACTIVE TRAFFIC IN THE U.K. (A) ISOTOPES
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL

5 PAGES- 1964, AHSB(A)R-8- PP. 31-35, SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL, BOURNEMOUTH, APRIL 13-15, 1964- HMSO

THE ISOTOPES TRAFFIC COMPRISES A LARGE NUMBER OF CONSIGNMENTS, THE BULK OF WHICH ARE OF LOW ACTIVITY MATERIALS IN TYPE A PACKAGES. THE CHEMICAL FORMS ARE NUMEROUS, BUT THE PHYSICAL AMOUNTS ARE SMALL. ISOTOPES ARE NOT IN THE SAME CLASS AS FISSIONABLE MATERIALS, AND IRRADIATED FUEL ELEMENTS. INDEED THEY GENERALLY PRESENT LESS HAZARD IN TRANSPORT THAN MANY ORDINARY NON-RADIOACTIVE CHEMICAL PRODUCTS, SUCH AS FUELS AND CORROSIVES, THAT ARE COMMONLY TRANSPORTED IN LARGE QUANTITY.

*TRANSPORTATION AND HANDLING + UNITED KINGDOM

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-04820 NORMAN KJ
THE NATURE AND EXTENT OF RADIOACTIVE TRAFFIC IN THE U.K. (B) MOVEMENT OF FUEL AND OF FUEL MATERIALS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL
9 PAGES- 1964, AHSB(A)R-8- PP. 37-45, SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL,
BOURNEMOUTH, APRIL 13-15, 1964- HMSO

AS THE VOLUME OF RADIOACTIVE TRAFFIC HAS GROWN OVER THE YEARS AND EXPERIENCE HAS BEEN
ACCUMULATED SO STANDARDS HAVE BEEN ESTABLISHED AND REGULATIONS PROMULGATED TO LEGISLATE FOR
THEIR SAFE MOVEMENT AND ENSURE THE PROTECTION OF WORKERS AND PUBLIC WHO MAY COME INTO CONTACT
WITH PACKAGES DURING THE COURSE OF TRANSIT. IT HAS FOLLOWED AS A MATTER OF COURSE THAT THE
MOVEMENT OF RADIOACTIVE MATERIALS HAS BECOME MORE AND MORE ROUTINE, AND THE BULK OF THE
MOVEMENTS CAN NOW BE MADE AS SIMPLY AS THE MOVEMENT OF ANY OTHER ARTICLE OF COMMERCE.

*ADMINISTRATIVE CONTROLS AND PRACTICES + *TRANSPORTATION AND HANDLING + SHIPPING CONTAINER + UNITED KINGDOM

3-04821 ARMSTRONG JB
TRANSPORT REGULATIONS. (A) GENERAL PRINCIPLES UNDERLYING REGULATIONS GOVERNING THE TRANSPORT OF
RADIOACTIVE MATERIALS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, MINISTRY OF TRANSPORT
6 PAGES- 1964, AHSB(A)R-8- PP. 47-52, SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL,
BOURNEMOUTH, APRIL 13-15, 1964- HMSO

THIS ARTICLE DISCUSSES REGULATIONS GOVERNING INTERNATIONAL TRAFFIC OF RADIOACTIVE MATERIALS,
SPECIFICALLY IAEA REGULATIONS.

*REGULATION, GENERAL + *TRANSPORTATION AND HANDLING + CRITICALITY SAFETY +
IAEA (INTERNATIONAL ATOMIC ENERGY AGENCY) + LAW + SHIPPING CONTAINER + UNITED KINGDOM

3-04822 GIBSON R
TRANSPORT REGULATIONS. (B) THE DEVELOPMENT OF INTERNATIONAL AND NATIONAL TRANSPORT REGULATIONS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HEALTH AND SAFETY BRANCH
6 PAGES- 1964, AHSB(A)R-8- PP. 53-58, SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL,
BOURNEMOUTH, APRIL 13-15, 1964- HMSO

THE HISTORY OF TRANSPORT REGULATIONS IS TRACED, INCLUDING THE FIRST CNES SET UP BY THE ICC,
FROM THE EARLIEST LAWS (C. MID-FIFTIES) TO THE PRESENT IAEA REVISIONS (JUNE 1964).

*IAEA (INTERNATIONAL ATOMIC ENERGY AGENCY) + *REGULATION, GENERAL + *TRANSPORTATION AND HANDLING + LAW

3-04823 DANIELS JT
THE TRANSPORT OF FISSIONABLE MATERIALS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HEALTH AND SAFETY BRANCH
4 PAGES- 1964, AHSB(A)R-8- PP. 57-62, SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL,
BOURNEMOUTH, APRIL 13-15, 1964- HMSO

IT WAS CONFIRMED IN THE COURSE OF A BRIEF DISCUSSION THAT THE THREE CLASSES OF FISSIONABLE
CONSIGNMENT SHOULD BE REGARDED AS ALTERNATIVE METHODS OF ACHIEVING SAFETY AGAINST THE
CRITICALITY HAZARD IN TRANSIT- AND THAT EACH REPRESENTED AN EQUALLY RELIABLE AND ACCEPTABLE
STANDARD OF SAFETY. THE TENDENCY IN SOME QUARTERS TO PREFER CLASS I TO CLASS II AND CLASS II
TO CLASS III WAS BASED ON MISUNDERSTANDING. EXCESSIVE CAUTION BUILT INTO ANY REGULATORY
SYSTEM CONTRIBUTED LITTLE TO SAFETY- IN FACT IT DETRACTED BY OVER-SHADOWING THE IMPORTANCE OF
PERSONAL RESPONSIBILITY.

*CRITICALITY SAFETY + *TRANSPORTATION AND HANDLING + SHIPPING CONTAINER

3-04824 FAIRBAIRN A
APPROVAL OF PACKAGING DESIGN
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HEALTH AND SAFETY BRANCH
18 PAGES- 1964, AHSB(A)R-8- PP. 63-80, SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL,
BOURNEMOUTH, APRIL 13-15, 1964- HMSO

THE SUBJECT IS APPROVAL OF PACKAGING DESIGN. AS USED IN THIS CONTEXT, THE TERM PACKAGE REFERS
TO THE ENTIRE ASSEMBLY AS PRESENTED FOR TRANSPORT, COMPRISING THE PACKAGING TOGETHER WITH ITS
RADIOACTIVE MATERIAL CONTENTS. THE PACKAGING MAY COMPRISE ONE OR MORE VESSELS WHICH, IF VERY
LARGE, ARE SOMETIMES REFERRED TO AS FLASKS, CASKS OR EVEN COFFINS. THESE NOTES ARE NOT
CONCERNED WITH THE ACTUAL APPROVAL PROCEDURE - THEIR PURPOSE IS TO SURVEY THE PROBLEMS
ENCOUNTERED BY THE A.H.S.B. IN THE APPROVAL OF A GREAT VARIETY OF PACKAGING DESIGNS.

*CONTAINMENT DESIGN + *SHIPPING CONTAINER + CRITICALITY SAFETY + TEST, PROOF +
TRANSPORTATION AND HANDLING + UNITED KINGDOM

3-04825 PEATEY BC
LIABILITY AND INDEMNITY POLICY
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HEALTH AND SAFETY BRANCH
8 PAGES- 1964, AHSB(A)R-8- PP. 01-08, SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL,
BOURNEMOUTH, APRIL 13-15, 1964- HMSO

THE HISTORY OF THE SPECIAL PROVISION FOR THIRD PARTY LIABILITY IN THE UNITED KINGDOM IS
DESCRIBED IN THE PAPER.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-04825 *CONTINUED*
*INSURANCE + *LIABILITY + *TRANSPORTATION AND HANDLING + LAW

3-04826 SOWBY FD
RADIATION AND OTHER RISKS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, SURREY
20 PAGES- 1964, AHSB(A)R-8- PP. 89-108, SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL,
BOURNEMOUTH, APRIL 13-15, 1964- HMSO

BEFORE WE CAN ANSWER SUCH QUESTIONS WE SHOULD FIND OUT THE MAGNITUDE OF OTHER EVERYDAY RISKS, AND THE WAY IN WHICH SOCIETY GOES ABOUT ASSESSING THEIR ACCEPTABILITY. THIS WILL BE DONE FOR WORLD CONDITIONS, AND THEN, IN OUR OWN SOCIETY, FOR EVERYDAY LIFE, FOR OCCUPATION, AND FOR SELF-IMPOSED HAZARDS. IT IS OFTEN STATED THAT ACCEPTABLE DOSES OF RADIATION SHOULD BE SET ONLY AFTER THE RISKS HAVE BEEN PROPERLY BALANCED AGAINST THE ADVANTAGES OF THE EXPOSURE. SINCE RADIATION IS BUT ONE OF MANY AGENTS INVOLVING A RISK, THE EXTENT OF THE ACTION TAKEN TO CONTROL IT SHOULD BE IN REASONABLE PROPORTION TO THE MAGNITUDE OF ITS RISK. AN ATTEMPT, ADMITTEDLY A CRUDE ONE, HAS THEREFORE BEEN MADE TO INDICATE THE MAGNITUDE OF A FEW OF THE OTHER RISKS IN OUR SOCIETY, AND TO RELATE THESE TO SOME SORT OF SCALE OF ACCEPTABILITY. WHEN MORE QUANTITATIVE DATA ARE AVAILABLE ON THE DOSE-EFFECT RELATIONSHIP FOR RADIATION, SUCH A SCALE OF ACCEPTABILITY WOULD ENABLE THE PROCESS OF BALANCING THE RISK TO TAKE ACCOUNT OF THE ACCEPTABILITY OF OTHER RISKS.

*RADIATION IN PERSPECTIVE + MAXIMUM PERMISSIBLE DOSE (MPD) + TRANSPORTATION AND HANDLING

3-04827 NEARY FJ
TRANSPORT ACCIDENTS- EMERGENCY ORGANISATION
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HEALTH AND SAFETY BRANCH
4 PAGES- 1964, AHSB(A)R-8- PP. 109-112, SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL,
BOURNEMOUTH, APRIL 13-15, 1964- HMSO

EMERGENCY COVER IN THE TRANSPORT CONTEXT IS PRIMARILY AN ORGANISATIONAL PROBLEM. THE RANGE OF POTENTIAL ACCIDENT AND SCOPE FOR HAZARD IS LESS THAN AT FIXED ESTABLISHMENTS BECAUSE OF THE RELATIVELY STRAIGHTFORWARD NATURE OF THE OPERATION AND LIMITED AMOUNTS OF ACTIVITY INVOLVED BUT SPECIAL FLEXIBILITY IS NECESSARY SINCE IT IS IMPOSSIBLE TO SAY IN ADVANCE WHERE AN ACCIDENT MAY OCCUR. A SIMILAR RECORD APPLIES TO TRAFFIC IN THE U.S.A. IN THE 16 YEAR RECORDS OF SHIPMENTS THERE IS NO CASE OF A RADIATION INJURY HAVING BEEN CAUSED IN THE TRANSPORT OF RADIOACTIVE MATERIALS. THERE WERE SOME 47 INCIDENTS REPORTED OVER THE PERIOD 1957 TO 1961 OF WHICH 29 INVOLVED NO RELEASE OF RADIOACTIVE MATERIAL, WHILE NONE OF THE 18 CASES WHERE THERE WAS A RELEASE CAUSED EXTENSIVE CONTAMINATION OR ANY SERIOUS CONSEQUENCES.

*ACCIDENT, TRANSPORTATION + *ADMINISTRATIVE CONTROLS AND PRACTICES + TRANSPORTATION AND HANDLING

3-04828 WINDEYER B
CLOSING ADDRESS
MEYERSTEIN INSTITUTE OF RADIOTHERAPY MIDDLESEX HOSPITAL, UNITED KINGDOM ATOMIC ENERGY AUTHORITY
9 PAGES- 1964, AHSB(A)R-8- PP. 113-121, SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL,
BOURNEMOUTH, APRIL 13-15, 1964- HMSO

THE DEVELOPMENT OF PROTECTIVE STANDARDS BY SUCH ORGANIZATIONS AS THE ICRP IS PRESENTED, AND THE SAFETY ASPECTS AND HAZARDS OF THE USE OF IONIZING RADIATION ARE POINTED OUT. THE NEED FOR NATIONAL AND INTERNATIONAL BODIES TO KEEP ABREAST OF EACH OTHERS DEVELOPMENT IN THIS FIELD IS NOTED.

*CODES AND STANDARDS + *TRANSPORTATION AND HANDLING + UNITED KINGDOM

3-04928 SHAPPERT LB
RESULTS OF IMPACT TESTS PERFORMED ON 55-GAL DRUM-TYPE BIRDCAGES
OAK RIDGE NATIONAL LABORATORY
56 PAGES, 29 FIGURES, 21 TABLES- ORNL-3735, DECEMBER 1964- OTS

IN ORDER TO PREVENT CRITICALITY INCIDENTS FROM OCCURRING IN THE SHIPMENT OF FISSIONABLE MATERIALS, SUCH MATERIALS ARE CONTAINED IN GEOMETRICALLY SAFE CONTAINERS (BIRDS) WHICH ARE KEPT AT A SAFE SPACING BY BUILDING A FRAMEWORK (BIRDCAGES) AROUND EACH CONTAINER. IN THE EVENT OF A SHIPPING ACCIDENT, THE FRAMEWORK MAY BE DISTORTED SUFFICIENTLY TO REDUCE THE SPACING TO UNSAFE VALUES. THEREFORE, IMPACT TESTS WERE MADE TO SIMULATE ACCIDENT CONDITIONS IN ORDER TO EVALUATE THE EXTENT OF THE DISTORTION AND TO IMPROVE THE BIRDCAGE DESIGN IN ORDER TO REDUCE DEFORMATION. IT WAS FOUND THAT WOODEN AND STEEL BRACES OF THE TYPE TESTED ARE NOT SUFFICIENT TO KEEP THE BIRD POSITIONED IN THE CENTER OF THE DRUM AFTER A 30-FT FREE FALL ONTO AN UNYIELDING SURFACE. HOWEVER, BY WELDING THIN STEEL BEARING PLATES TO THE END OF THE STEEL BRACES, IMPACT RESISTANCE IS GREATLY IMPROVED AND THE BIRD WILL REMAIN IN THE CENTER OF THE DRUM AFTER IMPACT.

*CRITICALITY SAFETY + *SHIPPING CONTAINER + *TESTING + TRANSPORTATION AND HANDLING

3-04952 ADCOCK FE + BYRNE JT + DELNAY RL + GAUTHIER RD + PARK DW + SCHUSKE CL
PLUTONIUM NITRATE SHIPPING PACKAGES
THE DOW CHEMICAL COMPANY
136 PAGES, 75 FIGURES- OCTOBER 16, 1964, RFP-437- OTS

THIS REPORT DESCRIBES PART OF A PROGRAM CARRIED OUT BY THE ROCKY FLATS DIVISION OF THE DOW

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-04952 *CONTINUED*

CHEMICAL COMPANY FOR THE DIVISION OF NUCLEAR MATERIALS MANAGEMENT (ATOMIC ENERGY COMMISSION) TO DEVELOP PROCEDURES AND CONTAINERS WHICH COULD PERMIT THE SHIPMENT OF PLUTONIUM NITRATE SOLUTIONS WITHOUT SHIPPER-RECEIVER DISCREPANCIES. THE DESIGN, TESTING, AND EVALUATION OF PLUTONIUM NITRATE SHIPPING PACKAGES ARE COVERED IN THIS REPORT.

*ADMINISTRATIVE CONTROLS AND PRACTICES + *PLUTONIUM + *SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING + CONTAINMENT DESIGN + CRITICALITY SAFETY + TEST, PROOF + TESTING

3-04957 ERNEST FA + MAHER R
SHIPMENT OF A LARGE LIQUID SOURCE - A CASE HISTORY
SAVANNAH RIVER PLANT

SC-RR-65-98+. 11 PAGES, 15 FIGURES, 3 TABLES, 2 REFERENCES, SYMPOSIUM ON SHIPMENT OF RADIOACTIVE MATERIALS, FIFTY-SEVENTH ANNUAL MEETING, BOSTON, MASSACHUSETTS, DECEMBER 6-10, 1964. INTERNATIONAL SYMPOSIUM ON PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS, ALBUQUERQUE, NEW MEXICO, JANUARY 12-15, 1965, CFSTI \$10.58 COPY, \$3.00 MICROFICHE

THE FIRST OF TWO SHIPMENTS OF AMERICIUM AND CURIUM ISOTOPES FROM THE SAVANNAH RIVER PLANT TO THE OAK RIDGE NATIONAL LABORATORY WAS REQUIRED IN 1963. THE DESIGN OF THE CASK AND ASSOCIATED NEW EQUIPMENT WAS INFLUENCED BY THE FACT THAT SAFE CONTAINMENT IS MORE DIFFICULT WITH A SOLUTION THAN WITH SOLID PRODUCTS SUCH AS IRRADIATED FUEL ELEMENTS, AND BY SPECIALIZED REQUIREMENTS FOR LOADING THE SOLUTION AT S.R.P. AND DIFFERENT SPECIALIZED REQUIREMENTS FOR UNLOADING AT O.R.N.L. IN ADDITION, A REVIEW OF PREVIOUS SHIPMENTS INDICATED THAT THE TWO PLANNED SHIPMENTS WOULD PROBABLY BE THE LARGEST OR CERTAINLY AMONG THE LARGEST KNOWN SHIPMENTS OF HIGHLY RADIOACTIVE SOLUTION EVER MADE. THIS PAPER PRESENTS THE DESIGN CONSIDERATIONS AND A DESCRIPTION OF THE EQUIPMENT, AS WELL AS A REVIEW OF EXPERIENCE DURING THE FIRST OF THE TWO SHIPMENTS.

*SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING + ACCIDENT ANALYSIS + ACCIDENT, LOSS OF COOLANT + ACCIDENT, MAXIMUM CREDIBLE (MCA) + CONTAINMENT DESIGN + CONTAINMENT, PRESSURE VESSEL + FIRE + TEST, LEAK RATE + TEST, PROOF

3-04960 LUSK EC
PRESSURE VENTING DEVICE FOR SPENT FUEL ELEMENT SHIPPING CASKS
BATTELLE MEMORIAL INSTITUTE

SC-RR-65-98+. 4 PAGES, 1 FIGURE, INTERNATIONAL SYMPOSIUM FOR PACKAGING AND TRANSPORT OF RADIOACTIVE MATERIALS, ALBUQUERQUE, NEW MEXICO, JANUARY 12-15, 1965, CFSTI \$10.58 COPY, \$3.00 MICROFICHE

SHIPPING CONTAINERS EMPLOYING LEAD AS THE SHIELDING MATERIAL HAVE A VOID REGION IN THE LEAD CAVITY DUE TO THE GREATER VOLUME CONTRACTION OF THE LEAD RELATIVE TO THE SHELL MATERIAL AFTER THE LEAD HAS SOLIDIFIED AT 620 F. ADDITIONAL VOID VOLUME IS ALSO INCLUDED IN THE LEAD CAVITY TO PROVIDE EXPANSION SPACE FOR THE LEAD IN ORDER TO MEET THE FIRE TEST REQUIREMENTS OF 10CFR PART 72. IF A CRACK OCCURS IN THE SHELL, MOISTURE CAN LEAK INTO THE VOID. IF THE CASK IS THEN EXPOSED TO HIGH TEMPERATURES, THE RAPID CONVERSION OF THE MOISTURE TO STEAM CAN PRODUCE DANGEROUSLY HIGH PRESSURES IN THE LEAD CAVITY. THE CRACK WHICH PERMITTED THE MOISTURE TO ENTER THE CASK SHELL CAN BECOME SEALED BY SEVERAL METHODS SUCH AS CORROSION, DIRT, PAINT, LEAD PACKING OR SHIFTING, AND BY THE YIELDING OF THE METAL SHELL. EVEN IF THE CRACK REMAINED OPEN, THE QUANTITY OF STEAM THAT COULD BE GENERATED IN A FIRE IN A SHORT TIME WOULD BUILD CONSIDERABLE PRESSURE IN TRYING TO ESCAPE THROUGH A SMALL OPENING. WATER HAS BEEN FOUND IN THE VOID AREA IN SEVERAL SHIPPING CASKS, AND AT LEAST ONE CASK NOT EQUIPPED WITH A VENTING DEVICE HAS EXPLODED FROM THIS CAUSE. TO ELIMINATE THIS POTENTIALLY DANGEROUS SITUATION, A DEVICE HAS BEEN DEVELOPED AND TESTED WHICH WILL SAFELY VENT STEAM FROM THE LEAD CAVITY.

*CONTAINMENT PENETRATION + *SHIPPING CONTAINER + LEAD + TRANSPORTATION AND HANDLING

3-04989 BOEGLY WJ + BRADSHAW RL + EMPSON FM + MCCLAIN WC + PARKER FL + SCHAFER WF
DISPOSAL OF HIGH-LEVEL POWER REACTOR WASTES IN A SALT MINE
OAK RIDGE NATIONAL LABORATORY

18 PAGES, FOR PRESENTATION OF THE ANNUAL MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS, CHICAGO, ILLINOIS, FEBRUARY 14-18, 1965

SALT FORMATIONS ARE THE MOST PROMISING MEDIUM FOR ULTIMATE DISPOSAL OF RADIOACTIVE WASTES-ADVANTAGES FOR SALT INCLUDE ITS AVAILABILITY, THERMAL CONDUCTIVITY, COMPRESSIVE STRENGTH, IMPERMEABILITY, AND LOW COST OF MINING. STUDIES AT THE OAK RIDGE NATIONAL LABORATORY HAVE BEEN CONCERNED WITH THE EFFECT OF THE WASTE ON THE SALT, AND HAVE ENCOMPASSED BOTH LIQUID AND SOLID WASTES. SPECIFIC AREAS OF STUDY WERE THE EFFECTS OF HEAT AND RADIATION ON THE PHYSICAL PROPERTIES OF ROCK SALT, HEAT TRANSFER FROM THE WASTE TO THE SALT, STABILITY OF THE MINE AT AMBIENT AND ELEVATED TEMPERATURES, AND THE PROCEDURES NECESSARY TO CONDUCT A DISPOSAL OPERATION IN A SALT MINE. AS A RESULT OF THESE STUDIES, A FIELD DEMONSTRATION OF A TYPICAL DISPOSAL OPERATION IN A SALT MINE (PROJECT SALT VAULT) HAS BEEN DESIGNED AND IS CURRENTLY BEING CONSTRUCTED. ETR FUEL ASSEMBLIES ARE USED AS THE HEAT AND RADIATION SOURCES. PROJECT SALT VAULT WILL BE OPERATED USING HANDLING OPERATIONS AND STORAGE TECHNIQUES THAT ARE SIMILAR TO THOSE PROPOSED FOR AN ACTUAL DISPOSAL OPERATION.

*RADIATION EFFECT + *THERMAL CONSIDERATION + *WASTE DISPOSAL, TERRESTRIAL + GEOLOGICAL CONSIDERATION, GENERAL + SITING, WASTE DISPOSAL + WASTE HANDLING + WASTE STORAGE

3-04999 LUKE CD
CONTAINER TESTING IN RELATION TO CRITICALITY EVALUATION
U. S. ATOMIC ENERGY COMMISSION, DIV. OF MATERIALS LICENSING
SC-RR-65-98+. 12 PAGES, INTERNATIONAL SYMPOSIUM ON PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS, ALBUQUERQUE, NEW MEXICO, JANUARY 12-15, 1965, CFSTI \$10.58 COPY, \$3.00 MICROFICHE

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-04999 *CONTINUED*

FOR SEVERAL YEARS THE ATOMIC ENERGY COMMISSION HAS BEEN FORMULATING STANDARDS FOR PACKAGING AND PROCEDURES TO ASSURE NUCLEAR SAFETY IN THE TRANSPORT OF SPECIAL NUCLEAR MATERIAL. IT IS THE OBJECTIVE HERE TO DISCUSS A PROPOSED PART 71 REVISION AS IT PERTAINS TO THE PREVENTION OF ACCIDENTAL CRITICALITY IN THE TRANSPORT OF UNIRRADIATED SPECIAL NUCLEAR MATERIAL. PART 71 SPECIFIES NO DESIGNS OR PACKAGING MATERIALS, BUT INCLUDES PERFORMANCE STANDARDS BASED UPON ENVIRONMENTAL CONSIDERATIONS AND AN ACCIDENT TEST SERIES. THERE ARE INCLUDED HEREIN COMMENTS ON THE INTERPRETATION OF STRUCTURAL TESTS ON PACKAGES AND A BRIEF RESUME OF COMPTITIVE METHODS FOR CONFIRMING THE NUCLEAR SAFETY OF INDIVIDUAL PACKAGES AND FOR ARRAYS OF PACKAGES COMPRISING A SHIPMENT.

*CRITICALITY SAFETY + *SHIPPING CONTAINER + *TESTING + ACCIDENT ANALYSIS + CODES AND STANDARDS + TRANSPORTATION AND HANDLING

3-05080 SISLER JA + GAUERKE RC
NEW DEVELOPMENTS IN CONTAINERS FOR SHIPPING RADIOACTIVE MATERIALS
SANDIA CORPORATION

SC-RR-65-98 + SC-DC-64-384+. 21 PAGES, 7 FIGURES, INTERNATIONAL SYMPOSIUM FOR PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS, JANUARY 12-15, 1965, ALBUQUERQUE, NEW MEXICO, CFSTI \$10.58 COPY \$3.00 MICROFICHE

THE ENTRANCE OF RADIOACTIVE ISOTOPES INTO THE INTERNATIONAL COMMERCIAL WORLD HAS CREATED NEW PROBLEMS FOR AGENCIES WHICH REGULATE THE PACKAGING AND SHIPMENT OF THESE DANGEROUS ARTICLES. BECAUSE THE CONSEQUENCES FROM AN ACCIDENTAL RELEASE OF RADIOACTIVE MATERIALS ARE UNKNOWN, STRINGENT REQUIREMENTS ARE IMPOSED UPON THE CONSTRUCTION OF CONTAINERS FOR THE SHIPMENT OF THESE ITEMS. THIS PAPER DISCUSSES THE DEVELOPMENT OF CONTAINERS WHICH MEET THESE RATHER UNUSUAL REQUIREMENTS.

*SHIPPING CONTAINER + *TESTING + ACCIDENT ANALYSIS + REGULATION, GENERAL + TRANSPORTATION AND HANDLING

3-05191 REVIEW OF 1964 GENEVA PAPERS RELATED TO NUCLEAR SAFETY
OAK RIDGE NATIONAL LABORATORY
21 PAGES, 1 TABLE- NUCLEAR SAFETY, 6(2)- 111-131 (WINTER 1964-1965)- GPO

THE CONTENTS OF THESE MORE THAN 150 PAPERS ARE REDUCED TO MANAGEABLE SCOPE HERE BY BRIEF DISCUSSIONS OF THE SUBJECT AREAS WITH WHICH THE RELEVANT PAPERS ARE CONCERNED, BY INCLUDING AN INDEX (TABLE 1) TO THE PAPERS COVERED, AND BY LISTING IN TABLE 2 THE NUMBER, ORIGINATING COUNTRY, AND PAPER TITLE. THE PAPERS GENERALLY REPRESENT A NATIONAL ENDEAVOR. NOTE- FOR ABSTRACTS OF INDIVIDUAL PAPERS, SEE NSIC-4254 THROUGH NSIC-4393.

*ACCIDENT ANALYSIS + *AEROSPACE SAFETY + *ATMOSPHERIC DIFFUSION + *BRITTLE FRACTURE + *CONTAINMENT, GENERAL + *CONTAINMENT, PRESSURE VESSEL + *CONTROL SYSTEM + *DESIGN CRITERIA + *DOSE + *EFFLUENT + *FAILURE, FUEL ELEMENT + *FUEL INTEGRITY + *HEAT TRANSFER + *REACTOR SAFETY SYSTEM + *REACTOR STABILITY + *REACTOR, MARITIME + *SITING, GENERAL + *SITING, REACTOR + *STEEL + *TESTING + *TRANSPORTATION AND HANDLING + *WASTE DISPOSAL, GENERAL + CHEMICAL SHIM + FISSION PRODUCT RELEASE, GENERAL + OPERATIONS REPORT, GENERAL + POISON, BURNABLE + POISON, SOLUBLE + REACTOR TRANSIENT

3-05278 COLE TA + TEMMER GM
A NEW METHOD FOR THE CONTAINMENT OF (ALPHA + BE) NEUTRON SOURCES
RUTGERS UNIVERSITY
2 PAGES, 2 TABLES, 6 REFERENCES- NUCLEAR INSTRUMENTS AND METHODS, 25(11)- 179-180 (1963)

MULTI-CURIE SOURCES OF ALPHA EMITTERS ARE NOW AVAILABLE FOR THE PREPARATION OF ENCAPSULATED NEUTRON SOURCES, USING THE WELL-KNOWN (ALPHA, N) REACTION ON BERYLLIUM. WHEN ENCLOSING SUCH SOURCES IN SMALL, TIGHT CONTAINERS, THERE ALWAYS EXISTS THE PROBLEM OF HELIUM-PRESSURE BUILD-UP DUE TO ALPHA DECAY. THE USUAL APPROACH TO COMBAT THIS DEFECT HAS BEEN TO MAKE THE CONTAINERS EVER STRONGER, AS WELL AS TO USE DOUBLE-WALLED CAPSULES. IT OCCURRED TO US THAT ONE MIGHT EXPLOIT THE FACT THAT QUARTZ AND PYREX ARE PERMEABLE TO HELIUM. FOR THE SAKE OF RUGGEDNESS OF THE SOURCE, THE RADIOACTIVE MATERIAL COULD BE SEALED IN A QUARTZ OR PYREX AMPULE, PADDED AGAINST SHOCK, AND ENCLOSED IN A PORCUS METAL CAPSULE.

*CONTAINMENT, SOURCE + FABRICATION + SOURCE, NEUTRON

3-05280 VORMUM G + MUENSTER HJ
OPERATION SAFETY OF SEALED RADIOACTIVE SOURCES
GERMAN ACADEMY OF SCIENCES, BERLIN-BUCH
10 PAGES, 4 FIGURES, 8 TABLES, 7 REFERENCES- KEPNERENERGIE 6(8)- 419-28 (AUGUST 1963)- ORNL-TR-258

THE OPERATIONAL SAFETY OF SEALED SOURCES DEPENDS ON THE MANNER OF FIXATION OF THE ACTIVITY AND ON THE MANNER OF CLOSING. THE PRESENTLY USED PREPARATION METHODS ARE CONSIDERED CRITICALLY. BY MEANS OF MORE LOAD TESTS, THE EFFICIENCY OF INDIVIDUAL SOURCE TYPES WAS ASCERTAINED. ON THE BASIS OF RESULTS, A FORMULATED TEST SCHEME IS DISCUSSED.

*CONTAINMENT, SOURCE + FABRICATION + SOURCE, NEUTRON

3-05290 NEW MOTION PICTURE TRANSPORTATION OF RADIOACTIVE MATERIALS, PART II, ACCIDENTS
U. S. ATOMIC ENERGY COMMISSION
1 PAGE- HEALTH AND SAFETY ISSUE NO. 205, MARCH 8, 1965- AEC-DOS

THE LECTURER POINTS OUT THE TRIFLING NATURE OF MOST ACCIDENTS INVOLVING RADIOACTIVE MATERIALS,

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-05290 *CONTINUED*

DEMONSTRATES THE SUPPOSED LEAKING CONTAINER, DISTINGUISHES BETWEEN A MINOR AND MAJOR GAMMA RADIATION HAZARD, DISCUSSES AIRBORNE RADIOACTIVITY, CONTAMINATION, FUEL ELEMENTS, WEAPONS AND RADIOLOGICAL ASSISTANCE.

*ACCIDENT, TRANSPORTATION + *TRANSPORTATION AND HANDLING + ACCIDENT ANALYSIS + AIRBORNE RELEASE

3-05291 REPORT ON INSURANCE PROBLEMS RELATING TO THE TRANSPORT OF IRRADIATED AND NON-IRRADIATED NUCLEAR FUELS BY SEA
LANGEVELDT DE VOS/DE WAAL + ZON, AMSTERDAM
102 PAGES- EUR-1639.F, 1964- MC

A DISCUSSION IS PRESENTED OF THE INSURANCE OF RISKS INVOLVED IN THE CARRIAGE BY SEA OF BOTH NON-IRRADIATED AND IRRADIATED NUCLEAR FUELS, THE ACCENT BEING ON THE LATTER. ALTHOUGH THE LIABILITY OF THE SHIPPER OF THE CONSIGNEE IS THE FOCAL PROBLEM, SPACE IS ALSO DEVOTED TO DAMAGE TO, OR LOSS OF, THE CARRYING VESSEL AND ITS NON-RADIOACTIVE CARGO.

*INSURANCE + *TRANSPORTATION AND HANDLING + FUEL HANDLING + LAW + LIABILITY

3-05299 DIXON FE

A STANDARD SERIES OF PACKAGINGS FOR LOADS UP TO 20,000 CURIES OF COBALT 60 OR EQUIVALENT UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL
SC-RR-65-98 + AERE-M-1512+. 8 PAGES, 4 FIGURES, 1 TABLE, 3 REFERENCES, INTERNATIONAL SYMPOSIUM FOR PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS, ALBUQUERQUE, NEW MEXICO, JANUARY 12-15, 1965, CFSTI \$10.58 COPY, \$3.00 MICROFICHE

WITH THE ADVENT OF THE I.A.E.A. REGULATIONS IN 1961 NEW PARAMETERS WERE SET FOR THE DESIGN OF PACKAGING FOR RADIOACTIVE MATERIAL. THIS PAPER DISCUSSES A COMPREHENSIVE RANGE BUILT UP LARGELY FROM AN EXISTING STANDARD RANGE, BUT WITH THE ADDITION OF THOSE FEATURES FOUND NECESSARY TO COMPLY WITH THE REGULATIONS, AND WHICH ARE DESCRIBED IN AERE R 4810 AND T.C.A.P. P64/65, TOGETHER WITH AN EXTENSION OF THE RANGE TO CARRY UP TO 20,000 CURIES OF COBALT 60 OR EQUIVALENT. THIS GIVES A COMPREHENSIVE RANGE OF SHIELDING THICKNESSES, ALL OF WHICH CAN BE TYPE B APPROVED AND SOME OF WHICH ARE USED ALSO AS TYPE A PACKAGING. THE SERIES CATERES FOR A LARGE PROPORTION OF THE ISOTOPE TRAFFIC.

*CODES AND STANDARDS + *SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING + COBALT + IAEA (INTERNATIONAL ATOMIC ENERGY AGENCY) + REGULATION, GENERAL

3-05300 DIXON FE + PARTRIDGE AH + BROOK AJ

THERMAL TESTS ON AN INSULATED, LARGE SOURCE, COBALT 60 CONTAINER DESIGN NO. 0063 UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL
SC-RR-65-98 + AERE-M-1511+. 27 PAGES, 7 FIGURES, 4 REFERENCES, DECEMBER 1964, INTERNATIONAL SYMPOSIUM FOR PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS, JANUARY 12-15, 1965, ALBUQUERQUE, NEW MEXICO, CFSTI \$10.58 COPY, \$3.00 MICROFICHE

AN ACCOUNT OF TESTS MADE TO DETERMINE THE TEMPERATURE RISE IN THE VENTILATED INSULATING SHIELD OF A CONTAINER DESIGN NO. 0063, CARRYING 105,000 CURIES OF COBALT 60, AND TO MEASURE THE EFFECT OF BLOCKING THE VENTILATION HOLES AS MIGHT OCCUR IN AN ACCIDENT. IT IS SHOWN THAT THE VENTILATED AND UNVENTILATED THERMAL SHIELDS DO NOT CAUSE OVER-HEATING OF THE CONTAINER.

*SHIPPING CONTAINER + *STEEL + *TESTING + CONTAINMENT PENETRATION + TEST, PROOF + TRANSPORTATION AND HANDLING

3-05387 BERNSTEIN GJ + CHILENSKAS AA + MALECHA RF
INTERBUILDING FUEL TRANSFER COFFIN FOR THE EBR-II REACTOR
ARGONNE NATIONAL LABORATORY

21 PAGES, 1 TABLE, 7 FIGURES, 2 REFERENCES- SEPTEMBER 1964, ANL-6934- CFSTI

A 20-TON, PORTABLE, LEAD-SHIELDED COFFIN HAS BEEN BUILT TO TRANSFER SPENT FUEL SUBASSEMBLIES FROM THE EBR-II REACTOR TO THE ADJOINING FUEL CYCLE FACILITY FOR PROCESSING. FISSION-PRODUCT HEAT OF ABOUT 1 KW IS REMOVED BY A CIRCULATING GAS STREAM WHICH IS DRIVEN BY AN ATTACHED BATTERY-POWERED BLOWER. AN INTERNAL HEAT EXCHANGER TRANSFERS THE HEAT FROM THE COOLANT GAS TO THE LEAD SHIELDING. PROVISION IS MADE FOR REMOVING A COATING OF SODIUM FROM THE FUEL SUBASSEMBLY WHILE IT IS WITHIN THE COFFIN. THE PRINCIPAL DESIGN FEATURES AND OPERATIONS ARE DESCRIBED.

*FUEL HANDLING + *SHIPPING CONTAINER + ACCIDENT ANALYSIS + ACCIDENT, LOSS OF COOLANT + EBR 1 AND 2 (EXPERIMENTAL BREEDER REACTORS) + EQUIPMENT DESIGN + HEAT TRANSFER + TRANSPORTATION AND HANDLING

3-05401 ADLER LB

HEAT TRANSFER STUDY OF COBALT-60 SHIPPING CONTAINER
BROOKHAVEN NATIONAL LABORATORY
14 PAGES, JUNE 1961, BNL-684- OTS

FURTHER HEAT TRANSFER STUDIES WERE MADE OF A 7-TON COBALT-60 SHIPPING CONTAINER WITH APPROXIMATE 81,000-CURIE COBALT LOADING. THE CONTAINER USED WAS OF REVISED GEOMETRY TO THAT EMPLOYED IN INITIAL EXPERIMENTS DUE TO THE INCLUSION OF AN ADDED SHIELDING LINER. MEASURED SURFACE TEMPERATURES INDICATED THAT THE REVISED CONTAINER IS SAFE- MAXIMUM TEMPERATURES RUN SLIGHTLY HIGHER THAN OBTAINED PREVIOUSLY. TEMPERATURE DATA SHOW THAT AIR-FLOW CONDITIONS

ACCESSION NUMBER 3-05290 TO 3-05401

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-05401 *CONTINUED*

WITHIN THE SOURCE LATTICE ARE RELATIVELY STAGNANT AND THAT CONVECTIVE HEAT REMOVAL IS SMALL. NON-RADIAL HEAT FLOW PATHS APPEAR TO BE MINIMAL. A DIRECTION FOR FUTURE EXPERIMENTS IS INDICATED- REVISIONS TO PRESENT APPARATUS ARE DESCRIBED.

*COBALT + *HEAT TRANSFER + *SHIPPING CONTAINER + CRITICALITY SAFETY + TRANSPORTATION AND HANDLING

3-05415 PATTERSON DA + FORTUNATO DE
FUEL HANDLING AND TRANSFER SYSTEM DEVELOPMENT
ALLIS-CHALMERS MANUFACTURING COMPANY
110 PAGES, 50 FIGURES- SEPTEMBER 28, 1964, ACNP-64015- OTS

THE PATHFINDER ATOMIC POWER PLANT INCLUDES A BOILING WATER REACTOR WITH AN INTEGRAL NUCLEAR SUPERHEATER. THIS REPORT SUMMARIZES THE DESIGN OF THE REFUELING SYSTEM FOR THE REACTOR. THE OBJECTIVE OF THIS PROJECT WAS TO PERFORM CONCEPTUAL ENGINEERING AND EXPERIMENTAL WORK AS REQUIRED FOR DEVELOPMENT OF SIMPLIFIED BUT RELIABLE FUEL HANDLING TOOLS AND SPECIAL TOOLS FOR REPAIRING OR REPLACING REACTOR PARTS.

*FUEL HANDLING + *MAINTENANCE AND REPAIR + *PATHFINDER + *TRANSPORTATION AND HANDLING + CONTAINMENT, HIGH PRESSURE + REACTOR, BOILING WATER + TESTING

3-05451 NOYES HE
IMPACT TESTS ON 20-INCH-CUBE BIRDCAGE-TYPE TRANSPORT CONTAINER (B. E. 1012)
LOS ALAMOS SCIENTIFIC LABORATORY
15 PAGES, 9 FIGURES- JANUARY 8, 1965, LA-3203-MS- CFSTI

THE SAFETY OF A PROPOSED UNIVERSAL CONTAINER FOR THE SHIPMENT OF FISSILE MATERIAL BY NORMAL METHODS OF TRANSPORT HAS BEEN EVALUATED BY DROP TESTS CONDUCTED BY THE SUPPLY AND PROPERTY DEPARTMENT AND BY CALCULATION OF NUCLEAR HAZARD BY GROUP N-2. THE CONTAINER WAS FOUND TO BE SAFE FOR PLANNED LOADINGS, AND HAS BEEN APPROVED BY THE BUREAU OF EXPLOSIVES UNDER APPROVAL NUMBER B. E. 1012.

*SHIPPING CONTAINER + *TEST, PROOF + *TESTING + FIRE + TRANSPORTATION AND HANDLING

3-05452 DOSHI KD
STRUCTURAL INTEGRITY OF SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS. PART IV- A DISCUSSION OF APPROACHES TO THE VEHICLE-COLLISION PROBLEM
FRANKLIN INST. LABS. FOR RESEARCH AND DEVELOPMENT, PHILADELPHIA
20 PAGES- DECEMBER 1964, NYO-2539-3- CFSTI

THE PRESENT REPORT EXAMINES SPECIFIC SITUATIONS, NAMELY, THOSE INVOLVING COLLISION BETWEEN TWO VEHICLES ON HIGHWAYS WITH AT LEAST ONE OF THE VEHICLES BEING A CARRIER OF RADIOACTIVE MATERIALS, AND IT PRESENTS VARIOUS APPROACHES AVAILABLE FOR STUDY OF THIS PROBLEM. THE REPORT IS DIVIDED INTO TWO PARTS- IN THE FIRST PART THE RESEARCH PROBLEM IS DEFINED AND A QUALITATIVE DESCRIPTION IS GIVEN OF MECHANICAL PROCESSES INVOLVED IN VEHICLE-COLLISIONS. THIS IS FOLLOWED BY AN OUTLINE OF PRESENTLY AVAILABLE TECHNICAL INFORMATION PERTINENT TO SUBJECT MATTER OF THE PROBLEM. IN THE SECOND PART, THREE DIFFERENT APPROACHES TO A STUDY OF THE PROBLEM ARE OUTLINED- THESE ARE NAMED EXPERIMENTAL APPROACH, ANALYTICAL APPROACH, AND ANALYTICAL-EXPERIMENTAL APPROACH.

*SHIPPING CONTAINER + ACCIDENT ANALYSIS + ACCIDENT, TRANSPORTATION + TRANSPORTATION AND HANDLING

3-05748 LLOYD RC + CLAYTON ED
SUBCRITICAL MEASUREMENTS WITH STORAGE CONTAINERS OF PLUTONIUM NITRATE SOLUTION
BATTELLE-NORTHWEST
16 PAGES, 7 FIGURES, 3 TABLES, 5 REFERENCES, FEB. 25, 1965, BNWL-19, CFSTI

SUBCRITICAL NEUTRON MULTIPLICATION MEASUREMENTS WERE PERFORMED WITH $Pu(NO_3)_4$ SOLUTIONS IN TWO TYPES OF STORAGE CONTAINERS - ONE SHIELDED WITH PB-CD (PR CAN) AND THE OTHER (SN CAN) NOT SHIELDED. THE DATA PROVIDE AN IMPROVED BASIS FOR ESTABLISHMENT OF NUCLEAR SAFETY IN REGARD TO STORAGE LIMITS FOR THESE CONTAINERS.

*CRITICALITY SAFETY + *FUEL STORAGE + *PLUTONIUM + *STORAGE CONTAINER

3-05755 CORDES OL + BIRD RP + DINNEEN GA + FIELDING JR
RADIOLOGICAL ASPECTS OF SNAPTRAN 2/10A-3 DESTRUCTIVE TEST
PHILLIPS PETROLEUM COMPANY
68 PAGES, 32 FIGURES, 13 TABLES, 18 REFERENCES, JANUARY, 1965, IDO-17038- CFSTI

INFORMATION FOR THE AEROSPACE SAFETY PROGRAM WAS ACQUIRED BY SUBJECTING A SNAP 2/10A REACTOR TO A SIMULATED WATER IMMERSION ACCIDENT WHICH RESULTED IN DESTRUCTIVE DISASSEMBLY OF THE REACTOR CORE. THIS REPORT DESCRIBES IN DETAIL AN EXTENSIVE MONITORING GRID USED TO MONITOR THE RADIOLOGICAL EFFECTS OF THE DESTRUCTIVE EXCURSION AND SUBSEQUENT RELEASE OF FISSION PRODUCTS. AN ANALYSIS OF THE DATA IS INCLUDED WHICH INDICATES THAT THE DIRECT RADIATION HAZARDS WERE LOW AND THAT THE ONLY FISSION PRODUCTS RELEASED TO THE ENVIRONMENT WERE LESS THAN 4 PERCENT OF THE NOBLE GASES. HALOGENS THAT ESCAPED FROM THE FUEL WERE RETAINED IN THE ENVIRONMENTAL WATER.

*AEROSPACE SAFETY + *SNAP 10A (SYSTEMS FOR NUCLEAR AUXILIARY POWER) + *SNAP 2 (SYSTEMS FOR NUCLEAR AUXILIARY POWER) + *TESTING + ACCIDENT ANALYSIS + ATMOSPHERIC DIFFUSION +

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-05755 *CONTINUED*
BERYLLIUM + CONTROL, METEOROLOGICAL + DEPOSITION + DOSE + DOSIMETRY, GENERAL + FILTER +
FILTER EFFICIENCY + FISSION GAS RELEASE + FISSION PRODUCT RELEASE, GENERAL + HALOGEN +
INSTRUMENTATION, AIR SAMPLING + INSTRUMENTATION, METEOROLOGICAL + IODINE + MONITOR, RADIATION, SAMPLING +
NOBLE GAS + REACTOR, SPACE

3-05831 AMERICIUM SHIPPING CONTAINER EXPLOSION
U. S. ATOMIC ENERGY COMMISSION
4 PAGES, 3 FIGURES- MARCH 26, 1965, SERIOUS ACCIDENTS, ISSUE NO. 247- AEC/DOS

A SHIPPING CONTAINER, HOLDING 4.83 GRAMS OF AMERICIUM IN AQUEOUS CHLORIDE SOLUTION, EXPLODED
IN AN UNOCCUPIED ROOM. THE ABOVE ACCIDENT CAUSED CONTAMINATION OF THE ROOM IN WHICH THE
EXPLOSION OCCURRED AND THE LOSS OF ABOUT 2.5 GRAMS OF AMERICIUM AND SOME FURNITURE. THE
MONETARY LOSS AND DAMAGE ARE ESTIMATED AT \$3,506. THERE WERE NO INJURIES OR RADIATION
EXPOSURES. IT IS NOT KNOWN WHETHER THE CONTAINER FAILED DUE TO A CHEMICAL EXPLOSION OR A
SLOW PRESSURE BUILDUP.

*SHIPPING CONTAINER + ACCIDENT ANALYSIS + ELEMENTS AND ISOTOPES + EXPLOSION + TRANSPORTATION AND HANDLING

3-05841 JAPANESE PATENT PUBLICATION 1963-3200 FREIGHT CONTAINER FOR RADIOACTIVE MATERIALS
11 PAGES- APRIL 12, 1965, JAPANESE PATENT 409,289, ORNL-TR-600- PATENTS (FOREIGN)

THE OBJECT OF THIS INVENTION IS TO FURNISH A FREIGHT CONTAINER WHICH MEETS THE ABOVE-MENTIONED
REQUIREMENTS, AND TO FURNISH A SHIELDED CONTAINER FOR THE CONSUMED FUEL MODULES WHICH
CONSISTS OF SUPPORTS FOR SEVERAL MODULES, A DEVICE FOR TRANSMITTING EXCESS HEAT GENERATED BY
THE FUEL MODULES, A DEVICE WHICH ALLOWS TOP LOADING OR UNLOADING OF THE FUEL ELEMENTS, AND A
REVOLVING TOP LID WHICH MAY BE ALIGNED WITH ANY FUEL ELEMENT FOR EASY LOADING OR UNLOADING.

*SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING + DESIGN CRITERIA + PATENTS

3-05881 CONTAINERS FOR RADIOACTIVE MATERIAL
UNITED KINGDOM ATOMIC ENERGY AUTHORITY
2 PAGES- ATOM, (101)- 60-61 (MARCH 1965)

A BRIEF ACCOUNT IS GIVEN OF THE IMPROVED CONTAINERS DEVELOPED BY THE AEA. FURTHER DETAILS CAN
BE OBTAINED FROM GRAVINER (GOSPORT) LTD., FAREHAM ROAD, GOSPORT, HAMPSHIRE.

*SHIPPING CONTAINER + *UNITED KINGDOM + CONTAINMENT DESIGN + TRANSPORTATION AND HANDLING

3-05998 TRANSPORT OF IRRADIATED FUEL
ARGONNE NATIONAL LABORATORY
4 PAGES, 3 TABLES, 5 REFERENCES- REACTOR FUEL PROCESSING 8(2)- 73-76, REF. 22-26, P. 76 (SPRING 1965)

REVIEW OF THE LATEST PRACTICES AND PROCEDURES FOR LICENSING IN THE UNITED STATES WAS PRESENTED
AT THE SYMPOSIUM ON SHIPMENT OF RADIOACTIVE MATERIALS AT THE 57TH ANNUAL MEETING OF THE
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. SEQUENTIAL ACCIDENT TEST CONDITIONS ARE (1) FREE
FALL FROM A HEIGHT OF 30 FT., STRIKING AN ESSENTIALLY UNYIELDING SURFACE IN SUCH A POSITION
AS TO SUFFER MAXIMUM DAMAGE- (2) A PUNCTURE DROP TEST- (3) A SPECIFIED FIRE- AND (4) TOTAL
IMMERSION UNDER 3 FT. OF WATER.

*TRANSPORTATION AND HANDLING + ACCIDENT ANALYSIS + FUEL HANDLING + SHIPPING CONTAINER + TESTING

3-06025 TREATMENT OF LIQUID WASTES BY ION EXCHANGE AND FOAM SEPARATION
ARGONNE NATIONAL LABORATORY
4 PAGES, 1 FIGURE- REACTOR FUEL PROCESSING, 6(1)- 44-47 (JANUARY 1963)- GPO

DEVELOPMENT OF A SCAVENGING ION-EXCHANGE PROCESS FOR PROCESS WATER HAS PROGRESSED TO THE
PILOT-PLANT PHASE AT ORNL. SODIUM HYDROXIDE AND AN IRON COAGULANT WAS USED TO REDUCE THE
INFLUENT HARDNESS AND DUOLITE CS-100 WAS USED AS THE ION EXCHANGE RESIN. DECONTAMINATION
FACTOR RANGED FROM 2000 TO 12,000 FOR SR AND 80 TO 3500 FOR CESIUM. ESTIMATED COSTS FOR A
750,000 GAL/DAY PLANT COME TO 63 CENTS/1000 GAL. AT HANFORD, AMBERLITE 200 WAS USED TO
DECONTAMINATE PUREX TANK-FARM CONDENSATE. THE EFFLUENT WAS BELOW MPCW, EXCEPT FOR RUTHENIUM.
ORGANIC MATTER AGGLOMERATION CAUSED AN INCREASE IN PRESSURE DROP ACROSS THE COLUMN. ADDITION
OF NITRIC ACID IMPROVED THE HYDRAULIC CHARACTERISTICS OF THE BED. CALCIUM INTERFERES WITH
STRONTIUM REMOVAL IN FOAM SEPARATION PROCESSES BEING STUDIED AT ORNL BUT PH IS NOT TOO
IMPORTANT. GOOD DECONTAMINATION CAN BE OBTAINED WITH A FOAM HEIGHT OF ONE FOOT. COPPER
FERROCYNANIDE, USED WITH GELATIN AS A SURFACTANT, REMOVED 96% OF THE CESIUM FROM 6M NaNO₃
SOLUTION WITH A VOLUME REDUCTION OF OVER 300. IN LOW-LEVEL ACTIVITY WASTES, SODIUM DODECYL
BENZENE SULFONATE GAVE THE HIGHEST STRONTIUM DISTRIBUTION COEFFICIENT.

*WASTE TREATMENT, GENERAL + EFFLUENT

3-06293 BARTON GB
RADIOACTIVE STRONTIUM CONTAINMENT
2 PAGES, 1 TABLE, 2 REFERENCES- DECEMBER 15, 1964, U. S. PATENT 3,161,600- PATENTS (U. S.)

A DESCRIPTION OF HOW RADIOACTIVE STRONTIUM CAN BE SAFELY CONTAINED WITHIN A NONFLAMMABLE,
HIGHLY INSOLUBLE MATERIAL IS GIVEN.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-06293 *CONTINUED*
*CONTAINMENT, SOURCE + *SHIPPING CONTAINER + *STRONTIUM + *TRANSPORTATION AND HANDLING

3-06294 BARTON GB
RADIOACTIVE CESIUM CONTAINMENT
2 PAGES, 1 TABLE, 1 REFERENCE- DECEMBER 15, 1964, U. S. PATENT 3,161,601- PATENTS (U. S.)

A DESCRIPTION OF HOW RADIOACTIVE CESIUM CAN BE SAFELY CONTAINED WITHIN A NONFLAMMABLE, HIGHLY INSOLUBLE MATERIAL IS GIVEN.

*CESIUM + *CONTAINMENT, SOURCE + *SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING + PATENTS

3-06304 BLOMEKE JO + SHAPPERT LB
RADIOCHEMICAL PROCESSING - OFF-SITE TRANSPORTATION AND ULTIMATE STORAGE PROBLEMS
OAK RIDGE NATIONAL LABORATORY
MARCH 14, 1965, ORNL-TM-164- (CF60-7-95) AICHE SYMPOSIUM ON NUCLEAR CHEMICAL PLANT SAFETY, WASHINGTON, D. C., DECEMBER 4-7, 1960- CFSTI

SAFE AND ECONOMICAL METHODS OF HANDLING RADIOACTIVE MATERIALS OFF-SITE ARE REQUIRED FOR THE SUCCESSFUL OPERATION OF NUCLEAR CHEMICAL PLANTS. THESE OCCASIONS ARISE IN THE SHIPMENT OF SPENT FUEL, RADIOACTIVE ISOTOPES, AND LIQUID WASTES. AN UNSOLVED PROBLEM EXISTS IN THE DEVELOPMENT OF TECHNIQUES AND SITES FOR THE FINAL DISPOSAL OF WASTE PRODUCTS.

*TRANSPORTATION AND HANDLING + ECONOMIC STUDY

3-06438 NOYES HE
SUPPLEMENTAL IMPACT TESTS ON ICC 6-J AND ICC 2-R CONTAINER (B.E. 1736)
LOS ALAMOS SCIENTIFIC LABORATORY
19 PAGES, 13 FIGURES- APRIL 30, 1965, LAMS-2983 SUPPLEMENT- CFSTI

THE TESTS HAVE CONCLUSIVELY PROVED THE INTEGRITY OF THE PACKAGE UNDER FULL LOADING AND SEVERE IMPACTS BEYOND NORMAL TRANSPORT ACCIDENT CONDITIONS, EVEN WHEN PERFORMED CONSECUTIVELY ON ONE CONTAINER AT TWICE THE SCOPE OF ACCEPTED CRITERIA. THERE WAS NO RUPTURE OF ANY PORTION OF THE CONTAINER, AND THE SEALS REMAINED INTACT. IT IS IMPRESSIVE TO NOTE THERE WAS LESS DENTING OF THE DRUM WITH THE 3/8-INCH BOLT THAN WITH THE 5/8-INCH BOLT USED IN THE FIRST DROPS OF THIS SERIES. THE CONTAINER WILL BE SUBMITTED TO THE INTERSTATE COMMERCE COMMISSION FOR APPROVAL AND SUBSEQUENT PUBLICATION IN THE TARIFFS AS A STANDARD SPECIFICATION REUSABLE CONTAINER.

*SHIPPING CONTAINER + *TESTING + *TRANSPORTATION AND HANDLING + CONTAINMENT CONSTRUCTION + CONTAINMENT INTEGRITY

3-06469 LAMB E
TRANSPORTATION OF IRRADIATED FUEL ELEMENTS
OAK RIDGE NATIONAL LABORATORY
6 PAGES, 1 TABLE, 23 REFERENCES- NUCLEAR SAFETY, 6(3)- 249-254, SPRING 1965- GPO

THIS ARTICLE DEALS MAINLY WITH THE SEPTEMBER 1961 VERSION OF PROPOSED PART 72, TITLE 10, CODE OF FEDERAL REGULATION, AND ATTEMPTS TO GIVE SOME INSIGHT INTO THOSE AREAS WHERE CHANGES ARE BEING DISCUSSED AND ARE MOST LIKELY TO BE MADE. AS OF APRIL 15, 1965, THE EXPECTED REVISIONS HAD NOT BEEN PUBLISHED. WHEN PART 72 DOES BECOME EFFECTIVE, NUCLEAR SAFETY WILL PUBLISH A NOTATION CONCERNING THE AREAS IN WHICH THE REGULATION DIFFERS FROM THE CONTENT OF THIS ARTICLE.

*FUEL HANDLING + *REGULATION, GENERAL + *TRANSPORTATION AND HANDLING + CODES AND STANDARDS + CRITICALITY SAFETY + DECAY HEAT + REGULATION, AEC + SHIPPING CONTAINER

3-06666 WHITE JD + RICHEY CR + LLOYD RC + CLAYTON ED + BIERMAN SR
CRITICAL MASS PHYSICS
HANFORD ATOMIC PRODUCTS OPERATION, RICHLAND, WASHINGTON
13 PAGES, 3 TABLES, 3 FIGURES, 10 REFERENCES- JANUARY 15, 1965, HW-84608- PAGES 77-90 OF PHYSICS RESEARCH QUARTERLY REPORT OCTOBER, NOVEMBER, DECEMBER, 1964, CFSTI

CRITICAL EXPERIMENTS WITH PLUTONIA-POLYSTYRENE COMPACTS AND VARIOUS COMPOSITE REFLECTORS AND SHIELDING MATERIALS, AND SUBCRITICAL MEASUREMENTS ON STORAGE CONTAINERS OF PLUTONIUM NITRATE AND PLUTONIA POWDER.

*CRITICALITY SAFETY + *PLUTONIUM + MEASUREMENT, SUBCRITICALITY + STORAGE CONTAINER

3-06703 ERKES P
HYDRODYNAMIC REACTOR-FUEL TRANSFER
BUREAU D ETUDES NUCLEAIRES, BRUSSELS, BELGIUM
2 PAGES, 3 FIGURES- NUCLEONICS 23(7)- 82-83, (JULY, 1965)

A FUEL TRANSFER SYSTEM FOR SIENA POWER REACTOR AT CHOOZ, FRANCE, HAS BEEN DEVELOPED. IT IS ACCOMPLISHED HYDRODYNAMICALLY THROUGH A TUBE BETWEEN 2 POOLS. THE SYSTEM IS DESCRIBED- DESIGN, OPERATION, COMPONENTS, ECONOMICS, AND HEAT DISSIPATION.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-06703 *CONTINUED*
*FRANCE + *FUEL HANDLING + *TRANSPORTATION AND HANDLING + ACCIDENT ANALYSIS + ECONOMICS

3-06709 METAL-OXIDATION AND IGNITION
ARGONNE NATIONAL LABORATORY
4 PAGES, 3 FIGURES- APRIL 1965, ANL-7020, PAGES 192-95 OF CHEMICAL ENGINEERING DIVISION RESEARCH HIGHLIGHTS- CFSTI

PRE-IRRADIATION DECREASES IGNITION TEMPERATURE OF URANIUM

*FIRE + FUEL HANDLING + URANIUM

3-06758 LEWIS RE + BUTLER TA + LAMB E
RECOVERY OF CS 137 FROM FISSION-PRODUCT WASTES AND TRANSPORT BY AN ALUMINOSILICATE ION EXCHANGER
OAK RIDGE NATIONAL LABORATORY
15 PAGES, 4 TABLES, 3 FIGURES, 20 REFERENCES- MAY 1965, ORNL-3765- CFSTI

THIS REPORT DESCRIBES THE DEVELOPMENT AND DEMONSTRATION OF AN ION EXCHANGE PROCEDURE FOR RECOVERING FISSION-PRODUCT CESIUM FROM BASIC FISSION-PRODUCT WASTES AND A MEANS FOR TRANSPORTING LARGE QUANTITIES OF CS 137 FROM RICHLAND, WASHINGTON, TO OAK RIDGE, TENNESSEE.

*CESIUM + *TRANSPORTATION AND HANDLING + *WASTE TRANSPORTATION

3-06760 JAMES B + PAYNE DD + WALCHLI HE
EXPERIENCE IN THE SHIPMENT OF YANKEE FUEL ASSEMBLIES FOR POST-IRRADIATION EXAMINATION
WESTINGHOUSE ELECTRIC CORPORATION, ATOMIC POWER DIVISION
160 PAGES, TABLES, FIGURES- FEBRUARY 1965, WCAP-6062, CFSTI

THE METHOD OF SHIPMENT SELECTED WAS TRANSPORT OF A PURCHASED SINGLE ELEMENT CASK BY COMMON CARRIER. CASK HANDLING, DECONTAMINATION, VEHICLE LOADING, GENERAL MAINTENANCE AND EMERGENCY SERVICES AT BOTH TERMINALS AND AS REQUIRED ENROUTE WERE PROVIDED BY A GENERAL CONTRACTOR WITH EXPERIENCE IN THIS LINE OF WORK. THIS REPORT PRESENTS THE KNOWLEDGE AND EXPERIENCE GAINED FROM THESE SPENT FUEL SHIPMENTS. IT DISCUSSES THE EQUIPMENT EMPLOYED, THE APPROVALS REQUIRED, AND THE TECHNICAL AND ADMINISTRATIVE PROBLEMS THAT HAD TO BE RESOLVED. THIS REPORT ALSO PRESENTS AN ANALYSIS OF THE THERMAL CHARACTERISTICS OF THE SPENT FUEL AND THE SINGLE ELEMENT SHIPPING CASK.

*FUEL HANDLING + *TRANSPORTATION AND HANDLING + *YANKEE + ACCIDENT ANALYSIS + CONTAINMENT, HIGH PRESSURE + CRITICALITY SAFETY + DECAY HEAT + HEAT TRANSFER + INTEGRITY + REACTOR, PRESSURIZED WATER + SHIPPING CONTAINER + THERMAL ANALYSIS

3-06765 ADCOCK FE + BYRNE JT + DELNAY RL
PLUTONIUM OXIDE SHIPPING PACKAGES
THE DOW CHEMICAL COMPANY, ROCKY FLATS DIVISION
90 PAGES, FIGURES, TABLES- APRIL 28, 1965, RFP-501- CFSTI

THIS REPORT DESCRIBES PART OF A PROGRAM CARRIED OUT BY THE ROCKY FLATS DIVISION OF THE DOW CHEMICAL COMPANY FOR THE DIVISION OF NUCLEAR MATERIALS MANAGEMENT TO DEVELOP PROCEDURES AND CONTAINERS WHICH WOULD PERMIT THE SHIPMENT OF PLUTONIUM OXIDE WITHOUT SHIPPER-RECEIVER DISCREPANCIES. THIS REPORT COVERS THE DESIGN, TESTING, AND EVALUATION OF PLUTONIUM OXIDE SHIPPING PACKAGES.

*OXIDE + *PLUTONIUM + *PROCEDURES AND MANUALS + *SHIPPING CONTAINER + DESIGN STUDY + REGULATION, AEC + TESTING

3-06829 JOHNSTON KW
THE TRANSPORT CONTAINER FOR IRRADIATED FUEL FROM CIVIL POWER STATIONS IN THE UK
8 PAGES, 8 FIGURES- JUNE 1965, SC-RR-65-98 (CONF-650103), PP. 711-718 OF PROCEEDINGS OF INTERNATIONAL SYMPOSIUM FOR PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS, ALBUQUERQUE, NEW MEXICO, JANUARY 12-15, 1965- CFSTI

THE CONTAINER IS A FABRICATED STEEL FLASK DESIGNED WITH A LIMIT OF 50 TONS/LOAD- FUEL ELEMENTS ARE RANDOMLY PACKED IN A SKIP AND COOLED BY WATER AND FINS ON THE FLASK. THE GAS RELIEF FILTER WHICH PREVENTS WATER LOSS IS DESCRIBED. THERMAL TESTS WITH EXTERNAL SOLAR RADIATION AND INTERNAL HEAT SOURCES UP TO 15 KW SHOW THAT TRANSPORT REGULATIONS WILL NOT BE VIOLATED. DIFFICULTIES ENCOUNTERED IN

*FUEL ELEMENT + *SHIPPING CONTAINER + TESTING + UNITED KINGDOM

3-06830 MORIYA T + JIN T
DISPERSION OF RADIOISOTOPES CAUSED BY TRANSPORT FIRES
4 PAGES, 1 FIGURE, 2 TABLES- JUNE 1965, SC-RR-65-98 (CONF-650103), PP. 719-722 OF PROCEEDINGS OF INTERNATIONAL SYMPOSIUM FOR PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS, ALBUQUERQUE, NEW MEXICO, JANUARY 12-15, 1965- CFSTI

MEASUREMENTS WERE CARRIED OUT ON THE DISPERSION RATIO OF RADIOISOTOPES CAUSED BY A FIRE, I.E., THE RATIO OF AIRBORNE ACTIVITY TO THE ACTIVITY REMAINING IN THE BURNED MATERIALS. THE MEASUREMENTS WERE MADE BURNING SODIUM CHLORIDE (24NA) AND AMMONIUM BROMIDE (82BR) SOLUTIONS

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-06830 *CONTINUED*

WITH VARIOUS COMBUSTIBLE MATERIALS AT TEMPERATURES UP TO 800 DEGREE C IN A PROPANE FIRE. THE MEASURED DISPERSION RATES ARE TABULATED.

*FIRE + *TRANSPORTATION AND HANDLING + BROMINE + DISPERSION + SHIPPING CONTAINER + SODIUM + TEST, LEAK LOCATION

3-06831 MORIYA T + JIN T

STUDIES ON FIRE RESISTIVITIES OF RADIOISOTOPE CONTAINERS

9 PAGES, 6 FIGURES, 2 TABLES, 3 REFERENCES- JUNE 1965, SC-RR-65-98 (CONF-650103), PP. 723-731 OF PROCEEDINGS OF INTERNATIONAL SYMPOSIUM FOR PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS, ALBUQUERQUE, NEW MEXICO, JANUARY 12-15, 1965- CFSTI

EXPERIMENTAL STUDIES AND THEORETICAL CALCULATIONS WERE MADE OF THE FIRE RESISTANCE OF LEAD-SHIELDED CONTAINERS OF VARIOUS SIZES. FIRE TESTS WERE ALSO PERFORMED ON PACKAGES USED FOR MAILING RADIOISOTOPES, AND THE LEAKAGE OF SODIUM CHLORIDE (24NA) AND AMMONIUM BROMIDE (82BR) SOLUTIONS FROM THE PACKAGES WERE MEASURED.

*FIRE + *SHIPPING CONTAINER + BROMINE + SODIUM + TEST, LEAK LOCATION + THERMAL EXPERIMENT

3-06932 TRANSPORTATION OF IRRADIATED FUEL

ARGONNE NATIONAL LABORATORY

2 PAGES, 2 TABLES- REACTOR FUEL PROCESSING 8(1)- 2-3 (1965)

IRRADIATED FUEL SHIPMENT COSTS ARE DISCUSSED (TABLES OF TYPICAL COSTS ACCORDING TO NORA AND MYRA CODES ARE PRESENTED), AND THE AUTHOR LAMENTS THAT MUCH REMAINS TO BE DONE IN ANALYZING ACCIDENTS AND IN ESTABLISHING SHIPPING AND DESIGN CRITERIA IN SUCH A MANNER THAT THE OVERALL COSTS AND ECONOMIC RISKS CAN BE EVALUATED.

*FUEL HANDLING + *TRANSPORTATION AND HANDLING

3-07117 NEFF KE

SUMMARY REPORT- PREPARATION AND TRANSPORTATION OF PIQUA FUEL ELEMENTS
ATOMICS INTERNATIONAL

32 PAGES, REFERENCES- OCTOBER 12, 1964, NAA-SR-MEMO-10529- CFSTI

THE RELATIVE MERITS OF FACTORY AND FIELD ASSEMBLY OF THE PIQUA FUEL ELEMENTS WERE EVALUATED, AND FACTORY ASSEMBLY WAS SELECTED AS THE MORE DESIRABLE. HOWEVER, DUE TO THEIR CONFIGURATION, IT WAS JUDGED PROBABLE THAT THE FINAL ELEMENTS WOULD SUSTAIN DAMAGE IF SHIPPED ASSEMBLED TO THE PNP SITE WITHOUT SPECIAL PROVISIONS. A PROCEDURE WAS THEN DEVELOPED, WHEREIN THE FUEL ELEMENTS WERE FILLED WITH DIPHENYL TO PREVENT RELATIVE MOVEMENT OF THE FUEL ELEMENT PARTS, THUS INHIBITING DAMAGE IN TRANSIT. SPECIAL SHIPPING CONTAINERS, A SOFT-RIDE VEHICLE, AND INSTRUMENTATION FOR MONITORING THE SHIPMENTS WERE PROVIDED. FOLLOWING A SUCCESSFUL TEST OF THE PROCEDURE AND EQUIPMENT, THE 120 INITIAL PIQUA FUEL ELEMENTS WERE DELIVERED TO THE PNP SITE.

*PIQUA + *TRANSPORTATION AND HANDLING + ADMINISTRATIVE CONTROLS AND PRACTICES + FUEL HANDLING + REACTOR, ORGANIC COOLED + TESTING

3-07173 RICHEY CR + WHITE JD

CRITICAL EXPERIMENTS WITH PLUTONIUM DIOXIDE-POLYSTYRENE COMPACTS PLUTONIUM-240 EQUAL 8.0 PERCENT, HYDROGEN TO PLUTONIUM RATIO EQUAL 15

BATTELLE-NORTHWEST, RICHLAND

9 PAGES, 2 FIGURES, 3 TABLES, 8 REFERENCES- PAGES 27-35 OF PHYSICS RESEARCH QUARTERLY REPORT, JANUARY, FEBRUARY, MARCH, 1965- JULY 28, 1965, BNWL-95- CFSTI

IN ORDER TO INVESTIGATE THE POSSIBLE CRITICALITY OF WET POWDERS, PRECIPITATES, SLURRIES, POLYMERS, ETC., HOMOGENEOUS PLUTONIUM DIOXIDE-POLYSTYRENE COMPACTS (H TO PU ATOMIC RATIO 15 8.0 PERCENT PU-240) IN THE SHAPE OF NEAR CUBES LONG COLUMNS AND THIN SLABS WERE ASSEMBLED ON THE SPLIT-TABLE MACHINE TABLES OF EXPERIMENTAL DATA. ANALYSIS BY CONSTANT BUCKLING CONVERSION SCHEME AND MULTIGROUP THEORY.

*CRITICALITY EXPERIMENT + *HYDROGEN + *PLUTONIUM OXIDE + COMPUTER, DIGITAL

3-07192 HAFF KW + SHAPPERT LB

INTERNATIONAL SYMPOSIUM ON PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS

OAK RIDGE NATIONAL LABORATORY

4 PAGES- NUCLEAR SAFETY 6(4)- 371-374 PLUS REFERENCES ON PAGE 385 (SUMMER 1965)

THE FIVE AREAS OF CONCERN COVERED AT THE SYMPOSIUM ARE REVIEWED- 1) REGULATIONS AND PROGRAMS 2) FIRE TESTING 3) VEHICLE AND CONTAINER IMPACTS 4) CONTAINER DEVELOPMENT AND 5) CRITICALITY.

*TRANSPORTATION AND HANDLING + CRITICALITY SAFETY + FIRE + REGULATION, GENERAL + SHIPPING CONTAINER + TESTING

3-07275 NICHOLS RC

EVALUATION OF THE OFF-SITE CONSEQUENCES OF A HYPOTHETICAL ACCIDENT IN A NUCLEAR REACTOR
WESTINGHOUSE ELECTRIC CORPORATION, ATOMIC POWER DIVISION, PITTSBURGH

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-07275 *CONTINUED*
1 PAGE, 1 FIGURE, 6 REFERENCES- CONF-650602, PAGE 138 OF AMERICAN NUCLEAR SOCIETY ANNUAL MEETING TRANSACTIONS, GATLINBURG, TENNESSEE, JUNE 21-25, 1965

THE ANALYTICAL METHOD PRESENTED IS DEVELOPED FOR GENERAL APPLICATION TO REACTOR-HAZARDS ANALYSIS. THE SPECIFIC EXAMPLE DISCUSSED COVERS THE MODEL AS APPLIED TO A NUCLEAR-POWER STATION THAT INCORPORATES THE DOUBLE CONTAINMENT WITH PUMPBACK CONCEPT IN ITS DESIGN. VARIOUS COMBINATIONS OF DISPERSION, DISTANCE AND TERRAIN ARE EVALUATED TO DETERMINE THE HIGHEST CONCENTRATION OCCURRING AT OR BEYOND THE SITE BOUNDARY. NO CREDIT IS TAKEN FOR REMOVAL OF ACTIVITY FROM THE PLUME BY DEPOSITION OR RAINOUT PHENOMENA. BOTH WHOLE BODY AND INHALATION MPCs ARE INVESTIGATED TO DETERMINE WHICH IS LIMITING.

*ACCIDENT MODEL + *HAZARDS ANALYSIS + CONTAINMENT, MULTIPLE + MAXIMUM PERMISSIBLE CONCENTRATION (MPC) + SITING, REACTOR

3-07470 MOSELEY JD + WING RO
PROPERTIES OF PLUTONIUM DIOXIDE
THE DOW CHEMICAL COMPANY, ROCKY FLATS DIVISION
30 PAGES, 11 TABLES, 4 FIGURES, 24 REFERENCES- AUGUST 24, 1965, RFP-503- CFSTI

SELECTED PHYSICAL AND CHEMICAL PROPERTIES OF PLUTONIUM DIOXIDE WERE INVESTIGATED. PLUTONIUM DIOXIDE WAS PREPARED FROM THE FOLLOWING PLUTONIUM SALTS- OXALATE, NITRATE, HYDROXIDE, AND PEROXIDE. CALCINATION TEMPERATURES USED WERE 240 DEGREE C, 400 DEGREE C, 600 DEGREE C, 800 DEGREE C, AND 1000 DEGREE C. THE DENSITY, PLUTONIUM CONTENT, RELATIVE SOLUBILITY, HYGROSCOPICITY, SURFACE AREA, CRYSTALLITE SIZE, AND THERMOGRAVIMETRIC BEHAVIOR OF THE OXIDES WERE MEASURED.

*PLUTONIUM OXIDE + CHEMICAL ANALYSIS + FUEL HANDLING + FUEL INTEGRITY + ROCKY FLATS

3-07472 FOX J
AIR TRANSPORTABILITY OF REACTOR AND RADIOISOTOPE MATERIALS
KIRTLAND AIR FORCE BASE, NEW MEXICO
230 PAGES, 24 FIGURES, 3 TABLES- AUGUST 1964, AFWL-TDR-64-81 (AD-606-056)- CFSTI

A STUDY WAS MADE TO INVESTIGATE THE PRIME CONSIDERATIONS INVOLVED IN AIR TRANSPORTATION OF NUCLEAR REACTOR COMPONENTS, RADIOACTIVE-WASTES, AND RADIOISOTOPE POWER-GENERATING UNITS. THE LOGISTICS, ECONOMICS, AND SAFETY OF SUPPLYING A REMOTE MILITARY NUCLEAR POWER PLANT BY AIR AND OF TRANSPORTING SNAP-TYPE REACTOR AND RADIOISOTOPE AUXILIARY POWER UNITS BY USAF AIRCRAFT ARE EXPLORED IN DETAIL. IT WAS DETERMINED THAT SUCH AIR TRANSPORT OPERATIONS ARE FEASIBLE AND REASONABLY SAFE IF PROPER PLANNING IS ACCOMPLISHED IN THE DESIGN OF EQUIPMENT AND IN THE DEFINITION OF MISSION PROFILES AND GROUND HANDLING PROCEDURES. CONTAINER CRITERIA AND PROCEDURAL STANDARDS FOR THE TRANSPORT OF THE DIFFERENT CATEGORIES OF MATERIAL ARE RECOMMENDED.

*FUEL HANDLING + *TRANSPORTATION AND HANDLING + *WASTE TRANSPORTATION + REGULATION, GENERAL + SHIPPING CONTAINER

3-07512 BYRNE JT + DELNAY RL + DOMNING WE + GRILL LF + MINER FJ
MEASUREMENTS OF PLUTONIUM NITRATE SHIPPING SOLUTIONS
DOW CHEMICAL COMPANY, ROCKY FLATS DIVISION
178 PAGES, 54 FIGURES, REFERENCES- OCTOBER 1, 1964, RFP-436- CFSTI, \$0.50 CY

A PROGRAM HAS BEEN UNDERTAKEN WHOSE OBJECTIVE IS TO DETERMINE THE CAUSES FOR, AND TO ELIMINATE IF POSSIBLE, THE SHIPPER-RECEIVER PLUTONIUM CONTENT DIFFERENCES ON SHIPMENTS OF PLUTONIUM NITRATE. USING BY-DIFFERENCE WEIGHT BULK MEASUREMENTS AND A STANDARDIZED ANALYTICAL METHOD, AN INTERPLANT SHIPMENT OF SIX 3-LITER CONTAINERS OF PLUTONIUM NITRATE HAS BEEN MADE WITH AN AVERAGE SHIPPER-RECEIVER DIFFERENCE LESS THAN 0.2 PERCENT. IN TWENTY INTRAPLANT SIMULATED SIMULATED SHIPPER-RECEIVER MEASUREMENTS AND IN THIRTEEN INTERPLANT SHIPMENTS OF PLUTONIUM NITRATE, THE RELATIVE STANDARD DEVIATION OF THE SHIPPER-RECEIVER DIFFERENCE HAS AVERAGED +-0.3 PERCENT. USING VOLUMETRIC BULK MEASUREMENTS, SIX INTRAPLANT SIMULATED SHIPMENTS OF PLUTONIUM NITRATE IN A 10 LITER CONTAINER HAVE SHOWN AN AVERAGE SHIPPER-RECEIVER DIFFERENCE OF +0.04 PERCENT AND A RELATIVE STANDARD DEVIATION OF +-0.25 PERCENT.

*CHEMICAL ANALYSIS + *PLUTONIUM + ANALYTICAL TECHNIQUE, CALIBRATION + RADIOCHEMICAL PROCESSING + RELIABILITY ANALYSIS + SHIPPING CONTAINER + TRANSPORTATION AND HANDLING

3-07513 PRICE LIST - SELECTIVE BIBLIOGRAPHY OF GOVERNMENT RESEARCH REPORTS AND TRANSLATIONS - CONTAINERS, PACKAGING, STORAGE, ETC.
U. S. DEPARTMENT OF COMMERCE
27 PAGES- MARCH 1965, SB-476, SUPPL. 1- CFSTI

AN ANNOTATED BIBLIOGRAPHY OF GOVERNMENT RESEARCH REPORTS THAT CONCERNS CONTAINERS, PACKAGING, STORAGE, ETC. OF IRRADIATED, RADIOACTIVE OR OTHER MATERIAL. TRANSLATIONS OF FOREIGN DOCUMENTS ARE INCLUDED.

*SHIPPING CONTAINER + *STORAGE CONTAINER + *TRANSPORTATION AND HANDLING + BIBLIOGRAPHY + FUEL HANDLING + FUEL SEGREGATION + FUEL STORAGE

3-07534 PERONA JJ + WHATLEY ME
CALCULATION OF TEMPERATURE RISE IN DEEPLY BURIED RADIOACTIVE CYLINDERS

ACCESSION NUMBER 3-07275 TO 3-07534

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-07534 *CONTINUED*
OAK RIDGE NATIONAL LABORATORY
45 PAGES, 15 FIGURES, 5 TABLES, 22 REFERENCES- FEBRUARY 23, 1960, ORNL-2812, CFSTI, \$1.25

TEMPERATURES WERE CALCULATED, FOR APPLICATION TO THE STORAGE OF RADIOACTIVE SOLID WASTE, AS A FUNCTION OF TIME AND RADIAL DISTANCE FOR RADIOACTIVE SOLID CYLINDERS IN INFINITE SOLID MEDIA OF AVERAGE SOIL, AVERAGE ROCK, AND SALT. A RESISTANCE AT THE CYLINDER--INFINITE MEDIUM BOUNDARY WAS INCLUDED IN THE FORM OF AN AIR SPACE. FOR THE RANGE OF PARAMETERS USED AND WITHIN THE PRACTICAL LIMITS OF ACCURACY, THE MAXIMUM TEMPERATURE RISE INCREASED LINEARLY WITH THE HEAT GENERATION RATE. THE FISSION PRODUCT SPECTRUM WAS NOT SIGNIFICANT IN THE DETERMINATION OF THE MAXIMUM TEMPERATURE RISE. UNDER THE PESSIMISTIC STORAGE CONDITIONS ASSUMED IN THIS STUDY, THE STORAGE OF CYLINDERS OF A PRACTICAL SIZE APPEARS FEASIBLE WITHOUT EXCESSIVE TEMPERATURE RISE.

*EQUATION, GENERAL + *TEMPERATURE REACTIVITY EFFECT + *THERMAL ANALYSIS + *WASTE DISPOSAL, SOLID + *WASTE DISPOSAL, TERRESTRIAL

3-07612 KLINGENSMITH RW + EPSTEIN HM + CHASTAIN JW
SHIELDING STUDIES ON SALT SLABS, GADOLINIUM, AND WATER
BATTELLE MEMORIAL INSTITUTE, COLUMBUS, OHIO
44 PAGES, 16 FIGURES, 13 TABLES, 16 REFERENCES- OCTOBER 7, 1959, BMI-1384, CFSTI

A LID-TANK SHIELDING FACILITY, SIMILAR TO THE ONE IN OPERATION AT OAK RIDGE HAS BEEN CONSTRUCTED AND IS IN OPERATION AT BATTELLE. THIS FACILITY WAS DESCRIBED IN BMI-1291. THE FAST-NEUTRON AND GAMMA DOSE RATES AND THERMAL-NEUTRON FLUXES WERE MAPPED IN A SYMMETRY PLANE OF THE SHIELDING TANK. FAST-NEUTRON AND GAMMA DOSE RATES WERE MEASURED BEHIND A SERIES OF SHIELDING PLUGS ALONG A LINE IN THE WATER PERPENDICULAR TO THE FISSION-PLATE CENTER. THE PLUG MATERIALS INCLUDED ALUMINUM, IRON, LEAD, TITANIUM, AND GADOLINIUM. THE PURPOSE OF THE TEST WAS TO DETERMINE THE REMOVAL CROSS SECTION OF GADOLINIUM BY COMPARISON WITH OTHER MATERIALS, USING A SMALL AMOUNT OF GADOLINIUM.

*DOSE MEASUREMENT, INTERNAL + *FAST-NEUTRON + *SHIELDING + DOSE MEASUREMENT, EXTERNAL + FLUX DISTRIBUTION

3-07777 SAFE HANDLING OF RADIOISOTOPES (FIRST EDITION WITH REVISED APPENDIX I)
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, AUSTRIA
119 PAGES, IAEA-SS-1, (STI/PUB/1/REV 1(E), DECEMBER 1963, IAEA

THIS MANUAL INCLUDES GENERAL INFORMATION ON SEALED AND UNSEALED SOURCES AND DISCUSSES THE STORAGE OF SOURCES, TRANSPORTATION OF RADIOACTIVE MATERIAL, ACCIDENTS, DECONTAMINATION AND RADIOACTIVE WASTE CONTROL AND DISPOSAL.

*MAXIMUM PERMISSIBLE CONCENTRATION (MPC) + *RADIATION SAFETY AND CONTROL + *TRANSPORTATION AND HANDLING + ACCIDENT, RADIOISOTOPE + CODES AND STANDARDS + DECONTAMINATION + IAEA (INTERNATIONAL ATOMIC ENERGY AGENCY) + MAXIMUM PERMISSIBLE DOSE (MPD) + SOURCE, RADIATION + WASTE DISPOSAL, ATMOSPHERIC + WASTE DISPOSAL, LIQUID + WASTE DISPOSAL, SOLID + WASTE STORAGE

3-07778 APPLETON GJ + KRISHNAMOORTHY PN
SAFE HANDLING OF RADIOISOTOPES- HEALTH PHYSICS ADDENDUM
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, AUSTRIA
120 PAGES, IAEA-SS-2, (STI/PUB/10), JULY 1960, IAEA

THIS MANUAL CONTAINS TECHNICAL INFORMATION NECESSARY FOR THE IMPLEMENTATION OF THE CONTROLS GIVEN IN THE SAFETY SERIES NO. 1 MANUAL ENTITLED SAFE HANDLING OF RADIOISOTOPES. IN ADDITION, IT IS INTENDED TO SERVE AS A BRIEF INTRODUCTION TO THE TECHNICAL PROBLEMS ENCOUNTERED IN RADIOLOGICAL PROTECTION WORK AND TO THE METHODS OF RESOLVING THEM.

CODES AND STANDARDS + DECONTAMINATION + DOSE + IAEA (INTERNATIONAL ATOMIC ENERGY AGENCY) + INCIDENT, EXPOSURE + INSTRUMENTATION, RADIATION MONITORING + MAXIMUM PERMISSIBLE DOSE (MPD) + RADIATION PROTECTION, ORGANIZATION + SHIELDING + SHIPPING CONTAINER + TRANSPORTATION AND HANDLING + WASTE DISPOSAL, GENERAL

3-07779 HERCIK F + JAMMET H
SAFE HANDLING OF RADIOISOTOPES- MEDICAL ADDENDUM
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, AUSTRIA
80 PAGES, IAEA-SS-3, (STI/PUB/11), AUGUST 1960, IAEA

THIS MANUAL WAS PREFACED PRIMARILY AS A SUPPLEMENT TO THE IAEA MANUAL ENTITLED SAFE HANDLING RADIOISOTOPES (SAFETY SERIES NO. 1 - STI/PUB/1). IT CONTAINS INFORMATION NECESSARY TO MEDICAL OFFICERS CONCERNED WITH THE IMPLEMENTATION OF THE CONTROLS GIVEN IN THE MANUAL. IN ADDITION, IT IS INTENDED TO SERVE AS A BRIEF INTRODUCTION TO THE MEDICAL PROBLEMS ENCOUNTERED IN RADIOLOGICAL PROTECTION WORK AND TO THE METHODS OF RESOLVING THEM.

*BIOMEDICAL + ACCIDENT, GENERAL + CODES AND STANDARDS + DOSE + DOSE MEASUREMENT, EXTERNAL + DOSIMETRY, GENERAL + INCIDENT, EXPOSURE + PERSONNEL EXPOSURE, RADIATION + RADIATION PROTECTION, ORGANIZATION

3-07782 REGULATIONS FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIALS (1964 REVISED ED.)
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, AUSTRIA
104 PAGES, IAEA-SS-6 (REV.), (STI/PUB/97), APRIL 1965, IAEA

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-07782 *CONTINUED*

THE REVISED EDITION OF THE REGULATIONS FOR SAFE TRANSPORT OF RADIOACTIVE MATERIALS IS A SET OF SAFETY REGULATIONS PUBLISHED BY THE IAEA WHICH COULD BE APPLIED TO THE NATIONAL AND INTERNATIONAL TRANSPORT OF RADIOACTIVE MATERIALS. THE REGULATION AIMS AT PROPOSING A LASTING FRAMEWORK OF PRINCIPLES AND RULES COMPLEMENTED BY APPROPRIATE TECHNICAL DATA, ACCEPTABLE FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIALS BY AIR, LAND AND WATER.

*REGULATION, IAEA + *TRANSPORTATION AND HANDLING + ACCIDENT, MAXIMUM CREDIBLE (MCA) + FUEL HANDLING + OCEAN AND SEA + SHIPPING CONTAINER

3-07783 REGULATIONS FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIALS- NOTES ON CERTAIN ASPECTS OF THE REGULATIONS
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, AUSTRIA
105 PAGES, IAEA-SS-7, (STI/PUB/32), MAY 1962, IAEA

THIS DOCUMENT IS A SUPPLEMENT TO THE REGULATIONS GIVEN IN IAEA SAFETY SERIES NO. 6. IT PROVIDES SOME BROAD GENERAL GUIDANCE TO USERS AS TO THE PURPOSE OF THE REGULATIONS AND THE PROBLEMS ENCOUNTERED IN THE APPLICATION OF THEM. BESIDES A NON-TECHNICAL DISCUSSION OF THE REGULATIONS, THE AREAS COVERED INCLUDE A CLASSIFICATION OF RADIOISOTOPES FOR PACKAGING, THE DERIVATION OF MAXIMUM PERMISSIBLE LEVELS OF RADIOACTIVE SURFACE CONTAMINATION OF CONTAINERS AND VEHICLES AND APPROPRIATE TESTS FOR CONTAINERS FOR TRANSPORT OF RADIOACTIVE MATERIAL.

*REGULATION, IAEA + *TRANSPORTATION AND HANDLING + ACCIDENT, MAXIMUM CREDIBLE (MCA) + ACCIDENT, TRANSPORTATION + DOSE CALCULATION, EXTERNAL + DOSE CALCULATION, INTERNAL + FUEL HANDLING + SHIPPING CONTAINER

3-07882 PEDIGO WR + SMITH VA + BERNSTEIN S + HAMER WJ + MYERS JL
TESTING OF TEN-TON URANIUM HEXAFLUORIDE CYLINDERS
PADUCAH GASEOUS DIFFUSION PLANT
59 PAGES, 22 FIGURES, 1 TABLE, 2 REFERENCES- OCTOBER 22, 1965, KY-500- CFSTI, \$3.00 CY, \$0.75 MN

THIS REPORT COVERS THE WORK DONE TO DATE ON DESTRUCTIVE TESTING OF LARGE (10-TON) URANIUM HEXAFLUORIDE SHIPPING CONTAINERS AT THE PADUCAH CYLINDER TEST FACILITY. THE PRIMARY OBJECTIVE OF THE INITIAL PHASE OF THIS TEST PROGRAM WAS TO COMPARE THE STRUCTURAL PROPERTIES OF LIGHT-AND HEAVY-WALLED CONTAINERS USED FOR STORAGE AND TRANSPORTATION OF URANIUM HEXAFLUORIDE. A TOTAL OF 12 DROP TESTS WERE MADE WITH THE CONTAINERS BEING DROPPED ON AN IMPACT SURFACE AND A 6-IN DIA. PENETRATION. RESULTS ARE REPORTED.

*TEST, DESTRUCTIVE + *TEST, DROP + ACCIDENT, TRANSPORTATION + IMPACT SHOCK + SHIPPING CONTAINER + TEST, PROOF + TRANSPORTATION AND HANDLING

3-07894 HOUGHTON AV + KITZINGER DG
SHORT CUT METHOD FOR DIMENSIONAL ANALYSIS
SANDIA CORPORATION
10 PAGES- SEPTEMBER 1965, SC-RR-65-306- CFSTI, \$1.00 CY, \$0.50 MN

A SHORT CUT METHOD FOR DIMENSIONAL ANALYSIS, AS APPLIED TO THE STRUCTURAL INTEGRITY OF ISOTOPE CONTAINMENT CAPSULES SUBJECT TO IMPACT IS DISCUSSED. THE IMPACT PROBLEM MAY INVOLVE EIGHT OR MORE RELATIVELY IMPORTANT PARAMETERS WHICH SHOULD BE VARIED IN THE TEST PROGRAM. DIMENSIONAL ANALYSIS LEADS TO A REDUCTION IN THE NUMBER OF VARIABLES BY THREE, AN IMPORTANT IMPROVEMENT WHICH ALLOWS A REASONABLE TEST PROGRAM. IN THE METHOD DESCRIBED, ONLY SIMPLIFIED LINEAR ALGEBRA METHODS, MATRIX METHODS AND DIMENSIONAL ANALYSIS NEED BE USED.

ACCIDENT ANALYSIS + ANALYTICAL TECHNIQUE, GENERAL + HAZARDS ANALYSIS + IMPACT SHOCK + MOCKUP + TESTING

3-07955 JOHNSON EB + REEDY RK
CRITICAL EXPERIMENTS WITH SPERT-D FUEL ELEMENTS
OAK RIDGE NATIONAL LABORATORY
19 PAGES, 7 FIGURES, 3 TABLES, 1 REFERENCE- JULY 14, 1965, ORNL-TM-1207- CFSTI, \$1.00 CY, \$0.50 MN

THE CRITICAL DIMENSIONS OF LATTICES OF SPERT-D FUEL ELEMENTS IN SEVERAL NONREACTOR ENVIRONMENTS WERE DETERMINED TO ESTABLISH SPECIFICATIONS FOR USE IN STORAGE, TRANSPORTATION, AND CHEMICAL PROCESSING OPERATIONS. EACH FUEL ELEMENT CONTAINED ABOUT 300 G OF URANIUM-235 IN 22 ALUMINUM-CLAD FUEL PLATES. IT WAS SHOWN THAT A MINIMUM OF ABOUT 3.5 KG OF URANIUM-235 IS REQUIRED IN A CRITICAL LATTICE MODERATED AND REFLECTED BY WATER. THIS MASS IS REDUCED TO 2.8 KG (CONTAINED IN THE ELEMENTS) WHEN U(92.6) SOLUTION HAVING A URANIUM-235 CONCENTRATION OF 3.99 G/LITER WAS SUBSTITUTED FOR WATER. IT WAS INCREASED TO 13.6 KG WHEN 1.116 G OF NATURAL BORON WAS ADDED TO EACH LITRE OF THE URANYL NITRATE SOLUTION.

*CRITICALITY SAFETY + CRITICALITY EXPERIMENT + FUEL STORAGE + RADIOCHEMICAL PLANT SAFETY + TRANSPORTATION AND HANDLING

3-07956 AINSWORTH SI
TRANSPORT OF IRRADIATED FUEL FROM NUCLEAR POWER STATIONS IN THE UNITED KINGDOM
CENTRAL ELECTRICITY GENERATING BOARD
8 PAGES, 7 FIGURES, 1 REFERENCE- J. BRIT. NUCL. ENERG. SOC. 4(4)- 299-306 (OCTOBER 1965)

THIS PAPER DISCUSSES THE PROBLEM OF TRANSPORTING WITHIN THE UNITED KINGDOM NUCLEAR FUEL FROM MAGNOX NUCLEAR POWER STATIONS. THE ORIGINAL APPROACH TO THE PROBLEM AND THE ARRANGEMENTS MADE TO ESTABLISH THE SYSTEM AS A ROUTINE ARE DESCRIBED. THE CONTROLLING FEATURES OF THE

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-07956 *CONTINUED*

METHODS OF TRANSPORT ARE LISTED AND THE DESIGN OF THE EQUIPMENT TO ACHIEVE THE NECESSARY PERFORMANCE IS DESCRIBED. THE INITIAL OPERATING EXPERIENCE AND THE CONSEQUENTIAL EQUIPMENT MODIFICATIONS ARE STATED. THE OUTLOOK FOR THE FUTURE IS DISCUSSED.

*FUEL HANDLING + *TRANSPORTATION AND HANDLING + ACCIDENT, TRANSPORTATION + FIRE + HEAT TRANSFER, NATURAL CONVECTION + SHIELDING + SHIPPING CONTAINER

3-07957 HAFF KW

TESTS ON TELETHERAPY SOURCES SEALED WITH LEAD O-RINGS

OAK RIDGE NATIONAL LABORATORY

4 PAGES, 5 FIGURES, 1 TABLE, 3 REFERENCES- ISOTOPES AND RADIATION TECHNOLOGY 1(2)- 156-199 (WINTER 1963/1964)

EIGHTEEN LEAD O-RING COBALT-60 TELETHERAPY SOURCES FROM FIVE TO EIGHT YEARS OLD HAVE BEEN TESTED IN THE OAK RIDGE NATIONAL LABORATORY (ORNL) SOURCE SAFETY TESTING PROGRAM TO DETERMINE THE EFFECTS OF AGE ON THEM AND PRECAUTIONS THAT WOULD BE REQUIRED IN THEIR REUSE. THE LEAD O-RING TELETHERAPY SOURCE IS ONE OF THE ORIGINAL CONCEPTS OF LARGE RADIOACTIVE SOURCE DESIGN. THE RESULTS OF TESTS INDICATE THAT THE SOURCES WOULD WITHSTAND CONSIDERABLE PHYSICAL SHOCK. HOWEVER, SINCE THEY ALL LEAKED, THEIR LEAD O-RING GASKETS WERE IN POOR CONDITION, AND TRANSFERABLE CONTAMINATION WAS HIGH, IT WAS RECOMMENDED THAT SOURCES OF THIS TYPE BE REENCAPSULATED IN AN ALL-WELDED STAINLESS-STEEL CAN BEFORE BEING REUSED.

*TEST, DESTRUCTIVE + *TEST, PROOF + COBALT + IMPACT SHOCK + RADIOISOTOPE + SOURCE, RADIATION

3-07968 EPSTEIN HM + KLINGENSMITH RW

DETECTION AND IDENTIFICATION OF NUCLEAR BURSTS

BATTELLE MEMORIAL INSTITUTE

7 PAGES, 3 FIGURES, 7 REFERENCES- BATTELLE TECH. REVIEW 18(8)- 3-9 (AUGUST 1964)

THE CHARACTERISTICS OF AND TECHNIQUES FOR DETECTING NUCLEAR BURSTS ARE REVIEWED. PROBLEMS WHICH MUST BE CONSIDERED INCLUDE NATURAL EVENTS THAT PRODUCE GREATER TOTAL ENERGY THAN NUCLEAR DETONATIONS, DECOUPLING TECHNIQUES IN AN UNDERGROUND EXPLOSION, AND VERY SMALL SHOTS. UNDERGROUND BURSTS ARE THE MOST DIFFICULT TO DETECT AND IDENTIFY. METHODS OF DETECTING BURSTS IN SPACE MAY BE ACCOMPLISHED BY FALLOUT MEASUREMENTS, OPTICAL DETECTION, RADIOFREQUENCY SIGNAL DETECTION OR BY SATELLITES.

*EXPLOSION + *FISSION PRODUCT RELEASE, GENERAL + *NUCLEAR DETONATION + *NUCLEAR EXPLOSION DEBRIS + MONITOR, RADIATION, NUCLEAR DETONATION

3-07990 FERGUSON DE + WYMER RG + BLANCO RE + BROWN KB + WHATLEY ME + GOELLER HE + BROOKSBANK RE
CHEMICAL TECHNOLOGY DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING MAY 31, 1965

OAK RIDGE NATIONAL LABORATORY

320 PAGES, FIGURES, TABLES, REFERENCES- NOVEMBER 1965, ORNL-3830- CFSTI, \$7.00 CY, \$1.50 MN

THE R+D PROGRAMS OF THE ORNL CHEMICAL TECHNOLOGY DIVISION ARE REVIEWED FOR THE YEAR ENDING MAY 31, 1965. PROGRAMS OF PRIMARY INTEREST TO NUCLEAR SAFETY ARE- 1) RADIOACTIVE WASTE TREATMENT AND DISPOSAL STUDIES INCLUDING PILOT PLANT DEMONSTRATIONS, 2) AIR FILTER TESTING AT THE NUCLEAR SAFETY PILOT PLANT, 3) SHIELDING STUDIES, 4) CRITICALITY CONTROL IN FUEL CYCLE PLANTS, AND 5) IRRADIATION AND DECONTAMINATION TESTS ON SELECTED PROTECTIVE COATINGS. THIS REPORT SUPPLIES A WEALTH OF INFORMATION AND DATA REFERENCES ON RADIOCHEMICAL PROCESSING TECHNOLOGY.

*FILTER SAFETY EVALUATION + *RADIOCHEMICAL PROCESSING + *SITING, WASTE DISPOSAL + *WASTE DISPOSAL, GENERAL + *WASTE MANAGEMENT + AIR CLEANING + CONTAINMENT, FUEL REPROCESSING + CRITICALITY SAFETY + DECONTAMINATION + FILTER, ABSOLUTE + FILTER, COMBINATION + MASS TRANSFER + ORNL (OAK RIDGE NATIONAL LABORATORY) + RADIOCHEMICAL PLANT SAFETY + SHIELDING + SURFACE CONTAMINATION + TRANSPORTATION AND HANDLING + WASTE HANDLING + WASTE STORAGE

3-07992 MCCRELESS TC

NEUTRONIC ISOLATION CHARACTERISTICS OF CONCRETE, LEAD, WOOD, POLYETHYLENE AND BERYLLIUM
LOS ALAMOS SCIENTIFIC LABORATORY

53 PAGES- 1965, LA-DC-7139, THESIS- CFSTI, \$3.00 CY, 0.50 MN

CRITICAL APPROACH EXPERIMENTS HAVE BEEN CONDUCTED TO DETERMINE THE NEUTRON ISOLATING EFFECTIVENESS OF CONCRETE, LEAD, WOOD, POLYETHYLENE, AND BERYLLIUM. THE LOS ALAMOS COMET ASSEMBLY MACHINE WAS USED TO DETERMINE THE CHANGE IN CRITICAL THICKNESS OF A REFERENCE SLAB OF ENRICHED (93.2 WEIGHT PERCENT URANIUM-235) URANIUM WITH AND WITHOUT AN ADDITIONAL ENRICHED URANIUM SLAB BEYOND AN ISOLATOR EIGHT INCH THICK. THIS CHANGE IN CRITICAL THICKNESS IS A MEASURE OF THE NEUTRON INTERACTION BETWEEN THE URANIUM UNITS. THE LESSER THE EFFECTIVE NEUTRON INTERACTION, THE BETTER THE ISOLATOR. THE ISOLATING ABILITIES OF SLABS OF THE SELECTED MATERIAL EIGHT INCHES THICK ARE COMPARED TO THE ABILITY PROVIDED BY AN EIGHT-INCH AIR SPACE.

*NEUTRON INTERACTION + BERYLLIUM + CONCRETE + LEAD + SHIELDING + STORAGE CONTAINER

3-08002 LEAKAGE OF METHYL IODIDE DURING TRANSPORT

1 PAGE- ATOMIC ENERGY CLEARING HOUSE 11(39)- 5 (SEPTEMBER 27, 1965)- POR

LEAKAGE WAS DISCOVERED WHEN ONE OF THE SHIPPING CARTONS WAS OPENED AT NRTS. ONLY A FEW

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-08002 *CONTINUED*
INDIVIDUALS MOST CLOSELY ASSOCIATED WITH TRANSPORT FROM NEW YORK STATE TO IDAHO HAVE SHOWN
VALUES ABOVE DETECTABLE LIMITS.

*FISSION PRODUCT RELEASE, GENERAL + *IODINE + *TRANSPORTATION AND HANDLING

3-08107 GUTMAN T
ADVANCES IN NUCLEAR TECHNOLOGY- SHIPPING CONTAINER FOR LOW-ENRICHMENT URANIUM
NUCLEAR MATERIALS AND EQUIPMENT CORP., APOLLA, PA.
1 PAGE, 1 FIGURE- NUCLEONICS 24(11)- 64 (JANUARY 1966)

A LIGHT WEIGHT CONTAINER, DEVELOPED FOR SHIPPING UNIRRADIATED URANIUM ENRICHED TO 5 PERCENT
URANIUM-235, HAS BEEN DEVELOPED. THE SHIPPING CONTAINER CONSISTS OF TWO 5 GALLON PAILS HELD
IN THE CENTER OF A 65 GALLON OPEN-HEAD DRUM FABRICATED FROM 16-GAGE STEEL. ITS CAPACITY IS
36 KG OF URANIUM BEARING PRODUCT OF ANY DENSITY.

*SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING + STORAGE CONTAINER

3-08124 BYRN J T
HANDLING AND MEASUREMENT OF PLUTONIUM SHIPMENTS
DOW CHEMICAL COMPANY, GOLDEN, COLORADO
32 PAGES, 5 TABLES, 31 REFERENCES- OCTOBER 1965, RFP-508, (CONF 650803-5), IAEA SYMPOSIUM ON NUCLEAR
MATERIALS MANAGEMENT, VIENNA, AUSTRIA, AUGUST 30- SEPTEMBER 3, 1965- CFSTI, \$2.00 CY, \$0.50 MN

RECENT STUDIES ON THE MEASUREMENT PROBLEMS ASSOCIATED WITH HANDLING AND SHIPPING PLUTONIUM ARE
SUMMARIZED. FACTORS AFFECTING THE STABILITY OF PLUTONIUM NITRATE INCLUDE GAS EVOLUTION,
HYDROGEN ION CONSUMPTION AND PRECIPITATION. WITH PROPER CONTROL OF THESE EFFECTS, NITRATE
SHIPMENTS CAN BE MADE WITH AVERAGE SHIPPER-RECEIVER DIFFERENCES UNDER 0.2 PERCENT. PLUTONIUM
OXIDE CANS MAY PRESSURIZE IN SHIPMENT IF THE OXIDE IS LOW-FIRED. METAL SHIPMENTS HAVE
PRESENTED LITTLE PROBLEMS IN MEASUREMENTS. THE COST OF SHIPPING PLUTONIUM DEPENDS UPON THE
FORM AND SIZE OF THE SHIPMENT. FACTORS AFFECTING THE SHIPPING COST ARE EVALUATED.

*PLUTONIUM + *TRANSPORTATION AND HANDLING + PLUTONIUM OXIDE + RADIOCHEMICAL ANALYSIS

3-08298 RECOMMENDATIONS FOR PROTECTION AGAINST IONIZING RADIATIONS IN INDUSTRIAL OPERATIONS CONNECTED
WITH THE GENERATION OF ELECTRIC POWER FROM NUCLEAR ENERGY
NATIONAL ASSOCIATION OF PRODUCERS AND DISTRIBUTORS OF ELECTRIC POWER (ANIDEL), ITALY
AEC-TR-2931 +. 14 PAGES- 1959- EXTRACT FROM L ENERGIE ELETTRICA 36(3)- 243-9 (1959)

THE REPORT INCLUDES RECOMMENDATIONS ON GENERAL DATA AND DEFINITIONS OF RADIATION PROTECTION,
MAXIMUM PERMISSIBLE DOSES, CONCENTRATIONS AND LEVELS, GENERAL ARRANGEMENTS, ARRANGEMENTS FOR
THE USE AND STORAGE OF SOURCES OF RADIATION, AND ARRANGEMENTS FOR THE TRANSPORTATION AND
DISPOSAL OF RADIOACTIVE MATERIALS.

*ADMINISTRATIVE CONTROLS AND PRACTICES + *RADIATION PROTECTION, ORGANIZATION +
*RADIATION SAFETY AND CONTROL + BIOMEDICAL + CODES AND STANDARDS + DECONTAMINATION +
TRANSPORTATION AND HANDLING + WASTE DISPOSAL, GENERAL

3-08302 SHIPPING OF SPENT NUCLEAR FUEL
1 PAGE- REACTOR FUEL PROCESSING 8(3)- 143 (SUMMER 1965)

A RESUME OF RECENT SHIPMENTS OF SPENT FUEL FROM DRESDEN AND AEC LICENSING ACTIVITIES ARE
PRESENTED AND TITLE TO RECENT PAPERS LISTED.

REGULATION, AEC + SHIPPING CONTAINER

3-08402 MOSELEY JD
STUDY OF PLUTONIUM OXIDE HEAT GENERATION IN A WOOD MODERATED CONTAINER
DOW CHEMICAL COMPANY
RFP-418 +. DECEMBER 28, 1964- CFSTI, \$2.00 CY

THE GENERATION OF HEAT DUE TO THE RADIOACTIVE DECAY OF PLUTONIUM IN THE FORM OF PLUTONIUM
DIOXIDE STORED IN WOODEN CONTAINERS IS CONSIDERED. THE RESULTS OF TWO EXPERIMENTS IN WHICH
PLUTONIUM DIOXIDE IS PLACED INSIDE WOODEN BLOCKS AND THE TEMPERATURE RISE MEASURED AT VARIOUS
POINTS IS REPORTED. HEAT TRANSFER CALCULATIONS ARE THEN PERFORMED TO SHOW THAT THE DATA
OBTAINED ARE THOSE WHICH WOULD BE EXPECTED, I.E., THAT FOURIERS LAW ADEQUATELY DESCRIBES THE
SITUATION. THE HEAT BUILD UP IN A PROPOSED WOOD MODERATED SHIPPING CONTAINER IS CALCULATED,
USING SOME OF THE ASSUMPTIONS VERIFIED IN THE DESCRIBED EXPERIMENTS.

*FUEL HANDLING + *HEAT TRANSFER + *PLUTONIUM + *SHIPPING CONTAINER + *TESTING

3-08428 WARREN JH
CRITICALITY SAFETY OF FISSILE MATERIALS IN THE CHEMICAL PROCESSING DEPARTMENT
HANFORD ATOMIC PRODUCTION OPERATION
RL-SEP-389 (REV) +. 11 PAGES- JULY 28, 1965- CFSTI, \$1.00 CY, \$0.50 MN

RESPONSIBILITY AND PROCEDURES ARE OUTLINED TO PROVIDE CRITICALITY SAFETY FOR SHIPPING AND
RECEIVING FISSILE MATERIALS IN HAPOCS CHEMICAL PROCESSING DEPT. RESPONSIBILITIES INCLUDE

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-08428 *CONTINUED*

PACKAGING AND LABELING, DESCRIPTION OF CONTENTS, CONTROL SPECIFICATIONS, CONTAINER DESIGN, COMPLIANCE REVIEW, HAZARD EVALUATION, AND CRITICALITY SAFETY REVIEW. PROCEDURES STATE THAT UP TO 15 GRAMS OF FISSIONABLE MATERIAL OR ANY AMOUNT OF NATURAL OR DEPLETED URANIUM MAY BE SHIPPED WITHOUT CRITICALITY SAFETY CONTROLS.

*ADMINISTRATIVE CONTROLS AND PRACTICES + *CRITICALITY SAFETY + *TRANSPORTATION AND HANDLING

3-08508 COX GW
LEGISLATION AND CODES OF PRACTICE GOVERNING THE USE OF RADIOACTIVE MATERIALS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY
NP-15279 +. 3 PAGES- JANUARY, 1965- UKAEA

THE UK RADIOACTIVE SUBSTANCES ACT OF 1960 (APPLIES TO MOST USERS OF RADIOISOTOPES)- THE IONIZING RADIATION (SEALED SOURCES) REGULATIONS OF 1961 AND THE PROPOSED UNSEALED RADIOACTIVE SUBSTANCES REGULATIONS (APPLY TO PREMISES IN WHICH UNSEALED OR SEALED SOURCES ARE USED)- THE TRANSPORT REGULATIONS (FOR SAFE TRANSPORT OF RADIOACTIVE MATERIALS)- AND THE RADIOLOGICAL PROTECTION SERVICES (TO PROVIDE ADVICE AND HEALTH PHYSICS SERVICES FOR WORKERS IN THE RADIATION FIELD) ARE REVIEWED IN A NON COMPREHENSIVE WAY TO INDICATE THE GENERAL PURPORT OF THE LEGISLATION AND CODES.

*CODES AND STANDARDS + *RADIATION PROTECTION, ORGANIZATION + *UNITED KINGDOM

3-08515 APPLETON GJ + DUNSTER HJ
RECOMMENDED PRACTICE IN THE SAFE HANDLING OF PLUTONIUM IN LABORATORIES AND PLANTS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL
AHSB(RP)R-6 +. 46 PAGES, FIGURES, TABLES, 26 REFERENCES- JANUARY 1961- HMSO

THIS REPORT PROVIDES A BRIEF INTRODUCTION TO THE PHYSICAL, CHEMICAL AND TOXIC PROPERTIES OF PLUTONIUM, REVIEWS THE PRECAUTIONS TO BE TAKEN IN THE DESIGN AND OPERATION OF LABORATORIES, PLANTS AND STORES, AND MAKES RECOMMENDATIONS FOR SAFE PRACTICE. CRITICALITY PROBLEMS ARE DISCUSSED ONLY IN OUTLINE.

ADMINISTRATIVE CONTROLS AND PRACTICES + BIOMEDICAL + CHEMICAL TOXICITY + FIRE + FUEL HANDLING + PLUTONIUM

3-08556 THE DESIGN OF LEAD SHIELDED CONTAINERS TO IAEA STANDARDS
LEAD DEVELOPMENT ASSOCIATION, LONDON
15 PAGES- LEAD SHIELDING FOR TRANSPORT CONTAINERS, MAY 1965

THIS REPORT DISCUSSES IN GENERAL TERMS, THE DESIGN OF LEAD SHIELDED CONTAINERS TO IAEA STANDARDS. IN PARTICULAR THE PROBLEM OF LEAD SHIELDED CONTAINERS INVOLVED IN A FIRE IS REVIEWED. CONTAINER TESTS THAT HAVE OCCURRED, MAINLY IN THE U. K. ARE DISCUSSED.

*ACCIDENT, TRANSPORTATION + *SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING + EQUIPMENT DESIGN + LEAD + REGULATION, IAEA + TEST, DESTRUCTIVE

3-08558 CLOYD DR + MURPHY WJ
HANDLING HAZARDOUS MATERIALS
WILLIAMS (CLYDE) AND CO., COLUMBUS, OHIO + TEMPLE UNIVERSITY, PHILADELPHIA
NASA-SP-5032 +. 93 PAGES, FIGURES, TABLES, REFERENCES- SEPTEMBER 1965- GPO

THIS REPORT DISCUSSES THE HANDLING OF HAZARDOUS CHEMICALS, IN PARTICULAR LIQUID HYDROGEN, PENTABORANE LIQUID FLUORINE, CHLORINE TRIFLUORIDE, OZONE, NITROGEN TETROXIDE AND HYDRAZINE COMPOUNDS. THE NATURE OF THE HAZARD AND THE DYNAMIC HANDLING, STORAGE, USE, TRANSFER AND HAZARD CONTROL ARE DISCUSSED FOR EACH OF THESE CHEMICALS.

*CHEMICAL REACTION + *HAZARDS ANALYSIS + ACCIDENT, GENERAL + CHLORINE + FLUORINE + HYDROGEN + TRANSPORTATION AND HANDLING

3-08559 DESIGN AND ECONOMIC STUDY OF SPENT FUEL SHIPPING
STANRAY CORPORATION, CHICAGO, ILLINOIS
EURAE-374 VOL. 2 +. 196 PAGES- MAY 1, 1962- CFSTI, \$5.00 CY, \$1.00 MN

VOL. 2 CONTAINS INFORMATION ON IRRADIATED FUEL AND ITS PROCESSING, THE SHIPPING CASK AND TRANSPORTATION IN THE USA. ILLUSTRATIONS OF WHAT TYPES OF CLAUSES AND INFORMATION ARE FOUND IN REPROCESSING AGREEMENTS ARE PRESENTED. THE CASK DESIGN IS DISCUSSED TO DETERMINE THE SUITABILITY OF THE VARIOUS FACILITIES AND THE PROBLEMS ASSOCIATED WITH THE RADIOACTIVE MATERIAL TRANSPORT REGULATIONS ARE DISCUSSED.

*FUEL HANDLING + *REGULATION, GENERAL + ECONOMIC STUDY + SHIPPING CONTAINER + TRANSPORTATION AND HANDLING

3-08560 RETZ A + SCHMIDDEM PJ + STEPHAN W + RAU J
PACKAGING DISASSEMBLED FUEL ELEMENTS AND RADIOACTIVE WASTE IN THE HOT CELLS AT THE KERNFORSCHUNGSANLAGE JULICH
KERNFORSCHUNGSANLAGE, JULICH, WEST GERMANY
JUL-249-RW +. 22 PAGES- APRIL, 1965- DEP/MN

DEPENDENT ON TYPE OF MATERIAL, ACTIVITY LEVEL, AND FIRE AND HEALTH HAZARD, SEVERAL METHODS OF

ACCESSION NUMBER 3-08428 TO 3-08560

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-08560 *CONTINUED*

WASTE AND FUEL PACKAGING ARE USED IN THE HOT CELLS AT KERNFORSCHUNGSANLAGE JULICH (KFA). LOW LEVEL WASTES SUCH AS PLASTICS, RAGS, AND SMALL TOOLS ARE REMOTELY WELDED INTO PLASTIC BAGS OF 0.2 - 0.4 MM THICKNESS. WASTES OF HIGHER ACTIVITY LEVEL ARE PACKED INTO DISPOSABLE CANS. TESTS OF THE TIGHTNESS OF THE CONTAINERS ARE DESCRIBED. FOR HIGHLY-ACTIVE FUEL WASTES WHICH MUST BE MOST SECURELY PACKAGED AND STORED, THREE METHODS HAVE BEEN TESTED- 1. REMOTE ARGON-ARC WELDING OF STAINLESS-STEEL AND ALUMINUM CANS, 2. ELECTRO-MAGNETIC CLOSING OF ALUMINUM CANS, 3. COLD PRESSURE WELDING OF ALUMINUM CANS. BY COMPARISON OF LEAK-TIGHTNESS, RESISTANCE TO MECHANICAL DAMAGE, AND COSTS, THE METHOD OF COLD-PRESSURE WELDING HAS BEEN CHOSEN.

*SHIPPING CONTAINER + *WASTE DISPOSAL, GENERAL + *WASTE TRANSPORTATION + TRANSPORTATION AND HANDLING

3-08561 HODKIN DJ + PITMAN RS + MARDON PG
GAS EVOLUTION FROM SOLID PLUTONIUM-BEARING RESIDUES DURING STORAGE
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL
AERE-M-1644 +. 13 PAGES, 6 FIGURES, 1 TABLE- SEPTEMBER 1965- HMSO, BIS, \$0.70

HERMETICALLY SEALED CANS CONTAINING SOLID PLUTONIUM-BEARING RESIDUES HAVE ON OCCASIONS PRESSURIZED DURING STORAGE. THIS HAS BEEN FOUND TO BE DUE TO RADIOLYSIS OF MOISTURE CHEMISORBED DURING THE EXPERIMENTAL LIFE OF THE SAMPLES AND IN PARTICULAR DURING LONG PERIODS OF STORAGE IN NON-AIRTIGHT CONTAINERS SEALED IN P.V.C. BAGS.

*PLUTONIUM + *STORAGE CONTAINER + PRESSURE, INTERNAL

3-08717 SHAPPERT LB
AN ECONOMIC ANALYSIS OF THE DOMESTIC AND OVERSEAS SHIPMENT OF SPENT REACTOR FUEL
OAK RIDGE NATIONAL LABORATORY
ORNL-TM-590 +. PAGES, FIGURES, TABLES, REFERENCES, JUNE 27, 1963, CFSTI \$2.60 CY

THE COST OF SHIPPING SPENT REACTOR FUEL FROM A DOMESTIC AND FOREIGN NATURAL URANIUM REACTOR TO A REPROCESSING PLANT IN THE U.S. WAS INVESTIGATED. THE DOMESTIC REACTOR WAS LOCATED AT POINT LOMA, CALIF., AND THE SPENT FUEL WAS SHIPPED 1176 MILES TO HANFORD, WASH. THE FOREIGN REACTOR WAS LOCATED IN ITALY, AND THE SPENT FUEL WAS SHIPPED TO SOUTHERN CALIFORNIA. TWO REACTORS WERE CONSIDERED - ONE WITH THERMAL POWER OF 3500 MW (CASE 1, DOMESTIC ONLY) AND THE OTHER WAS A 25,000-MW REACTOR (CASE 2). RESULTS INDICATED THAT FOR THE LARGEST REACTOR (CASE 2) SITUATED IN THE U.S., TRUCK TRANSPORTATION WAS THE CHEAPEST PRACTICAL METHOD - \$1.30 PER KILOGRAM OF URANIUM SHIPPED UNDER THE CONDITIONS SPECIFIED. BARGING WAS ASSUMED IMPRACTICAL DUE TO THE CONDITIONS ENCOUNTERED ON THE WEST COAST. DUE TO THE LARGE QUANTITY OF FUEL TO BE SHIPPED FROM THE FOREIGN REACTOR, IT WAS CONSIDERED PRACTICAL TO TIME CHARTER A VESSEL TO SHIP THE FUEL TO THE U.S. IF THE FUEL WAS SHIPPED BY WAY OF THE PANAMA CANAL WITH ALMOST NO OVERLAND TRANSPORTATION, TRANSIT TIME WOULD INCREASE 28 PERCENT, BUT THE UNIT COST WOULD BE \$1.25 PER KILOGRAM OF URANIUM.

*ECONOMIC STUDY + *TRANSPORTATION AND HANDLING + FUEL HANDLING + INSURANCE + LIABILITY

3-08718 ALBRECHT WL
SHIPMENT OF SPENT FUEL ELEMENTS
OAK RIDGE NATIONAL LABORATORY
3 PAGES, NUCLEAR SAFETY 2(1)- 3-6 (SEPTEMBER 1966)

A GENERAL DISCUSSION OF THE PROBLEMS RELATED TO THE SHIPPING OF SPENT FUEL ELEMENTS IS GIVEN. PARTICULAR NOTE IS TAKEN OF CRITICALITY CONTROL, HEAT REMOVAL, EXTERNAL RADIATION LEVELS, EXTERNAL CONTAMINATION LIMITS AND POSSIBLE EFFECTS OF THE REGULATIONS.

*TRANSPORTATION AND HANDLING + FUEL HANDLING + HEAT TRANSFER + REGULATION, GENERAL + SHIPPING CONTAINER

3-08719 MORGAN KZ
PRESENT STATUS OF RECOMMENDATIONS OF THE INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION, NATIONAL COUNCIL ON RADIATION PROTECTION AND FEDERAL RADIATION COUNCIL
OAK RIDGE NATIONAL LABORATORY
32 PAGES, TABLES, 35 REFERENCES, JUNE 14, 1965, PUBLISHED IN PROGRESS IN NUCLEAR ENERGY SERIES XII, VOL. 2, PERGAMON PRESS, LONDON

THE HISTORICAL BACKGROUNDS OF THE INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION (ICRP), THE NATIONAL COUNCIL ON RADIATION PROTECTION (NCRP) AND THE FEDERAL RADIATION COUNCIL (FRC) ARE DISCUSSED AS WELL AS MANY CURRENT RECOMMENDATIONS MADE BY THESE ORGANIZATIONS AS THEY APPLY TO RADIATION PROTECTION IN MAN. THIS INCLUDES WORKERS IN THE RADIATION INDUSTRY, BUT ALSO THE POPULATION AT LARGE.

*RADIATION PROTECTION, ORGANIZATION + PERSONNEL EXPOSURE, RADIATION + RADIATION IN PERSPECTIVE + RADIATION SAFETY AND CONTROL

3-08720 SNYDER WS
BASIC CONSIDERATIONS OF RADIATION PROTECTION
OAK RIDGE NATIONAL LABORATORY
2 PAGES, NUCLEAR SAFETY 2(1), PAGES 14-18

FOUR ARTICLES, EACH OF WHICH IS CONCERNED WITH THE PROPER BASES FOR THE DETERMINATION OF RADIATION PROTECTION STANDARDS. THE ARTICLES ARE - SOMATIC RADIATION DOSE FOR THE GENERAL

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-08720 *CONTINUED*

POPULATION, SCIENCE 131(3399), 482-486 (FEBRUARY 1960), RADIATION HAZARDS POSE PROBLEM OF HOW GOVERNMENT CAN BEST BE ORGANIZED TO PROTECT THE PUBLIC, SCIENCE 129(3357), 1210-1212 (MAY 1, 1959), REPORTS DISAGREE ON RADIATION HAZARDS, SCIENCE 129(3361), 1473-1474 (MAY 29, 1959) AND RADIATION CONTROL DILEMMA FACED BY GOVERNMENT. THE FORUM MEMO TO MEMBERS, ATOMIC INDUSTRIAL FORUM, INC. 6(4), 23-26 (APRIL 1959). AN EXTENSIVE BIBLIOGRAPHY IS GIVEN.

*RADIATION SAFETY AND CONTROL + PERSONNEL EXPOSURE, RADIATION + RADIATION IN PERSPECTIVE + RADIATION PROTECTION, ORGANIZATION

3-08910 SHAPPERT LB + SALMON R

SHIPPING COST COMPARISONS FOR LEAD-, STEEL-, AND URANIUM-SHIELDED CASKS
OAK RIDGE NATIONAL LABORATORY
19 PAGES, 9 TABLES, 2 REFERENCES- MARCH 1966, ORNL-3918- CFSTI, \$2.00

LEAD-, STEEL-, AND URANIUM-SHIELDED CASKS ARE COMPARED, BASED ON THE TOTAL COST OF TRANSPORTING SPENT FUEL FROM A REACTOR TO A REPROCESSING SITE 1,000 MILES DISTANT. THE UNIQUE FEATURE OF THE COMPARISON IS THAT THE COSTS ARE COMPARED NOT ON THE BASIS OF THE SAME FUEL LOAD FOR EACH CASK, BUT ON THE SAME CASK WEIGHT. THIS WEIGHT WAS LIMITED TO 25 TONS EMPTY WEIGHT. THE RESULTS OF THIS COMPARISON INDICATE THAT THE USE OF URANIUM-SHIELDED CASKS CAN BE ECONOMICALLY ADVANTAGEOUS, PROVIDED THAT THE COST OF THE CASK CAN BE KEPT IN THE RANGE OF \$4.00 TO \$9.00 PER POUND OF CASK WEIGHT (EMPTY). THE GREATEST ADVANTAGE TO THE REACTOR OPERATOR OCCURS IF HE IS ABLE TO KEEP THE CASK IN USE 100% OF THE TIME, OR RENT A CASK WHEN NEEDED.

*ECONOMIC STUDY + LEAD + SHIELDING + SHIPPING CONTAINER + STEEL + TRANSPORTATION AND HANDLING + URANIUM

3-08917 HENRY HF

DEVELOPMENTS IN THE SAFE HANDLING OF FISSIONABLE MATERIALS
OAK RIDGE NATIONAL LABORATORY
4 PAGES, REFERENCES- NUCLEAR SAFETY 3(1)- 4-7 (SEPTEMBER 1961)- GPO

RECENT DEVELOPMENTS IN THE SAFE HANDLING OF FISSIONABLE MATERIALS ARE DISCUSSED. OF PARTICULAR INTEREST IS THE BIBLIOGRAPHY WHICH LISTS A NUMBER OF U.S. AND FOREIGN REPORTS MAINLY CONCERNING CRITICALITY. STANDARDS AND REGULATIONS ARE ALSO DISCUSSED.

*CRITICALITY SAFETY + *TRANSPORTATION AND HANDLING + REGULATION, GENERAL

3-08943 BLOMEKE JO + SALMON R + ROBERTS JT + BRADSHAW RL + PERONA JJ

ESTIMATED COSTS OF HIGH-LEVEL WASTE MANAGEMENT
OAK RIDGE NATIONAL LABORATORY
ORNL-P-1926 + CONF-660208-1 +. 19 PAGES, 8 FIGURES, 5 TABLES- A PAPER FOR PRESENTATION AT THE SYMPOSIUM ON THE SOLIDIFICATION AND LONG-TERM STORAGE OF HIGHLY RADIOACTIVE WASTES, RICHLAND, WASHINGTON, FEBRUARY 14-18, 1966

THE COSTS OF PERPETUAL TANK STORAGE OF BOTH ACID AND ALKALINE WASTES WERE ESTIMATED AS A FUNCTION OF TANK SIZE, TANK LIFE, AND FISSION PRODUCT CONCENTRATION IN THE WASTE FOR THREE REPRESENTATIVE TYPES OF FINANCING. FOR ACID WASTES, THE OPTIMUM TANK CAPACITY IS ABOUT A MILLION GALLONS, AND MINIMUM TOTAL COSTS RANGE FROM 0.0165 TO 0.0272 MILL/KWHR. FOR ALKALINE WASTES, THE OPTIMUM TANK CAPACITY IS 2.5 MILLION GALLONS, AND MINIMUM TOTAL COSTS RANGE FROM 0.0177 TO 0.0294 MILL/KWHR. REDUCING THE VOLUME OF WASTES, AS STORED, BY DOUBLING THE CONCENTRATION OF FISSION PRODUCTS REDUCES THE TOTAL COSTS BETWEEN 15 AND 30%. THE MINIMUM TOTAL COSTS FOR MANAGEMENT BY THE SERIES OF OPERATIONS CONSISTING OF INTERIM LIQUID STORAGE, POT CALCINATION, INTERIM SOLID STORAGE, SHIPMENT, AND DISPOSAL IN SALT MINES, ARE ESTIMATED TO RANGE FROM 0.017 TO 0.020 MILL/KWHR WHEN CARRIED OUT OVER A 30-YEAR PERIOD.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA 22151, \$3.00 COPY, \$0.65 MICRONEGATIVE

*ECONOMIC STUDY + *WASTE DISPOSAL, LIQUID + *WASTE DISPOSAL, SOLID + STORAGE CONTAINER

3-08944 LANGHAAR JW + SHAPPERT LB

NUCLEAR ENGINEERING PART XIV
F. I. DU PONT DE NEMOURS AND COMPANY + OAK RIDGE NATIONAL LABORATORY
93 PAGES, FIGURES, TABLES, REFERENCES- CHEMICAL ENGINEERING PROGRESS SYMPOSIUM SERIES 61(56)- (1965)- PROCEEDINGS OF A.I.C.H.E. ANNUAL MEETING, BOSTON, MASSACHUSETTS, DECEMBER, 1964

THIS SYMPOSIUM SERIES IS CONCERNED WITH THE TRANSPORTATION OF RADIOACTIVE MATERIALS. THE 10 PAPERS PRESENTED COVERED SAFETY ASPECTS, ECONOMICS, DESIGN AND DEVELOPMENT OF SHIPPING CASKS, LICENSING PRACTICE AND PROCEDURES AND PACKAGING STANDARDS AS WELL AS IMPACT RESISTANCE AND HEAT REMOVAL ABILITY OF CASKS, HEAT TRANSFER IN A LIQUID HYDROCARBON FIRE AND A CASE HISTORY OF A LARGE LIQUID SHIPMENT.

*SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING + FIRE + MOCKUP + REGULATION, AEC + REGULATION, IAEA + TESTING

3-09028 DAMAGE TO YANKEE FUEL SHIPPING CASK

YANKEE ATOMIC ELECTRIC COMPANY
1 PAGE- ATOMIC ENERGY CLEARING HOUSE 12(12)- 25 (MARCH 21, 1966)

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-09028 *CONTINUED*

INADEQUATE TIGHTENING OF SOME FRAMEWORK ALLOWED MOVEMENT OF CASK TO DAMAGE THE YOKE USED FOR CASK UNLOADING. DAMAGE HAPPENED DURING RAIL SHIPMENT BACK TO ROWE. NO INDICATION OF IMMINENT HAZARD TO PUBLIC.

*ACCIDENT, TRANSPORTATION + FUEL HANDLING + REACTOR, PRESSURIZED WATER + YANKEE

3-09101 DAVIS FC + PATE WA
A MACHINE TO TRANSFER POWDERED RADIOACTIVE FUEL REMOTELY
OAK RIDGE NATIONAL LABORATORY
ORNL-TM-1397 +. 21 PAGES, 2 FIGURES- JANUARY 28, 1966- CFSTI, \$1.00- \$0.50 MN.

THE FUEL TRANSFER MACHINE WAS DESIGNED FOR USE AS ONE OF THE MACHINES IN AN ASSEMBLY LINE THAT WILL CONSTITUTE THE OXIDE FABRICATION PROCESS PLANNED FOR THE THORIUM-URANIUM FUEL CYCLE DEVELOPMENT FACILITY BEING CONSTRUCTED AT OAK RIDGE NATIONAL LABORATORY. THE FUEL TRANSFER MACHINE WILL RECEIVE THE THORIUM-URANIUM OXIDE POWDER FROM THE WEIGHING MACHINES, BLEND THE FUEL WHILE TRANSPORTING IT TO THE FILL-COMPACT MACHINE, AND EMPTY THE BLENDED FUEL MATERIAL INTO THE FILL-COMPACT MACHINE. THE REQUIREMENTS, PROBLEMS, AND SOLUTION OF THOSE PROBLEMS ENCOUNTERED IN THE DESIGN FOR THE FUEL TRANSFER MACHINE ARE DISCUSSED IN THIS REPORT.

*FUEL HANDLING MACHINE + DESIGN STUDY + THORIUM + URANIUM

3-09216 AEC AND ICC APPROVE MEMORANDUM OF UNDERSTANDING ON SHIPMENTS OF RADIOACTIVE MATERIALS
U. S. ATOMIC ENERGY COMMISSION + INTERSTATE COMMERCE COMMISSION
AEC PRESS RELEASE J-64- 5 PAGES- MARCH 18, 1966- DPI

CHAIRMAN GLENN T. SEABORG OF THE ATOMIC ENERGY COMMISSION AND CHAIRMAN JOHN W. BUSH OF THE INTERSTATE COMMERCE COMMISSION SIGNED A MEMORANDUM OF UNDERSTANDING CONCERNING THE TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS. OBJECTIVES OF THE AGREEMENT ARE TO MINIMIZE DUPLICATION AND PROVIDE AS MUCH CONSISTENCY AS POSSIBLE IN REGULATIONS AND REQUIREMENTS, AND TO ASSURE THAT ALL SHIPMENTS OF RADIOACTIVE MATERIAL WITHIN THE JURISDICTION OF THE TWO AGENCIES ARE SUBJECT TO THE REGULATIONS OF EITHER THE ICC OR THE AEC. THE MEMORANDUM SETS FORTH GUIDELINES AS TO THE MANNER IN WHICH THE ICC AND THE AEC WILL EXERCISE THEIR AUTHORITIES WITH RESPECT TO THE SAFE TRANSPORT OF RADIOACTIVE MATERIALS. WORK IS UNDERWAY TO REVISE EXISTING ICC REGULATIONS TO PROVIDE MORE DETAILED STANDARDS FOR THE MAJORITY OF THE SHIPMENTS OF RADIOACTIVE MATERIAL.

*ADMINISTRATIVE CONTROLS AND PRACTICES + *TRANSPORTATION AND HANDLING + REGULATION, AEC + REGULATION, GENERAL

3-09217 KOOPMANS LH
A STATISTICAL STUDY OF THE DERAILMENT HAZARD FOR U.S. CLASS I RAILWAYS
SANDIA LABORATORY, ALBUQUERQUE, NEW MEXICO
23 PAGES, 1 FIGURE, 2 TABLES, 5 REFERENCES- NAVAL RESEARCH LOGISTICS QUARTERLY 12(1)- 95-118 (MARCH 6, 1965)

A SIMPLE PROBABILISTIC MODEL IS PROPOSED FOR THE COLLISION AND DERAILMENT EXPERIENCE FOR FREIGHT TRAINS OF U. S. CLASS I RAILWAYS. BY MEANS OF THIS MODEL, ASYMPTOTIC CONFIDENCE INTERVALS ARE CONSTRUCTED FOR THE PROBABILITY PER MILE OF A DERAILMENT ACCIDENT AS A FUNCTION OF TRAIN SPEED AND TRAIN LENGTH WHICH UTILIZE DATA AVAILABLE FROM RECORDS FOR U. S. CLASS I RAILWAYS KEPT BY THE INTERSTATE COMMERCE COMMISSION AND THE ASSOCIATION OF AMERICAN RAILROADS. ALLOWANCE IS MADE IN THE MODEL FOR THE GROUPING OF DATA BY TRAIN LENGTH AND SPEED. THE THEORY IS APPLIED TO A PARTICULAR SUMMARY OF ACCIDENT DATA FOR ALL U. S. CLASS I RAILWAYS FOR THE YEARS 1952 THROUGH 1955. ON THE BASIS OF THIS DATA, CONFIDENCE INTERVALS FOR THE DERAILMENT PROBABILITY ARE COMPUTED FOR SPEEDS IN EXCESS OF 10 MPH AND TRAIN LENGTHS OF FROM 11 TO 130 CARS IN GROUPS OF 5 CARS.

*ACCIDENT, TRANSPORTATION + ACCIDENT MODEL + ANALYTICAL MODEL

3-09287 AMENDMENT NO. 11 TO LICENSE APPLICATION FOR NUCLEAR TEST REACTOR
GENERAL ELECTRIC COMPANY, SAN JOSE
17 PAGES, 1 TABLE, OCTOBER 4, 1965, DOCKET NO. 50-73, PDR

OBJECTIVE OF THIS AMENDMENT - TO SUBMIT TECHNICAL SPECIFICATIONS PROPOSED FOR OPERATION OF NTR AS ESSENTIALLY FINALIZED THROUGH DISCUSSIONS WITH THE AEC STAFF.

CONTROL POD + CONTROL SYSTEM + FUEL HANDLING + FUEL STORAGE + INSTRUMENTATION, NUCLEAR + LICENSING STATUS OF NUCLEAR PROJECTS + OPERATING LIMITS/TECHNICAL SPECIFICATIONS + REACTOR SAFETY SYSTEM + REACTOR, RESEARCH + SITING, REACTOR + VENTILATION SYSTEM

3-09526 BELLET J + CHOUARD P + TALON R
HANDLING OF SUBASSEMBLIES AND LOADING OF SLEEVES OF THE HEATED CORE WITH THE HELP OF AN AUXILIARY GRIPPER ON THE RAPSODIE ENGINEERING MOCK-UP
COMMISSARIAT A L ENERGIE ATOMIQUE, CADARACHE, FRANCE, CENTRE D ETUDES NUCLEAIRES
ORNI-TR-985 +. PNR/SEPR-65-004 +. 100 PAGES, FEBRUARY 26, 1965, JCL, \$0.60 FS, \$3.20 MF

REPORT DEALS WITH THE LOADING AND UNLOADING CAMPAIGNS CARRIED OUT WITH THE HELP OF AN AUXILIARY GRIPPER ON THE RAPSODIE ENGINEERING MOCKUP, JULY-NOVEMBER, 1964. ON THE WHOLE, THE UNLOADING OPERATIONS ENTAILLED ONLY MINOR DETAIL MODIFICATIONS. AFTER THE ENCOURAGING RESULTS OBTAINED WITH THE AUXILIARY GRIPPER WHICH CAN OPERATE EVEN IN ABNORMAL CASES OF UNLOADING,

ACCESSION NUMBER 3-09028 TO 3-09526

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-09526 *CONTINUED*

WHICH IS IMPOSSIBLE WITH THE PRIMARY UNLOADING CASK CAR, IT SEEMS DESIRABLE THAT A GRIPPER SPECIALLY ADAPTED TO WORKING CONDITIONS BE DESIGNED IN ORDER TO ALLOW SOME SPECIAL UNLOADINGS.

*FUEL HANDLING + *FUEL HANDLING MACHINE + FRANCE + MAIN COOLING SYSTEM + SODIUM

3-09527 WILDING MW + RHODES DW

STABILITY STUDIES OF HIGHLY RADIOACTIVE ALUMINA CALCINE DURING HIGH TEMPERATURE STORAGE
PHILLIPS PETROLEUM COMPANY, IDAHO
100-14670 +. 8 PAGES, 5 FIGURES, 8 REFERENCES- JANUARY 1966- CFSTI, \$1.00 CY, \$0.50 MN

LABORATORY STUDIES WERE MADE OF THE STABILITY OF HIGHLY RADIOACTIVE ALUMINA CALCINE FROM THE WASTE CALCINING FACILITY (WCF) IN A TEMPERATURE RANGE FROM 600C TO 1200C IN 24-HOUR TESTS AND AT 800C FOR ONE YEAR. STRONTIUM-90 AND CERIUM-144 DID NOT VOLATILIZE AT TEMPERATURES UP TO 1200C. VOLATILIZATION OF CESIUM-137 AND RUTHENIUM-106 WAS FIRST DETECTABLE AT 800C, AND THAT OF BORON AT 1000C- MERCURY AND NITRATE WERE VOLATILE AT 600C. X-RAY DIFFRACTION PATTERNS OF THE CALCINE SHOWED THAT THE AMORPHOUS ALUMINA PRODUCED IN THE WCF CONVERTED TO ALPHA ALUMINA (THE STABLE, HIGH-TEMPERATURE, ACID-INSOLUBLE FORM OF ALUMINA) ABOVE 1000C IN THE 24-HOUR TESTS. STORAGE OF THE ALUMINA CALCINE AT TEMPERATURES UNDER 400C NOW APPEARS TO BE UNNECESSARILY CONSERVATIVE. ON THE BASIS OF THE RESULTS OBTAINED IN THIS STUDY, SECOND-GENERATION STORAGE BINS ARE BEING DESIGNED FOR MAXIMUM (CENTERLINE) TEMPERATURES OF 700C, AND FURTHER STUDIES ARE EXPECTED TO SHOW THAT THIS TEMPERATURE LIMITATION CAN BE SIGNIFICANTLY INCREASED IN THE FUTURE.

*HIGH TEMPERATURE + *WASTE STORAGE + CERIUM + STRONTIUM

3-09528 IMPROVEMENTS IN OR RELATING TO CONTAINERS FOR TRANSPORTING RADIOACTIVE MATERIALS
BRITISH PAT. 973,448 +. 3 PAGES, 1 FIGURE, OCTOBER 28, 1964, PATENT (BRITISH)

PATENT DESCRIBES IMPROVEMENTS IN OR RELATING TO CONTAINERS FOR TRANSPORTING RADIOACTIVE MATERIALS, SPECIFICALLY ISOTOPES. THE UNIQUE FEATURE IS AN INNER, HERMETICALLY SEALED VESSEL OF DENSE RADIATION-RESISTING MATERIAL INSIDE A THERMAL INSULATING CASING COMPOSED OF A HARD WOOD. THESE CONTAINERS ARE THEN ENCLOSED IN A THIRD CONTAINER, WITH SPACING PROVIDED BETWEEN THE OUTER TWO.

*SHIPPING CONTAINER + *THERMAL INSULATION + *TRANSPORTATION AND HANDLING + PATENTS

3-09529 KAVANAUGH MT + GUALTIERI G

TRANSPORT OF IRRADIATED FUEL FROM LATINA TO WINDSCALE.
UNITED KINGDOM ATOMIC ENERGY AUTHORITY + ENTE NAZIONALE PER L ENERGIA ELETTRICA (ENEL)
6 PAGES, 5 FIGURES- NUCLEAR ENGINEERING 11(117)- 117-122 (FEBRUARY 1966)

THE TRANSPORT OF IRRADIATED FUEL FROM LATINA ITALY TO WINDSCALE, UK IS DESCRIBED. A SMALL CHARTER VESSEL WITH A CARGO OF 6 CASKS PER VOYAGE PROVIDED ECONOMIC TRANSPORTATION. THE CASKS WERE FABRICATED FROM 14-1/2-IN.-THICK MILD STEEL WHOSE LOADED WEIGHT WAS 47.5 TONS. THE PAYLOAD WAS 2.66 TONS OF MAGNOX-CLAD NATURAL URANIUM CONTAINING 2.41 TONS OF URANIUM. CASKS WERE WATER-FILLED TO IMPROVE HEAT TRANSFER. TO REDUCE HYDROGEN EVOLUTION CAUSED BY MAGNOX CORROSION AND RADIOLYSIS, THE CASKS WERE REFRIGERATED DURING THE VOYAGE. THE PROBLEMS OF INDEMNITIES AND INSURANCE COVERAGE IN THIS INTERNATIONAL SHIPMENT ARE DESCRIBED.

*SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING + CORROSION + HYDROGEN + INSURANCE + OCEAN AND SEA + PRESSURE, INTERNAL

3-09564 WILKINS BW

FREEZING PRECAUTIONS IN SHIPPING SPENT FUEL, FEBRUARY 1966
GENERAL ELECTRIC COMPANY, SYRACUSE, N.Y.
2 PAGES, MARCH 18, 1966, ATOMIC ENERGY CLEARING HOUSE, 12(18), PP. 17-18 (MAY 2, 1966)

SEVERAL INDIAN POINT CORE A SHIPMENTS WERE MADE WITH ALCOHOL ADDED TO THE CASK COOLANT. AFTER THE 16-HR JOURNEY TO NFS, CASK PRESSURES WERE 19-34 PSI DUE TO VAPORIZATION CAUSED BY FUEL-SURFACE TEMPERATURES AS HIGH AS 180 F. WOODEN ENCLOSURES WERE THEN TRIED, AND LOUVERS ADJUSTED ACCORDING TO CASK SURFACE TEMPERATURE AND MANUFACTURERS CALCULATIONS. RUPTURE DISK DISCHARGE LINE WAS CONNECTED TO 55-GAL DRUM TO MONITOR FOR LEAKAGE.

*OPERATING EXPERIENCE + *SHIPPING CONTAINER + FUEL ELEMENT + NFS (NUCLEAR FUEL SERVICES) + PRESSURE, INTERNAL

3-09585 NEUTRON SOURCE

ARGENTINE PAT. 134,870 +. ABSTRACT ONLY, AUGUST 14, 1963, PATENT (FOREIGN)

A NEW METHOD OF MANUFACTURING PU-BE NEUTRON SOURCES IS DESCRIBED. THE BERYLLIUM CONTAINER THAT HOLDS THE PLUTONIUM PRIOR TO ALLOYING, IS OXIDIZED IN A NITROGEN ATMOSPHERE FORMING A BERYLLIUM OXIDE-NITRIDE LAYER. THIS LAYER PREVENTS INTERACTION OF THE BERYLLIUM CONTAINER WITH THE METAL CONTAINER THAT HOUSES THE MATERIALS DURING THE ALLOYING STEP.

*BERYLLIUM + *PLUTONIUM + *SOURCE, NEUTRON + ALLOY + ARGENTINA + PATENTS

3-09849 DOSHI KD

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-09849 *CONTINUED*
STRUCTURAL INTEGRITY OF SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS. PART V. AN ANALYTICAL STUDY OF LONGITUDINAL VEHICLE-COLLISIONS.
FRANKLIN INST. RESEARCH LABS., PHILADELPHIA
NYO-2539-4 +. 49 PAGES, FIGURES, REFERENCES, NOVEMBER 1965, CFSTI, \$2.00 CY, \$0.50 MN

A BASIC APPROACH IS OUTLINED FOR DEVELOPING ANALYTICAL PROCEDURES TO PREDICT VEHICLE-COLLISION BEHAVIOR. THE APPROACH IS TO IDEALIZE THE PHYSICAL SYSTEM BY A NONLINEAR, LUMPED-PARAMETER MATHEMATICAL MODEL, THEN TO SET UP THE EQUATIONS OF MOTION OF THE MODEL AND SOLVE THESE NUMERICALLY BY MEANS OF RUNGE-KUTTA PROPAGATION TECHNIQUES FOR INITIAL-VALUE PROBLEMS. AN ANALYSIS AND DIGITAL COMPUTER PROGRAM ARE PROVIDED FOR NUMERICAL EVALUATION OF SYSTEM RESPONSE FOR THE LONGITUDINAL COLLISION OF A TRACTOR SEMITRAILER CARRYING A CONTAINER FOR IRRADIATED FUEL. THE ANALYSIS GIVEN FOR THIS SPECIFIC CASE PRESUMES FOREKNOWLEDGE OF COLLISION INPUT FORCE AND OF THE FORCE-DISPLACEMENT CHARACTERISTICS OF DEFORMABLE ELEMENTS OF THE SYSTEM. IN ADDITION, ONLY LONGITUDINAL MOTION OF THE SYSTEM WAS CONSIDERED. MODIFICATIONS CAN BE MADE TO THE ANALYSIS IF FUTURE COLLISION-TEST RESULTS REQUIRE THEM.

*ACCIDENT ANALYSIS + *ACCIDENT, TRANSPORTATION + *ANALYTICAL MODEL + TRANSPORTATION AND HANDLING

3-09850 DUHAMEL F + LAVIE JM
THE LIMITATION OF THE QUANTITIES OF RADIOACTIVE SUBSTANCES MANIPULATED OR TRANSPORTED. EVALUATION OF ACCIDENTAL EXPOSURES TO RADIATION
ATOMIC ENERGY COMMISSION, NUCLEAR RESEARCH CENTER, SACLAY, FRANCE
AEC-TR-6525 +. 35 PAGES, TRANSLATED FROM HEALTH PHYSICS 10, PP. 453-468 (1964), JCL \$3.60 FS, \$1.25 MF

VARIOUS NATIONAL AND INTERNATIONAL GROUPS HAVE STUDIED THE PROBLEM OF LIMITING THE QUANTITIES OF RADIOACTIVE SUBSTANCES THAT MAY BE MANIPULATED UNDER CERTAIN OPERATING CONDITIONS. THE MOST VALUABLE STUDIES HAVE BEEN ACHIEVED ON THE BASIS OF RADIOBIOLOGY. NOW, IT IS CLEAR THAT THE RESULTS FROM RADIOBIOLOGY DO NOT SUFFICE TO ESTABLISH A COMPLETE AND SCIENTIFIC BASIS. FOR PRACTICAL APPLICATION, NUMEROUS COMPLEMENTARY HYPOTHESES MUST BE MADE. IN ATTEMPTING TO INTERRELATE OPERATIONS THAT ARE VERY DIFFERENT, THE AUTHORS PROPOSE A PROCEDURE WHICH, ALTHOUGH NOT SCIENTIFICALLY RIGOROUS, MAKES APPARENT THE RELATIONSHIPS BEING HYPOTHECATED BETWEEN THE FUNDAMENTAL THEORETICAL ASSUMPTIONS AND THE PRACTICAL VALUE TO BE OBSERVED. THIS PROCEDURE PERMITS ONE TO EVALUATE, UNAMBIGUOUSLY, THE MAXIMUM QUANTITIES TO BE MANIPULATED IN THE CASE OF ANY RADIONUCLIDE, CHEMICAL FORM, PHYSICAL STATE, DEGREE OF CONTAINMENT, TYPE OF OPERATION, KIND OF FACILITY AND TECHNICAL SKILL OF THE OPERATORS. THUS THIS PROCEDURE POSSESSES GREAT FLEXIBILITY AND PERMITS ONE TO DETERMINE THESE QUANTITIES ON A SCALE EXTENDING OVER A RANGE OF 10 TO THE 14.

*OPERATING LIMITS/TECHNICAL SPECIFICATIONS + ADMINISTRATIVE CONTROLS AND PRACTICES + INCIDENT, EXPOSURE + TRANSPORTATION AND HANDLING

3-09968 REPROCESSING TECHNIQUES AND PROGRESS
2 PAGES, EURONUCLEAR 2(12), PAGES 604-605 (DECEMBER, 1965)

THE INCREASINGLY IMPORTANT PROBLEMS ASSOCIATED WITH THE REPROCESSING OF IRRADIATED NUCLEAR FUELS ARE NOW ACHIEVING PRIORITY IN ALL COUNTRIES WHERE NUCLEAR POWER IS BEING, OR IS EXPECTED TO BE, UTILIZED. THE EUROCHEMIC PLANT AT MOL IN BELGIUM IS EXPECTED TO PROVIDE A LARGE PERCENTAGE OF THE REPROCESSING CAPACITY REQUIRED DURING THE NEXT FEW YEARS, BUT SEVERAL OTHER NUCLEAR-DEVELOPED COUNTRIES HAVE THEIR OWN SMALLER PLANTS WHICH MAY ALSO CONTRIBUTE TO THE TOTAL EUROPEAN REQUIREMENT.

*CONTAINMENT, FUEL REPROCESSING + *EUROCHEMIC + *RADIOCHEMICAL PROCESSING + BELGIUM + ITALY + NETHERLANDS + TRANSPORTATION AND HANDLING + UNITED KINGDOM

3-10055 BYRNE JT + CALDWELL CE + DELNAY RL + MOSELEY JD + OETTING FL
MEASUREMENTS INVOLVED IN SHIPPING PLUTONIUM OXIDE
DOW CHEMICAL COMPANY, ROCKY FLATS DIVISION
RFP-502 +. 80 PAGES, AUGUST 10, 1965- CFSTI \$4.00 CY, \$0.15 MN

THE MAJOR CAUSES OF SHIPPER-RECEIVER DIFFERENCES DURING SHIPMENTS OF PLUTONIUM OXIDE HAVE BEEN IDENTIFIED, AND METHODS OF MINIMIZING THE DIFFERENCES HAVE BEEN DEVELOPED. ACCEPTABLE LEVELS OF SHIPPER-RECEIVER DIFFERENCES HAVE BEEN DEMONSTRATED, AND RECOMMENDATIONS FOR FURTHER IMPROVEMENT HAVE BEEN MADE. PLUTONIUM OXIDE, PROPERLY PREPARED, IS STABLE AND SUFFICIENTLY SOLUBLE TO USE AS A SHIPPING FORM. THE EQUIPMENT AND PROCEDURES USED IN THIS STUDY FOR THE PREPARATION OF ACCEPTABLE PLUTONIUM OXIDE ARE RECOMMENDED AS SPECIFICATIONS. BULK-MEASUREMENT ERRORS ARE MINIMAL WHEN PROPER PROCEDURES AND EQUIPMENT ARE USED. RETENTION OF PLUTONIUM OXIDE IN THE SHIPPING CANS WAS NEGLIGIBLE. A TEMPLATE-SAMPLING METHOD APPEARS TO BE ADEQUATE. A PROCEDURE FOR THE NONDESTRUCTIVE CALORIMETRIC DETERMINATION OF PLUTONIUM IN A SHIPPING CONTAINER HAS BEEN DEMONSTRATED.

*ANALYTICAL TECHNIQUE, GENERAL + *PLUTONIUM OXIDE + *SHIPPING CONTAINER + TRANSPORTATION AND HANDLING

3-10056 MALLET AJ + WHEATLEY SJ
FISSILE-MATERIAL CONTAINER AND PACKAGING DEVELOPMENT AND TESTING PROGRAM
UNION CARBIDE CORPORATION, OAK RIDGE, ORGDP
K-1661 +. 41 PAGES, 10 FIGURES, APRIL 1966, CFSTI, \$2.00 CY, \$0.50 MN

PRESSURE TESTS (400 PSIG) WERE MADE ON THE 5-, 8-, 12-, AND 30-IN.-DIAM URANIUM HEXAFLUORIDE CYLINDERS. IN ADDITION, SIMILAR CONTAINERS WERE SUBJECTED TO DROP TESTS FROM HEIGHTS OF 4 AND 30 FT. TO OBTAIN ADDITIONAL STRUCTURAL DATA, A 30-IN.-DIAM CYLINDER WAS MOUNTED ON A QUARTER-SCALE-MODEL TRUCK BED AND DROPPED FROM VARIOUS HEIGHTS TO SIMULATE COLLISIONS.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-10056 *CONTINUED*

VARIOUS TIEDOWN COMPONENTS WERE ASSESSED. IN RELATED COMPONENT ASSESSMENT, A FOAM PLASTIC THAT HAS EXCELLENT SHOCK ABSORPTION, INSULATING, AND NEUTRON ATTENUATING PROPERTIES WAS DEVELOPED AT ORGDP AND TESTED. IT APPEARS SUPERIOR TO MANY OTHERS USED IN THESE APPLICATIONS.

*ACCIDENT ANALYSIS + *SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING + *URANIUM HEXAFLUORIDE + PRESSURE, INTERNAL

3-10251 DIXON FE

EXTENDED FIRE TESTS ON TINPLATE CANS

UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL

AERE-M-1664 +. 13 PAGES, 12 FIGURES, REFERENCES, NOVEMBER, 1965, 81S, \$1.40, HMSO

IAEA REGULATIONS REQUIRE THAT SOURCES OF GAMMA-EMITTING MATERIALS WITH A STRENGTH BETWEEN 3 AND 20 CURIES SHALL HAVE AN OUTER STEEL CONTAINMENT VESSEL OF 2 MM THICKNESS. IT IS VERY DIFFICULT TO OBTAIN SMALL STANDARD DRUMS IN THIS THICKNESS. TO PROVE THAT TINPLATE CONTAINERS WOULD WITHSTAND EXTENDED FIRE TESTS, SAMPLES WERE SUBJECTED TO A TORCH TEST (TO SIMULATE A JET OF FLAME) ON A CONTAINER FOR FOUR HOURS, AND A FOUR-HOUR FIRE TEST IN A COMPLETELY OXIDIZING ATMOSPHERE IN AN ELECTRIC FURNACE. A TORCHING FLAME OF 800 C FOR FOUR HOURS HAD NO SIGNIFICANT EFFECT ON THE STRENGTH OF THE CAN OR ON ITS ABILITY TO CONTAIN THE ISOTOPE SPECIFIED. AFTER THE OXIDIZING TEST AT 800 C, THE CAN, ALTHOUGH HEAVILY OXIDIZED, WAS STILL CAPABLE OF RETAINING THE ISOTOPE AS SPECIFIED.

*FIRE + *SHIPPING CONTAINER + *TEST, PROOF + CONTAINMENT INTEGRITY + HIGH TEMPERATURE + STEEL + THERMAL EXPERIMENT

3-10258 SALLERON C

INTERNATIONAL REGULATION OF TRANSPORT OF RADIOACTIVE MATERIALS. PRESENT TRENDS

PARIS UNIVERSITY, FRANCE

NP-15620 +. 45 PAGES, 1964, IN FRENCH, DEP. MN

THE MODIFICATIONS AND ALTERATIONS MADE IN 1963 BY THE INTERNATIONAL AGENCY FOR ATOMIC ENERGY TO THE REGULATIONS FOR TRANSPORTING RADIOACTIVE MATERIALS ARE SUMMARIZED. THE DEFINITIONS OF TERMS ARE GIVEN, AND THE MATERIALS EXEMPT FROM INTERNATIONAL REGULATION ARE DESCRIBED. THE CONDITIONS FOR PACKAGING AND PERMISSION FOR TRANSPORTATION ARE OUTLINED, AND THE REGULATIONS CONCERNING STORAGE AND TRANSPORTATION ARE INDICATED.

*IAEA (INTERNATIONAL ATOMIC ENERGY AGENCY) + *REGULATION, IAEA + *TRANSPORTATION AND HANDLING

3-10307 BAKER PS

LIST OF AEC RADIOISOTOPE CUSTOMERS WITH SUMMARY OF RADIOISOTOPE SHIPMENTS FY 1965

OAK RIDGE NATIONAL LABORATORY

ORNL-IIC-6 +. 73 PAGES, TABLES, MARCH 1966, CFSTI \$3.00 CY

THIS DOCUMENT PROVIDES AN ALPHABETICAL LIST OF CUSTOMERS WHO BOUGHT RADIOISOTOPES FROM AEC FACILITIES DURING FY 1965. THE INFORMATION IS DIVIDED INTO DOMESTIC AND FOREIGN CUSTOMERS AND IS CROSS-REFERENCED WITH AN ALPHABETICAL LIST OF ISOTOPES, STATES AND COUNTRIES SERVICED, AND FINALLY, SHIPMENTS, QUANTITIES, AND COST FOR EACH ISOTOPE UNDER DOMESTIC, FOREIGN, AND PROJECT (AEC FACILITIES) CATEGORIES.

*ELEMENTS AND ISOTOPES + *TRANSPORTATION AND HANDLING

3-10308 SPALLER AE + SHOBE LR

STRUCTURAL ANALYSIS OF SHIPPING CASKS VOL. I. ANALYSIS OF A SHIPPING CASK SUBJECTED TO INTERNAL PRESSURE

OAK RIDGE NATIONAL LABORATORY, OAK RIDGE

ORNL-TM-1312 +. 58 PAGES, 19 FIGURES, 9 TABLES, MARCH 1966, CFSTI, \$3.00 CY, \$0.75 MN

FORMULAS TO BE USED BY THE DESIGN ENGINEER TO CALCULATE THE MAXIMUM STRESS PRODUCED IN A CASK USED TO SHIP RADIOACTIVE MATERIALS WHEN IT IS SUBJECTED TO INTERNAL PRESSURE ARE PRESENTED. THE FORMULAS WERE DEVELOPED FOR USE AS A GUIDE TO INDICATE COMPLIANCE WITH THE PROPOSED AEC REGULATION PERTAINING TO THE DESIGN REQUIREMENT FOR RESISTANCE TO INTERNAL PRESSURE. HOWEVER, USE OF THESE FORMULAS, WHICH TAKE INTO ACCOUNT THE ELASTIC NATURE OF THE LEAD SHIELDING, ARE DERIVED TO DETERMINE THE THICKNESS OF THE CAVITY WALL FOR CASKS OF BOTH PRISMATIC AND CYLINDRICAL CONFIGURATION, THE FORMULAS ARE TABULATED, AND EXAMPLE PROBLEMS ARE GIVEN. CREEP OF THE LEAD SHIELD IS EVALUATED, AND IT IS CONCLUDED THAT THE CREEP PROBLEM TENDS TO BE SELF-ALLEVIATING.

*PRESSURE, INTERNAL + *SHIPPING CONTAINER + *STRESS ANALYSIS + *TRANSPORTATION AND HANDLING

3-10309 SALMON R

ESTIMATION OF FUEL-SHIPPING COSTS FOR NUCLEAR POWER COST-EVALUATION PURPOSES

OAK RIDGE NATIONAL LABORATORY, OAK RIDGE

ORNL-3943 +. 67 PAGES, 23 FIGURES, 9 TABLES, 23 REFERENCES, MARCH 1966, CFSTI \$3.00 CY, \$0.75 MN

THE AEC GUIDE TO NUCLEAR PCWER COST EVALUATION, TID-7025 (MARCH 1962), SUGGESTED THAT COSTS OF \$3 PER KG U FOR FRESH FUELS AND \$16 PER KG U FOR SPENT FUELS BE USED FOR EVALUATION PURPOSES. THE WORK REPORTED HERE IS AN ATTEMPT TO PROVIDE A MORE DETAILED BASIS FOR SHIPPING-COST ESTIMATION, SO THAT DIFFERENCES INHERENT IN THE REACTOR AND FUEL ASSEMBLY DESIGN MAY BE ACCOUNTED FOR. THE METHODS PRESENTED FOLLOW GENERALLY THE APPROACH USED BY THE AUTHOR IN COMPUTER CODES MYRA AND NORA. THE MAJOR NEW FEATURES ARE THAT (1) DESIGN CHARTS BASED ON

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TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-10309 *CONTINUED*

DATA CORRELATIONS ARE USED AS A MEANS OF ARRIVING AT AN APPROXIMATE CASK DESIGN, WHEREAS THE PREVIOUS WORK DEPENDED ON THE USE OF COMPUTER CODES, (2) THE SCOPE OF THE WORK HAS BEEN ENLARGED TO COVER THE SHIPMENT OF FRESH FUELS, INCLUDING THOSE CONTAINING GAMMA-ACTIVE RECYCLED MATERIALS, AND (3) A SECTION ON THE SHIPMENT OF CERTAIN FUEL CHEMICALS HAS BEEN ADDED. RECENT CHANGES IN SHIPPING REGULATIONS (DECEMBER 1965) GOVERNING CASK DESIGN HAVE ALSO BEEN TAKEN INTO ACCOUNT. THIS REPORT WILL PROVIDE A RAPID MEANS OF ESTIMATING FUEL SHIPPING COSTS FOR THOSE WHO DO NOT HAVE ACCESS TO THE COMPUTER CODES MENTIONED.

*ECONOMIC STUDY + *TRANSPORTATION AND HANDLING + DESIGN STUDY + HEAT TRANSFER + SHIPPING CONTAINER

3-10310 SHAW AE

THE SAFE TRANSPORT OF RADIOACTIVE MATERIALS. A KEY TO THE 1964 REVISION OF THE INTERNATIONAL ATOMIC ENERGY AGENCY'S REGULATIONS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, RISLEY
TRG-1073 (D) +. 21 PAGES, 1 FIGURE, 4 TABLES, JULY 1965, BIS, \$0.70 CY

A KEYED INDEX TO HELP THE DAY-TO-DAY USER OF THE INTERNATIONAL ATOMIC ENERGY AGENCY DOCUMENT REGULATIONS FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIALS (1964 REVISION OF MAY 1961 REGULATIONS). IF IT IS KNOWN WHAT RADIOACTIVE MATERIAL HAS TO BE TRANSPORTED (IN TERMS OF ELEMENT, ISOTOPE, ITS TOTAL AND SPECIFIC ACTIVITIES ITS CHEMICAL AND PHYSICAL FORM, AND DETAILS OF THE PACKAGE TYPE ALONG WITH SURFACE CONTAMINATION AND EXTERNAL RADIATION DOSE-RATE MEASUREMENTS), STEP-BY-STEP USE OF THE KEY WILL INDICATE THE CORRECT PROCEDURE. THIS KEY DOES NOT AVOID THE NEED TO UNDERSTAND THE DETAIL OF THE IAEA DOCUMENT BUT IS INTENDED AS A SUMMARY FOR DAY-TO-DAY USAGE BY THE CONSIGNOR. ANY REFERENCE IN THE KEY TO THE REGULATIONS IMPLIES THE REVISED IAEA REGULATIONS.

*REGULATION, IAEA + *SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING

3-10311 MARKS RE + ROGERS LA

SHOCK FRONT STUDIES OF THE HANDCAR EVENT
LAWRENCE RADIATION LABORATORY, LIVERMORE, CALIFORNIA
PNE-801F +. 61 PAGES, 47 FIGURES, 13 TABLES, 9 REFERENCES, APRIL 1966- CFSTI, \$3.00 CY

CLOSE-IN SHOCK-WAVE AND SEISMIC EFFECTS WERE MEASURED SUBSEQUENT TO A 12-KT DETONATION IN A NEVADA TEST SITE DOLOMITE MEDIUM AND COMPARED WITH PREDETONATION CODE-PREDICTED RESULTS. COMPARATIVE AGREEMENT OF EXPERIMENTAL STRESSES WITH CALCULATED STRESSES IN THE HYDRODYNAMIC PRESSURE REGION WAS WITHIN 13 PERCENT, WHEREAS SIMILAR COMPARISONS IN THE LOW-PRESSURE AREA INDICATED A MAXIMUM DISAGREEMENT OF 390 PERCENT. BRIEF DESCRIPTIONS OF THE CODE, CODE INPUT DATA, AND CODE-PREDICTED RESULTS ARE ALSO PRESENTED ALONG WITH MORE DETAILED DESCRIPTIONS OF THE SHOCK-WAVE INSTRUMENTATION, ITS INSTALLATION AND CHECKOUT, AND THE MEASURED RESULTS.

*COMPARISON, THEORY AND EXPERIENCE + *PLOWSHARE PROGRAM + *SHOCK WAVE + SEISMOLOGY

3-10522 SMITH DR

CRITERIA AND EVALUATION FOR THE STORAGE OF FISSILE MATERIAL IN A LARGE AND VARIED REACTOR RESEARCH AND DEVELOPMENT PROGRAM
LOS ALAMOS SCIENTIFIC LABORATORY
LA-DC-7248 + CONF-651103-13 + SM-70-50 +. 13 PAGES, 1965, IAEA SYMPOSIUM ON CRITICALITY CONTROL OF FISSILE MATERIALS, STOCKHOLM, CFSTI, \$1.00 CY, \$0.50 MN

A SIMPLIFIED METHOD FOR EVALUATING CRITICAL PARAMETERS OF FISSILE MATERIAL WHICH AFFECTS ITS STORAGE CAPABILITY IS DISCUSSED. THE DENSITY-ANALOG APPROACH PROVIDES A CONSERVATIVE ANALYSIS OF SUBCRITICAL, REFLECTED ARRAYS STORED IN VARIOUS CONFIGURATIONS. SEVERAL ILLUSTRATIONS OF THE USE OF THE METHOD ARE GIVEN, ALONG WITH THE SIGNIFICANCE OF VARIOUS PARAMETERS THAT INFLUENCE THE QUANTITY OF MATERIAL WHICH CAN BE STORED IN A PARTICULAR VAULT.

*CRITICALITY SAFETY + *FUEL STORAGE + HAZARDS ANALYSIS + NEUTRON INTERACTION

3-10806 REPORT OF INVESTIGATION OF THE AMERICIUM SHIPPING CONTAINER EXPLOSION IN BUILDING 71 ON SEPTEMBER 25, 1964

THE DOW CHEMICAL COMPANY, DENVER, COLORADO
15 PAGES, 12 FIGURES, OCTOBER 20, 1964, SOURCE

ON SEPTEMBER 25, 1964, A SHIPPING CONTAINER AT DOW CHEMICAL COMPANY, ROCKY FLATS SITE, CONTAINING 5 G OF AMERICIUM AQUEOUS CHLORIDE SOLUTION, EXPLODED. INVESTIGATION INDICATED THAT THERE WAS INSUFFICIENT DATA TO DETERMINE WHETHER THE SHIPPING CONTAINER FAILED DUE TO CHEMICAL EXPLOSION OR SLOW PRESSURE BUILDUP. EITHER IS POSSIBLE BECAUSE OF RADIOLYTIC DECOMPOSITION OF THE SOLUTION. THE MAIN RECOMMENDATION FOR FUTURE RADIOACTIVE SHIPMENTS IS TO AVOID SENDING THE MATERIAL IN SOLUTION FORM WHEN POSSIBLE.

*AMERICIUM + *EXPLOSION + *STORAGE CONTAINER

3-10807 AEC REVISES REGULATIONS ON TRANSPORT OF RADIOACTIVE MATERIAL

U. S. ATOMIC ENERGY COMMISSION
PRESS REL. NO. J-178 +. 2 PAGES, JULY 21, 1966, OFI

THE AEC APPROVED A REVISION OF ITS REGULATIONS ON THE SAFE TRANSPORTATION OF LICENSED RADIOACTIVE MATERIAL. IT IS REPORTED IN THE CODE OF FEDERAL REGULATIONS, TITLE 10 PART 71. THE STANDARDS INCLUDE A MINIMUM OF DETAIL ON REQUIRED PACKAGING SPECIFICATIONS. EMPHASIS WAS

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3-10807 *CONTINUED*

PLACED ON PERFORMANCE STANDARDS TO PROVIDE THE NEEDED FLEXIBILITY TO DEVELOP IMPROVED SHIPPING METHODS. THE PERFORMANCE STANDARDS ARE COMPATIBLE WITH THOSE DEVELOPED BY THE INTERNATIONAL ATOMIC ENERGY AGENCY DURING THE PAST FEW YEARS, BUT THIS NEW VERSION MUST BE USED IN CONJUNCTION WITH ORDER NO. 70 OF THE ICC.

*REGULATION, AEC + *SHIPPING CONTAINER + *TRANSPORTATION AND HANDLING + FUEL HANDLING

3-10808 DUGAN FA

BROOKHAVEN EXPERIENCE WITH HANDLING AND SHIPPING OF, AND CASK DESIGN FOR, REACTOR SPENT-FUEL ELEMENTS
BROOKHAVEN NATIONAL LABORATORY
CONF-651-110-22 + 65-WA/NE-7 +. 7 PAGES, 7 FIGURES, 3 REFERENCES, PRESENTED AT AMERICAN SOCIETY OF MECHANICAL ENGINEERS WINTER MEETING, CHICAGO, ILL., NOVEMBER 7-11, 1965, SOURCE, \$1.50 CY

THE GENERAL PROBLEMS OF HANDLING, SHIPPING, AND DESIGNING SPENT-FUEL SHIPPING CASKS ARE PRESENTED. SOLUTIONS TO SPECIFIC PROBLEMS AT BROOKHAVEN ARE DISCUSSED IN RELATION TO THE GENERAL PROBLEM. PRESENTATION COVERS (A) CANAL STORAGE FACILITIES, (B) METHODS OF SHIPMENT, (C) BRIEF REVIEW OF THE AEC AND ICC REGULATORY REQUIREMENTS, (D) OPTIMIZED DESIGN OF THE SHIPPING CONTAINER. SPECIFIC SOLUTIONS USED BY BNL OVER A SIX-YEAR PERIOD ARE DESCRIBED. THE NEED FOR COMPLETE AND EARLY ANALYSIS OF THE SPECIFIC PROBLEM IS INDICATED.

DESIGN STUDY + FUEL STORAGE + REGULATION, AEC + SHIPPING CONTAINER + TRANSPORTATION AND HANDLING

3-10839 A SUMMARY OF INCIDENTS INVOLVING USAEC SHIPMENTS OF RADIOACTIVE MATERIAL, 1963-1964
DIVISION OF OPERATIONAL SAFETY, USAEC
TID-16764 (SUPPL. 2) +. 23 PAGES, 8 TABLES, APRIL, 1966, GPO, \$0.20

THIS SUMMARY WAS PREPARED TO PRESENT INFORMATION PERTAINING TO INCIDENTS SUSTAINED BY THE AEC IN THE TRANSPORTATION OF RADIOACTIVE MATERIALS, COVERING THE PERIOD FROM JANUARY 1, 1963, THROUGH DECEMBER 31, 1964. IN THE PERIOD COVERED BY THIS REPORT, THERE WERE TWENTY-FOUR INCIDENTS REPORTED. THIRTEEN OF THE TWENTY-FOUR INCIDENTS DID NOT RESULT IN RELEASE OF RADIOACTIVE MATERIALS. OF THE REMAINING ELEVEN, WHICH DID INVOLVE RADIATION RELEASES, SIX WERE LIMITED TO THE CARRIER VEHICLE AND ONLY ONE INVOLVED COSTLY CLEANUP. OF THE TWENTY-FOUR INCIDENTS REPORTED, ONLY ONE INVOLVED IMPACT DAMAGE TO THE SHIPPING CONTAINER, WHILE THE VEHICLES INVOLVED SUFFERED DAMAGE RANGING FROM NONE TO TOTAL DESTRUCTION.

*ACCIDENT, CONSEQUENCES + *TRANSPORTATION AND HANDLING + RADIOACTIVITY, RELEASE + SHIPPING CONTAINER

3-10840 CLARKE HG + DOSHI KD
STRUCTURAL INTEGRITY OF SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS. PART III. ANALYSIS OF CONTAINER TIEDOWN DURING COLLISION OF HIGHWAY VEHICLES
FRANKLIN INSTITUTE RESEARCH LABORATORIES
NYO-2539-2 + I-A2412-3 +. 70 PAGES, FEBRUARY, 1966, CFSTI, \$3.00 CY, \$0.75 MN

ANALYTICAL AND GRAPHICAL PROCEDURES ARE PRESENTED FOR DETERMINING APPROXIMATELY THE DYNAMIC RESPONSE OF CONTAINER TIEDOWNS DURING LONGITUDINAL COLLISIONS OF HIGHWAY VEHICLES. THE METHOD IS BASED ON A SIMPLIFIED MODEL OF THE VEHICLE-CONTAINER-TIEDOWN SYSTEM AND ON AN ASSUMED FORCE PULSE. ILLUSTRATIVE EXAMPLES ARE GIVEN OF THE CALCULATED RESPONSE OF A FOUR-POINT TIEDOWN MADE FROM SEVERAL DIFFERENT MATERIALS. THE ANALYTICAL METHOD IS APPLICABLE TO OTHER TIEDOWN GEOMETRIES AND MATERIALS WITHIN THE LIMITS IMPOSED BY THE CONDITIONS OF THE DERIVATION. THE METHOD SHOULD BE USEFUL TO DESIGNERS AND SHIPPERS FOR COMPARATIVE EVALUATION OF VARIOUS TIEDOWNS.

*ACCIDENT ANALYSIS + *TRANSPORTATION AND HANDLING + ANALYTICAL MODEL + DYNAMICS, NONLINEAR + IMPACT SHOCK

3-10841 CAPSULE OF RADIUM LOST IN SHIPMENT
NEWSPAPER ARTICLES, THE CHATTANOOGA TIMES, PP. 1-2, THE OAK RIDGER, PP. 1 AND 6, THE KNOXVILLE NEWS-SENTINEL, P. 28, AUGUST 18, 1966

A CAPSULE CONTAINING 300 MG. OF RADIUM WAS LOST WHILE ENROUTE BETWEEN FORT WORTH AND QUEENS COUNTY, NEW YORK. THE MATERIAL WAS SHIPPED FROM GEARHART-OWEN COMPANY AND CONSIGNED TO THE RADIUM CHEMICAL COMPANY.

*RADIOACTIVITY, RELEASE + *RADIUM + *TRANSPORTATION AND HANDLING

3-10842 NEWLON CE + MALLETT AJ
HYDROGEN MODERATION - A PRIMARY NUCLEAR SAFETY CONTROL FOR HANDLING AND TRANSPORTING LOW-ENRICHMENT UF6
OAK RIDGE GASEOUS DIFFUSION PLANT
K-1663 +. 20 PAGES, MAY 31, 1966, CFSTI, \$1.00 CY, \$0.50 MN

THE USE OF HYDROGEN MODERATION AS A PRIMARY NUCLEAR SAFETY CONTROL HAS BEEN IN EFFECT FOR MANY YEARS FOR LARGE-SCALE UF6 SHIPMENTS AMONG AEC-OWNED CONTRACTOR OPERATED FACILITIES. THE EXTENSION OF THE USE OF MODERATION-CONTROLLED SHIPMENTS TO LICENSEES AS WELL AS CONTRACTOR ORGANIZATIONS IS DESIRABLE, AND THIS REPORT SUMMARIZES, IN SUPPORT OF THIS METHOD, THE WORK DONE IN DEVELOPING BASIC CRITICALITY DATA AND THE NECESSARY EQUIPMENT AND OPERATIONAL TECHNIQUES.

*TRANSPORTATION AND HANDLING + *URANIUM HEXAFLUORIDE + CONTROL, GENERAL + HYDROGEN + SAFETY REVIEW (OPERATIONS, EXPERIMENTS)

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-11221 JAPAN RETURNING IRRADIATED FUEL ELEMENTS TO U.S. FOR REPROCESSING - FIRST TO BE SHIPPED FROM ASIA
ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.
PRESS REL. J-194 +. 1 PAGE, AUGUST 15, 1966, DPI

THE FIRST CONSIGNMENT OF IRRADIATED NUCLEAR FUEL FROM ASIA TO BE REPROCESSED IN THE UNITED STATES WILL ARRIVE FROM JAPAN AT SEATTLE, WASHINGTON, ON AUGUST 16, 1966. TWENTY-FOUR IRRADIATED FUEL ELEMENTS, CONTAINED IN TWO 11-TON CASKS, WILL BE REMOVED FROM THE NIKKEI-MARU OF THE JAPANESE SHOWA LINE AND SHIPPED DIRECTLY BY TRUCK TO THE AEC IDAHO CHEMICAL PROCESSING PLANT AT THE NATIONAL REACTOR TESTING STATION IN IDAHO. SEATTLE IS AMONG THE 44 U.S. PORTS THAT HAVE NOTIFIED THE U.S. COAST GUARD THAT THEIR PORT AND COMMUNITY FACILITIES ARE AVAILABLE FOR THE ACCEPTANCE AND TRANSIT OF SHIPMENTS OF RADIOACTIVE MATERIALS, PROVIDED THAT THERE IS COMPLIANCE WITH THE REGULATIONS OF THE U.S. AGENCIES EXERCISING JURISDICTION OVER THE ENTRY AND MOVEMENT OF SUCH MATERIALS INTO AND WITHIN THE COUNTRY.

*FUEL HANDLING + JAPAN + SHIPPING CONTAINER + TRANSPORTATION AND HANDLING

3-11222 GASKILL JR + TAYLOR RD
IMPROVED SHIPPING CONTAINER FOR FISSION MATERIAL
LAWRENCE RADIATION LAB., UNIV. OF CALIF., LIVERMORE
UCRL-14903 +. 26 PAGES, 14 FIGURES, 3 TABLES, JUNE 3, 1966, CFSTI \$2.00 CY, \$0.50 MN

BASED ON AN ORNL DESIGN, WHICH CALLED FOR A FOAM-GLASS SPACER IN A 55-GAL DRUM, AN IMPROVED SHIPPING CONTAINER FOR UNIRRADIATED FISSION MATERIALS WAS DEVELOPED. IT PASSED THE NORMAL AND ACCIDENT TESTS PROPOSED IN THE CURRENT REVISION OF AEC SAFETY STANDARDS. FURTHER, A CRITICALITY ANALYSIS BY THE LRL CRITICALITY SAFETY ADVISORY GROUP ESTABLISHED QUANTITATIVE LIMITS FOR SHIPPING SOLID FORMS OF ENRICHED URANIUM AND PLUTONIUM ACCORDING TO AEC CRITERIA FOR BOTH CLASS I AND CLASS II CATEGORIES.

*SHIPPING CONTAINER + *TEST, DROP + CRITICALITY SAFETY + FIRE + TEST, DESTRUCTIVE

3-11223 STETSON FT
AN ANALYSIS OF STEADY-STATE HEAT TRANSFER IN A SPRING-LOADED DRY SHIPPING CASK
KNOLLS ATOMIC POWER LABORATORY, SCHENECTADY, NEW YORK
KAPL-M-6106 +. 18 PAGES, 6 FIGURES, FEBRUARY 11, 1964, CFSTI, \$1.60 FS, \$0.80 MN

THIS REPORT PRESENTS THE RESULTS OF AN ANALYSIS OF HEAT REMOVAL FROM A KAPL SPRING-LOADED DRY SHIPPING CASK. THE INTERNAL HEAT GENERATION IS PROVIDED BY DECAY HEAT FROM TEST SPECIMENS IRRADIATED IN THE MTR AND ETR. THE RESULTS REPRESENT MAXIMUM TEMPERATURES OF THE SPECIMENS, TEMPERATURE DISTRIBUTIONS, AND THE TEMPERATURE DISTRIBUTION OF THE HOLDERS. THE VARIABLES WERE THE INTERNAL HEAT GENERATION RATES, THE METAL-TO-METAL CONTACT RESISTANCES, AND THE SPECIMEN LOADING IN THE HOLDER.

*HEAT TRANSFER ANALYSIS + *SHIPPING CONTAINER + ETR (ENGINEERING TEST REACTOR) + MTR (MATERIAL TESTING REACTOR) + REACTOR, TEST

3-11301 SISLER JA + GAUERKE RC
NEW DEVELOPMENTS IN CONTAINERS FOR SHIPPING RADIOACTIVE MATERIALS
SANDIA CORPORATION, ALBUQUERQUE, NEW MEXICO
64-WA/NE-6 +. 7 PAGES, 7 FIGURES, 1964, FOR PRESENTATION AT THE ASME WINTER ANNUAL MEETING, NOVEMBER 29 - DECEMBER 4, 1964, NEW YORK, NEW YORK, ASME \$1.00 CY

NEW DEVELOPMENTS IN CONTAINERS FOR RADIOACTIVE MATERIALS, BASED ON THE RESULTS OF AN EXTENSIVE TESTING PROGRAM AT SANDIA CORPORATION, ARE DISCUSSED. THE ENTIRE TEST PROGRAM, INCLUDING FIRE, DROP, AND WATER-SUBMERGENCE TESTS, IS REPORTED. THE PRIMARY DEVELOPMENT IS THE INDICATION OF SAFETY OBTAINED BY SURROUNDING A HEAVY (4000-LB) CASK WITH A 6-IN. WALL OF DOUGLAS-FIR PLYWOOD. ADEQUATE PROTECTION FROM FIRE, IMPACT, AND SUBMERGENCE WAS ACHIEVED.

*STRUCTURAL INTEGRITY + *TEST, DESTRUCTIVE + SHIPPING CONTAINER + TRANSPORTATION AND HANDLING

3-11302 THOMPSON JT + MORGAN JM
NUCLEAR TRANSPORTATION. PART I. RESEARCH AND ITS COORDINATION. PART II. PROBLEMS ASSOCIATED WITH RESEARCH
JOHNS HOPKINS UNIVERSITY
TID-23390 +. 82 PAGES, 1 FIGURE, 1 TABLE, 60 REFERENCES, DECEMBER 1965

A STUDY WAS MADE OF RESEARCH AND ITS COORDINATION AND OF PROBLEMS ASSOCIATED WITH RESEARCH IN THE INCREASINGLY IMPORTANT FIELD OF NUCLEAR TRANSPORTATION. THE PURPOSE OF THE STUDY WAS TO- (1) ASCERTAIN WHAT HAS BEEN COMPLETED, WHAT IS IN PROGRESS, AND WHAT LIES AHEAD- (2) JUDGE WHETHER OR NOT DUPLICATION IS PRESENT, IF THERE EXISTS GAPS IN THE PROGRAM UNDERWAY, OR IF NEEDED AREAS ARE BEING NEGLECTED- AND (3) DETERMINE IF THE EFFORT IS PROPERLY COORDINATED AND IF NOT RECOMMEND STEPS TO IMPROVE THE SITUATION. RECOMMENDATIONS AND CONCLUSIONS ARE MADE.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA 22151, \$3.00 COPY, \$0.65 MICRONEGATIVE

CRITICALITY SAFETY + ECONOMIC STUDY + INSURANCE + REGULATION, GENERAL + SAFETY STUDY

3-11381 SHAPPERT LB + SALMON R
SHIPPING COST COMPARISONS FOR LEAD-, STEEL-, AND URANIUM-SHIELDED CASKS

ACCESSION NUMBER 3-11221 TO 3-11381

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-11381 *CONTINUED*

OAK RIDGE NATIONAL LABORATORY, OAK RIDGE
ORNL-P-2161 + CONF-660532-1 +. 8 PAGES, FROM ATOMIC ENERGY COMMISSION TRAFFIC MANAGEMENT CONFERENCE, LAS VEGAS, NEV., 1966, CFSTI \$1.00 CY, \$0.60 MN

THIS REPORT DEALS MAINLY WITH A COST COMPARISON AMONG LEAD-, STEEL-, AND URANIUM-SHIELDED CASKS (25 TONS) THAT CAN BE SHIPPED BY MOTOR FREIGHT (25 TON WEIGHT). ECONOMICS OF THE TRANSPORTATION OF THESE CASKS ARE A FUNCTION OF HANDLING, TRANSPORTATION, INSURANCE, AND AMORTIZATION COSTS. THESE COSTS AND HOW THEY ARE AFFECTED BY CASK WEIGHT, ROUND-TRIP TIME, ETC., ARE DISCUSSED.

*ECONOMIC STUDY + *SHIELDING + LEAD + SHIPPING CONTAINER + URANIUM

3-11382 ANDELIN RL

HIGH-TEMPERATURE COMPATIBILITY TESTING OF MOLTEN PLUTONIUM FUEL-CONTAINER SYSTEMS
LOS ALAMOS SCIENTIFIC LABORATORY, LOS ALAMOS
LA-DC-7315 + CONF-651101-28 +. 5 PAGES, FOR PRESENTATION AT THE 13TH CONFERENCE ON REMOTE SYSTEMS TECHNOLOGY, WASHINGTON, D. C., 1965, CFSTI \$1.00 CY, \$0.50 MN

TO DETERMINE THE COMPATIBILITY OF MOLTEN PLUTONIUM AND ITS CONTAINER FOR THE FAST-BREEDER PROGRAM, FUEL-CONTAINER SYSTEMS AT RELATIVELY HIGH TEMPERATURES (900 TO 1150 C) WERE TESTED TO REDUCE THE TIME REQUIRED TO OBTAIN CORROSION DATA, AND THIS INFORMATION WAS EXTRAPOLATED TO LOWER TEMPERATURES (600 TO 700 C), MORE PRACTICAL FOR REACTOR OPERATION. THIS REPORT DESCRIBES THE RESULTS OF SUCH TESTS ON TWO FUEL SYSTEMS - PLUTONIUM CONTAINED IN TANTALUM, AND 97.5 PERCENT PLUTONIUM PLUS 2.5 PERCENT IRON-GALLIUM STABILIZED FUEL ALLOY CONTAINED IN TANTALUM. THE TESTS WERE CONDUCTED IN A VACUUM.

*HIGH TEMPERATURE + *PLUTONIUM + REACTOR, BREEDER + REACTOR, FAST + TEST, PROOF

3-11423 MARRIOTT AJ + HOWDEN JL

TRANSPORT OF NON-IRRADIATED FISSILE MATERIAL UNDER THE INTERNATIONAL ATOMIC ENERGY AGENCY REVISED TRANSPORT REGULATIONS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, ALDERMASTON
9 PAGES, 1 TABLE, 4 FIGURES, JOURNAL OF BRITISH NUCLEAR ENERGY SOCIETY 5(2), PAGES 137-145, APRIL 1966

THE PAPER CHIEFLY RECOUNTS THOSE PARTS OF THE IAEA REGULATIONS THAT DEAL WITH THE TRANSPORT OF NONIRRADIATED FISSILE MATERIALS AND REVIEWS UKAEA ATOMIC WEAPONS RESEARCH ESTABLISHMENT EXPERIENCE WITH RELATED RECOMMENDATIONS ON THE DESIGN, MANUFACTURE, AND MAINTENANCE OF PACKINGS.

*EQUIPMENT DESIGN + *REGULATION, IAEA + CODES AND STANDARDS + CRITICALITY SAFETY + LIQUID FUEL + OPERATING EXPERIENCE + PLUTONIUM + SHIPPING CONTAINER + TEST, PROOF + TRANSPORTATION AND HANDLING + UNITED KINGDOM

3-11505 MINOR JE + RASTRELLI LU

INVESTIGATION OF LOW-LEVEL RADIOACTIVE WASTE CONTAINERS IN AN ACCIDENT ENVIRONMENT. PART I - SURVEY OF TRANSPORT AND DISPOSAL PROCEDURES. PART II - STRUCTURAL INTEGRITY OF TYPICAL LOW-LEVEL RADIOACTIVE WASTE CONTAINERS
SOUTHWEST RESEARCH INSTITUTE, SAN ANTONIO, HOUSTON, TEXAS
SWRI-1262-4 +. 155 PAGES, 25 FIGURES, 13 TABLES, 23 REFERENCES, OCTOBER 1965, SOURCE

THE DISCUSSIONS IN PART I CONSTITUTE A TIMELY, COMPREHENSIVE SURVEY OF CURRENT DISPOSAL PRACTICES AND PROVIDE A BASIS FOR CONTAINER STRUCTURAL INTEGRITY EVALUATIONS PRESENTED IN PART II. IN PART II, AN ANALYSIS OF THE ACCIDENT ENVIRONMENT, BASED ON PREVIOUSLY ACCOMPLISHED STATISTICAL AND EXPERIMENTAL INVESTIGATIONS, IS PRESENTED. IDENTIFICATION OF THE DYNAMIC FORCES THAT MAY BE EXPERIENCED BY A LOW-LEVEL RADIOACTIVE MATERIAL CONTAINER IN A HIGHWAY ACCIDENT LEAD TO THE DEVELOPMENT OF ANALYTICAL PROCEDURES FOR PREDICTING THE DYNAMIC RESPONSE OF TYPICAL CONTAINERS. A COMPARISON OF STRUCTURAL-INTEGRITY PROPERTIES OF TYPICAL CYLINDER AND BOX CONTAINERS IS PRESENTED, AND CONCLUSIONS RELATING THE EFFECTIVENESS WITH WHICH THE TWO CONTAINER TYPES CAN WITHSTAND AN ACCIDENT ARE ADVANCED.

ACCIDENT ANALYSIS + FIRE + IMPACT SHOCK + REGULATION, GENERAL + STRESS ANALYSIS + STRUCTURAL INTEGRITY + WASTE TRANSPORTATION

3-11847 WHITTLE D + ANDERSON D

INVESTIGATION OF FUEL ELEMENT TEMPERATURES IN CHAPELCROSS DISCHARGE VESSELS AND TRANSPORT FLASKS
DOMINION TAR AND CHEMICAL CO., LTD., CANADA + UNITED KINGDOM ATOMIC ENERGY AUTHORITY, CHAPELCROSS PRODUCTION GROUP
8 PAGES, 8 FIGURES, 2 TABLES, 5 REFERENCES, BRITISH NUCLEAR ENERGY SOCIETY 5(2), PAGES 156-164, (APRIL 1966)

STEADY-STATE TEMPERATURE MEASUREMENTS HAVE BEEN MADE IN THE VESSELS USED AT THE UKAEA CHAPELCROSS WORKS FOR THE DISCHARGE AND TRANSPORT OF FUEL ELEMENTS. THESE MEASUREMENTS HAVE BEEN USED TO CALCULATE THE MAXIMUM TEMPERATURE TO WHICH AN IRRADIATED FUEL ELEMENT IS HEATED WHEN PLACED IN A DISCHARGE VESSEL AND TO CALCULATE THE MAXIMUM TEMPERATURE TO WHICH THE INTERIOR OF A WATER-FILLED TRANSPORT FLASK WOULD BE HEATED WHEN USED DURING HOT SUMMER WEATHER. EXPERIMENTAL AND DATA ANALYSIS TECHNIQUES WHICH CAN HAVE GENERAL APPLICATION TO SIMILAR PROBLEMS ARE ILLUSTRATED. MODELS FOR THE WET AND DRY TRANSPORT FLASKS ARE DESCRIBED, PERMITTING PREDICTIONS TO BE MADE OF SPECIFIC TEMPERATURE CONDITIONS WHICH WERE IN EXCELLENT AGREEMENT WITH MEASURED TEMPERATURES.

*HEAT TRANSFER EXPERIMENT + CANADA + HEAT TRANSFER ANALYSIS + SHIPPING CONTAINER +

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-11847 *CONTINUED*
TRANSPORTATION AND HANDLING + UNITED KINGDOM

3-12215 IRL WISHES TO CARRY OUT SHIPPING CASK SUBCRITICALITY STUDIES FOR POOL TYPE REACTOR ELEMENTS
COLUMBIA UNIVERSITY, NEW YORK
86 PAGES, FIGURES, TABLES, JULY 8, 1966, DOCKET NO. 50-17, PDR

NATIONAL LEAD CO. HAS A 28-ELEMENT SHIPPING CASK FOR SPENT, POOL-TYPE REACTOR ELEMENTS, POISONED WITH 1/4-IN. BORAL PLATES. MULTIPLICATION MEASUREMENTS MADE EARLIER WERE OVERLY CONSERVATIVE BECAUSE OF PU-BE HIGH-ENERGY NEUTRONS. THIS SET OF CRITICALITY MEASUREMENTS IS INTENDED TO IMPROVE CALCULATIONAL TECHNIQUES AND PROVIDE ACCURATE MEASUREMENTS OF SUBCRITICALITY IN VARIOUS ARRAYS OF 18-PLATE, PARTIALLY SPENT IRL ELEMENTS, WITH ELEMENT ROWS SEPARATED BY BORAL. REVIEWS OF PREVIOUS DATA, SIMILAR EXPERIMENTS, AND HEAT-TRANSFER CALCULATIONS.

*CRITICALITY EXPERIMENT + *MEASUREMENT, SUBCRITICALITY + FUEL STORAGE + REACTOR, POOL TYPE + SHIPPING CONTAINER

3-12277 SCHAFER WF + BOEGLY WJ + PARKER FL + BRADSHAW RL + EMPSON FM + MCCLAIN WC
PROJECT SALT VAULT - DESIGN AND DEMONSTRATION OF EQUIPMENT
OAK RIDGE NATIONAL LABORATORY, OAK RIDGE, TENNESSEE
ORNL-P-1987 + CONF-660208-4 +. 36 PAGES, (1964), FROM SYMPOSIUM ON SOLIDIFICATION AND LONG-TERM STORAGE OF HIGHLY RADIOACTIVE WASTES, RICHLAND, WASHINGTON, CFSTI \$3.00 CY, \$0.50 MN

HANDLING, TRANSFER, AND STORAGE TECHNIQUES APPLICABLE TO HIGH-LEVEL SOLID WASTE DISPOSAL OPERATIONS HAVE BEEN SUCCESSFULLY DEMONSTRATED WITH SHORT-COOLED ETR FUEL ASSEMBLIES. THE DESIGN OF PROJECT SALT VAULT EQUIPMENT FOR THE ENCAPSULATION OF THE FUEL ASSEMBLIES, CROSS COUNTRY SHIPMENT, TRANSFER FROM THE SURFACE TO THE MINE LEVEL, MOVEMENT WITHIN THE MINE, AND TRANSFER INTO STORAGE IS DESCRIBED. THE OPERATIONS ARE UNIQUE IN THAT HIGH-LEVEL RADIOACTIVE MATERIALS ARE TRANSFERRED FROM A SHIPPING CASK ON THE SURFACE TO THE MINE LEVEL 1000 FEET BELOW WITHOUT THE USE OF HOT CELLS.

*WASTE DISPOSAL, SALT + *WASTE HANDLING + FUEL ELEMENT + WASTE TRANSPORTATION

3-12347 INVESTIGATION OF LEAKING POLYETHYLENE BOTTLES
ATOMIC ENERGY COMMISSION
6 PAGES, AEC HEALTH AND SAFETY INFORMATION BULLETIN NO. 244, OCTOBER 12, 1966

THE ROCKY FLATS L-3 SHIPPING CONTAINER DEVELOPED LEAKS IN THE INNER POLYETHYLENE BOTTLE WHEN USED WITH PLUTONIUM OR URANYL NITRATE. ISOCEM HAS SINCE DETERMINED THAT THE NECKS OF THE BOTTLES WERE IMPROPERLY FINISHED AND OFFERED EIGHT RECOMMENDATIONS. SEALING PROCEDURE IS INCLUDED.

*SHIPPING CONTAINER + FAILURE, DESIGN ERROR + FUEL STORAGE + LIQUID FUEL + TEST, LEAK RATE + TRANSPORTATION AND HANDLING

3-12348 CAUTION WARRANTED IN USING POLYETHYLENE CONTAINERS IN CHEMICAL SERVICE
ATOMIC ENERGY COMMISSION
3 PAGES, AEC HEALTH AND SAFETY INFORMATION BULLETIN NO. 246, NOVEMBER 14, 1966

FOUR YEARS OF TESTING BY THE MANUFACTURING CHEMISTS ASSOCIATION ON ICC-SPECIFICATION POLYETHYLENE BOTTLES FILLED WITH NITRIC ACID (20-67.5 PERCENT) LED TO THE CONCLUSION RECOMMENDING AGAINST USE OF SUCH CONTAINERS FOR SHIPPING NITRIC ACID IN MULTIPLE-OR SINGLE-TRIP SERVICE. DATA INCLUDED. AEC IS STUDYING THE STORAGE OF VARIOUS CHEMICALS IN SUCH CONTAINERS.

*STORAGE CONTAINER + TEST, LEAK RATE + TRANSPORTATION AND HANDLING

3-12501 SOUSSELIER Y
IRRADIATED FUEL TRANSPORT COSTS AND MAINTENANCE COSTS IN CHEMICAL REPROCESSING PLANT
COMMISSARIAT A L ENERGIE ATOMIQUE, PARIS, FRANCE
A/CONF.28/P/64 +. 13 PAGES, MAY 1964, UNITED NATIONS THIRD INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY, 1964

THE TRANSPORT OF IRRADIATED URANIUM BETWEEN THE CHINON REACTORS AND THE REPROCESSING PLANT OF LA HAGUE AND BETWEEN RESEARCH REACTORS AND FOREIGN REPROCESSING PLANTS WAS STUDIED. THE RESULTS INDICATE THAT COSTS CAN BE REDUCED EITHER BY COMBINING RAIL AND ROAD TRANSPORT OR BY INCREASING THE CAPACITIES OF THE TRANSPORT CONTAINERS. AN EVALUATION OF THE MAINTENANCE COSTS OF A REPROCESSING PLANT INDICATES THAT IT RUNS TO ABOUT 6 PERCENT OF THE TOTAL INVESTMENT, COMPARABLE TO THAT OF A CONVENTIONAL CHEMICAL PLANT.

AVAILABILITY - EUROPEAN OFFICE OF THE UNITED NATIONS, PALAIS DES NATIONS, GENEVA, SWITZERLAND. ATTENTION - R. FURSTENBERG, CHIEF, DISTRIBUTION SERVICE, DOCUMENT DIVISION, \$0.50

*ECONOMIC STUDY + FRANCE + OPERATING EXPERIENCE

3-12502 JUDSON OF + ZAHN LL + TOMLINSON RF
LARGE-SCALE FISSION-PRODUCT RECOVERY

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12502 *CONTINUED*
HANFORD ATOMIC PRODUCTS OPERATION
A/CONF-28/P/252 +. 15 PAGES, MAY 1964, UNITED NATIONS THIRD INTERNATIONAL CONFERENCE ON THE PEACEFUL USES
OF ATOMIC ENERGY, 1964

METHODS USED FOR SEPARATING AND TRANSPORTING LARGE QUANTITIES OF FISSION PRODUCTS (BA-LA, SR,
CE, PM, ZR, CS, TC, KR, AND XE) ARE OUTLINED. FUTURE PRODUCTION PLANS ARE DISCUSSED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA, \$1.00 CY

FISSION PRODUCT ACTIVITY, GROSS + TRANSPORTATION AND HANDLING

3-12504 IRRADIATED FUEL ASSEMBLY SHIPPING CONTAINER, FUNCTIONAL REQUIREMENTS
WESTINGHOUSE ELECTRIC CORPORATION, PITTSBURGH
AECU-3575 +. 8 PAGES, APRIL 1957

THE DESIGN OF AN IRRADIATED-FUEL-ASSEMBLY SHIPPING CONTAINER WHICH IS TO BE USED TO SHIP ONE
COMPLETE PWR FUEL ASSEMBLY TO A LABORATORY FOR EXAMINATION AND TESTING IS PRESENTED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA, \$1.80 CY, \$1.80 MF

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12505 TRANSPORTATION COSTS FOR IRRADIATED MTR FUEL ELEMENTS
U. S. ATOMIC ENERGY COMMISSION, DIVISION OF CIVILIAN APPLICATION
AECU-3254 +. 6 PAGES, 1956

ABSTRACT IS NOT AVAILABLE FOR THIS DOCUMENT.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$0.10 COPY

ECONOMIC STUDY + FUEL ELEMENT + MTR (MATERIAL TESTING REACTOR) + REACTOR, TEST

3-12506 BROWNELL LE + PATTERSON J + PUROHIT SN
DESIGN OF MTR FUEL-ELEMENT-SOURCE SHIPPING CASK FOR RAILWAY MOBILE IRRADIATION FACILITY. PROGRESS REPORT
UNIVERSITY OF MICHIGAN, ANN ARBOR
AECU-3624 + ERI-1943-8-101-P +. 46 PAGES, SEPTEMBER 1957

THE GAMMA-RADIATION FIELD FROM A BATTERY OF 10 MTR SPENT FUEL ELEMENTS WAS CALCULATED AND A
SPECIAL SHIPPING CASK DESIGNED TO CONTAIN THE 10 ELEMENTS. A WATER-COOLED TANK IN THE CASK
HOLDS THE 10 ELEMENTS IN THE VERTICAL POSITION. TWO EXTERNAL AIR-COOLED, FINNED-TUBE HEAT
EXCHANGERS CONTROL THE WATER TEMPERATURE. THE SIDES OF THE CASK OPEN TO CONVERT THE CASK TO
A RADIATION SOURCE WITHOUT CHANGING THE POSITION OF THE ELEMENTS. A UNIQUE FEATURE OF THE
DESIGN IS A DEVICE FOR CLOSING THE SIDES OF THE CASK BY GRAVITY IN THE EVENT OF ACCIDENT OR
POWER FAILURE. THIS PROVIDES A FAIL-SAFE SAFETY FEATURE.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA, \$7.80 CY, \$3.30 MF

EQUIPMENT DESIGN + FUEL ELEMENT + MTR (MATERIAL TESTING REACTOR) + REACTOR, TEST + SHIPPING CONTAINER

3-12507 A SUMMARY OF TRANSPORTATION INCIDENTS IN ATOMIC ENERGY ACTIVITIES, 1949-1956
U. S. ATOMIC ENERGY COMMISSION, DIVISION OF ORGANIZATION AND PERSONNEL
AECU-3613 +. 29 PAGES, DECEMBER 1957

TRANSPORTATION INCIDENTS REPORTED IN THE OPERATIONS OF THE ATOMIC ENERGY COMMISSION AND ITS
CONTRACTORS FROM 1949 THROUGH 1956 ARE SUMMARIZED AND ILLUSTRATED PHOTOGRAPHICALLY. MOST
INVOLVED THE TRANSPORTATION OF RADIOACTIVE MATERIALS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.00 CY

ACCIDENT ANALYSIS + ACCIDENT, TRANSPORTATION + SAFETY REVIEW (OPERATIONS, EXPERIMENTS) +
TRANSPORTATION AND HANDLING

3-12508 DIXON FE + PARTRIDGE AH
EXPERIMENTAL WORK AT A.E.R.E. ON THE DEVELOPMENT OF PACKAGING FOR RADIOACTIVE MATERIALS WHICH WILL MEET
THE I.A.E.A. REGULATIONS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL
AERE-R-4810 +. 38 PAGES, APRIL 1965

THIS SERIES OF EXPERIMENTS COVERS WORK PERFORMED SINCE 1962 WHEN THE REPORT TCAP/P 64/65
COVERING THE EARLIER WORK WAS PUBLISHED. THE TWO MORE IMPORTANT SERIES OF EXPERIMENTS ARE
THOSE COVERING (1) THE DEVELOPMENT OF EXPENDABLE TYPE B PACKAGING AND (2) TESTS LEADING TO
THE DEVELOPMENT OF A VENTILATED TYPE B LARGE SOURCE PACKAGE. OTHER TESTS COVERED PLASTIC
PACKAGING, SMALL PACKAGES FOR EXEMPT QUANTITIES OF FISSIONABLE MATERIALS, THE THREE-TON DROP
TEST, MODEL TESTS, AND PRESSURE TESTS.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12508 *CONTINUED*

AVAILABILITY - BRITISH INFORMATION SERVICE, 845 THIRD AVENUE, NEW YORK, N.Y., 10022, \$1.40 CY. HER MAJESTYS STATIONERY OFFICE, LONDON

EQUIPMENT DESIGN + HEAT TRANSFER + MODEL TESTING + REGULATION, IAEA + TEST, DROP + TEST, PRESSURE VESSEL + UNITED KINGDOM

3-12509 ALCORN JS
PROPOSED NYLON TIEDOWN SYSTEM FOR THE ML-1
AEROJET-GENERAL
AGN-TM-379 +. 51 PAGES, 1960

A NYLON-ROPE TIEDOWN/SHOCK-ISOLATION SYSTEM FOR AIR TRANSPORT OF THE ML-1 (A MOBILE, LOW POWER NUCLEAR POWER PLANT) IS RECOMMENDED TO ENSURE PLANT SERVICEABILITY AFTER AN EMERGENCY LANDING. THE CUSTOMARY CHAIN TIEDOWN SYSTEM WILL MEET THE AIR TRANSPORTABILITY SPECIFICATIONS FOR THE SYSTEM BUT WILL NOT ENSURE PLANT SERVICEABILITY AFTER AN 8-G EMERGENCY LANDING. IN ADDITION TO PROVIDING THE REQUIRED TIEDOWN RESTRAINT, THE PROPOSED SYSTEM REDUCES SHOCKS TRANSMITTED TO THE ML-1 PACKAGES FROM THE AIRFRAME, REDUCES PACKAGE SHOCKS TRANSMITTED BACK INTO THE AIRFRAME, AND PREDICTABLY DISTRIBUTES TIEDOWN LOADS. THESE FUNCTIONS ARE REALIZED PRIMARILY BY INTERPOSING FIVE-FOOT NYLON ROPE ELEMENTS IN SERIES WITH THE STANDARD CHAIN TIEDOWNS. EXTENSIVE SYSTEM AND COMPONENT TESTING ACCOMPANIED DEVELOPMENT OF THE SYSTEM, WHOSE RESPONSE UNDER AN ACTUAL AIRCRAFT EMERGENCY LANDING IS PREDICTED BY THEORETICAL CALCULATIONS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.60 CY, \$1.73 MF

AIRCRAFT + CONTAINER TIEDOWN + EQUIPMENT DESIGN

3-12510 PENDLEBURY ED + WOODCOCK ER + THOMAS AF + JOHNSON KD + NICHOLLS CM
LECTURES ON CRITICALITY
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, RISLEY
AHSR(S)R-4 +. 99 PAGES, NOVEMBER 23, 1960

INCLUDES A COLLECTION OF LECTURES ABOUT NUCLEAR CONSTANTS, THEORETICAL CONSIDERATIONS FOR THE BEHAVIOR OF NEUTRONS IN MATTER AND CRITERIA FOR CRITICAL SIZE, AND THE FACTORS AFFECTING CRITICALITY, INTERACTION AND STORAGE, AND TRANSPORT CONTAINERS. ALSO INCLUDES CRITICALITY PROBLEMS WITH METAL SYSTEMS, CHEMICAL ASPECTS OF CRITICALITY, AND CHEMICAL PLANT DESIGN FOR CRITICALITY SAFETY.

AVAILABILITY - BRITISH INFORMATION SERVICE, 845 THIRD AVENUE, NEW YORK, N. Y., 10022, \$1.26 CY.

CRITICALITY SAFETY + SHIPPING CONTAINER + UNITED KINGDOM

3-12511 NEARY FJ
PROCEEDINGS OF THE SYMPOSIUM ON THE TRANSPORT OF RADIOACTIVE MATERIALS, DURLEY HALL, BOURNEMOUTH, APRIL 13-15, 1964
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, AUTHORITY HEALTH AND SAFETY BRANCH, LONDON
AHSB(A)R-8 +. 129 PAGES, AUGUST 1964

ABSTRACTS ARE INCLUDED ON PAPERS PRESENTED AT THIS SYMPOSIUM.

AVAILABILITY - BRITISH INFORMATION SERVICE, 845 THIRD AVENUE, NEW YORK, N.Y., 10022, \$3.40 CY. HER MAJESTYS STATIONERY OFFICE, LONDON

TRANSPORTATION AND HANDLING + UNITED KINGDOM

3-12512 MESSENGER WI + FAIRBAIRN A
THE TRANSPORT OF RADIOACTIVE MATERIALS. INTERIM RECOMMENDATIONS FOR THE APPLICATION OF ENVIRONMENTAL TESTS TO THE APPROVAL OF PACKAGING
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, RISLEY
AHSB(S)R-19 +. 128 PAGES, NOVEMBER 27, 1962

PRESENTS A SURVEY OF RADIOACTIVE MATERIAL TRANSPORT ENVIRONMENTS. CORRESPONDING ENVIRONMENTAL TESTS ARE PROPOSED WHICH MAY BE USED, WHEN NECESSARY, TO DEMONSTRATE THAT PACKAGING DESIGNS FOR THESE MATERIALS COMPLY WITH STANDARDS.

AVAILABILITY - BRITISH INFORMATION SERVICE, 845 THIRD AVENUE, NEW YORK, N.Y., 10022, \$1.26 CY

ENVIRONMENTAL CONDITION + TEST, PROOF + UNITED KINGDOM

3-12513 DOWSON DC + MURPHY T + O'SULLIVAN RA + WOODCOCK ER
THE INTERPRETATION OF WOOD DENSITY MEASUREMENTS IN THE CRITICALITY CLEARANCE OF TRANSPORT CONTAINERS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, RISLEY
AHSR(S)R-36 +. 8 PAGES, FEBRUARY 26, 1962

DESCRIBES A TECHNIQUE FOR DETERMINING THE TRUE WOOD DENSITY FOR USE IN RADIOACTIVE-MATERIAL-TRANSPORT CONTAINERS. CRITICALITY CLEARANCE CALCULATIONS REQUIRE DATA ON WOOD DENSITY.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12513 *CONTINUED*
AVAILABILITY - MICROCARD EDITIONS, INC. (FOR SALE) ACCOUNTING AND SHIPPING DEPARTMENT, WEST SALEM,
WISCONSIN, 54669

CRITICALITY SAFETY + UNITED KINGDOM

3-12514 ABBEY F + OSULLIVAN RA
A SPECIFICATION OF WOOD- AND CADMIUM-SHIELDED CLASS I PACKAGES PROPOSED FOR I.A.E.A. TRANSPORT
REGULATIONS, 1963
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, RISLEY
AHSB(S)R-63 +. 23 PAGES, 1963

CHARGES IN PART OF ANNEX II OF THE FIRST REGULATIONS FOR SAFE TRANSPORT OF RADIOACTIVE
MATERIALS PUBLISHED IN SAFETY SERIES NO. 6 ARE PROPOSED IN WHICH CERTAIN VALUES ARE REVISED
AND THE SCOPE OF THE ANNEX IS EXTENDED TO INCLUDE PACKAGES SATISFYING CLASS I REQUIREMENTS
(SAFE IN ANY ARRANGEMENT UNDER ALL FORESEEABLE CIRCUMSTANCES OF TRANSPORT) BY THE APPLICATION
OF AN ADVANTAGEOUS COMBINATION OF BOTH MASS AND GEOMETRY RESTRICTION TO THE FISSILE CONTENT.
THE METHODS OF CALCULATION USED ARE DESCRIBED, AND THE SOURCES OF ESSENTIAL DATA ARE
INDICATED.

AVAILABILITY - BRITISH INFORMATION SERVICE, 845 THIRD AVENUE, NEW YORK, N.Y., 10022, \$0.60 CY

CADMIUM + CRITICALITY SAFETY + REGULATION, IAEA + UNITED KINGDOM

3-12515 HAUENSTEIN GG + PCMERoy DL
SPENT FUEL TRANSFER, STORAGE AND SHIPMENT FOR PL-3
ALCO PRODUCTS INC., NEW YORK
APAE-MEMO-310 +. 49 PAGES, 1962

IN REFUELING-DEVELOPMENT STUDIES PERFORMED ON PL-3 PHASE I DESIGN, SEVERAL METHODS OF FUEL
TRANSFER, STORAGE, AND SHIPMENT WERE INVESTIGATED. AN EVALUATION OF THE RELATIVE MERITS OF
THE SYSTEMS AND DESIGNS UNDER STUDY, AS APPLIED TO EITHER THE BWR AND PWR CONCEPTS, IS MADE,
AND OPTIMUM DESIGNS ARE SELECTED. AN ANALYSIS OF SPENT-FUEL SHIPPING-CASK SHIELDING
REQUIREMENTS IS PRESENTED, ALONG WITH RECOMMENDATIONS FOR FUTURE STUDY IN THIS AREA.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.60 CY, \$1.94 MF

SAFETY ANALYSIS + SAFETY STUDY + SHIPPING CONTAINER + TRANSPORTATION AND HANDLING

3-12516 FAIRBANKS FB + MORSE DC
SHIELDING OF IRRADIATED ADR-1 FUEL ELEMENTS
ALPO PRODUCTS INC., SCHENECTADY, N.Y.
APAE-MEMO-34 +. 7 PAGES, JULY 6, 1956

THE PURPOSE OF THIS ANALYSIS IS TO DETERMINE THE SHIELDING REQUIREMENTS FOR IRRADIATED APPR-1
FUEL ELEMENTS BOTH IN THE FUEL ELEMENT STORAGE PIT AND IN TRANSIT TO THE REPROCESSING PLANT.
THE GENERAL METHOD OF CALCULATION AND THE RESULTS FOR EACH CASE ARE PRESENTED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.80 CY, \$1.80 MF

SAFETY ANALYSIS + SHIELDING

3-12517 SAYWELL GL
DESTRUCTIVE DROP TESTS OF A MODEL FUEL-SHIPPING CASK
VALLECITOS ATOMIC LABORATORY, GENERAL ELECTRIC CO., SAN JOSE
APED-4522 +. 32 PAGES, APRIL 15, 1964

DEACTIVATION OF THE VALLECITOS BOILING WATER REACTOR BROUGHT ABOUT A NEED FOR A SHIPPING CASK
THAT COULD ACCOMMODATE 54-IN.-LONG IRRADIATED FUEL ELEMENTS. THE 40-IN. CAVITY OF THE
EXISTING 700-SERIES SHIPPING CASKS COULD BE LENGTHENED BY USING A SIMPLE SPOOL-PIECE. THE
RESULTS OF A STRESS ANALYSIS OF THE MODIFIED CASK SHOWED THAT THE CONDITIONS OF CODE OF
FEDERAL REGULATIONS 10CFR72 (PROPOSED) WOULD BE MET. TO VERIFY THIS CONCLUSION, A
ONE-QUARTER-SIZE MODEL WAS MADE AND DROPPED TWICE 15 FT ONTO AN UNYIELDING SURFACE. ALTHOUGH
DEFORMATION OCCURRED, THE CASK RETAINED STRUCTURAL INTEGRITY.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

REACTOR, BOILING WATER + REGULATION, AEC + STRUCTURAL INTEGRITY + TEST, DESTRUCTIVE + TEST, DROP +
VBWR (VALLECITOS BOILING WATER REACTOR)

3-12518 COWPER G
THE INFLUENCE OF PACKAGING ON RADIATION FIELDS FROM RADIOACTIVE SHIPMENTS
ATOMIC ENERGY OF CANADA LTD., CHALK RIVER
AECL-1802 + CRRD-1110 +. 12 PAGES, JUNE 21, 1963

ERRORS INVOLVED IN THE DETERMINATION OF CONTACT DOSE RATES ARE DISCUSSED, AND PROPOSALS ARE
MADE WHICH WILL PERMIT A BETTER ASSESSMENT OF RADIATION SITUATIONS ENCOUNTERED IN PRACTICE.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12518 *CONTINUED*
AVAILABILITY - ATOMIC ENERGY OF CANADA, LTD., CHALK RIVER, ONTARIO, CANADA, \$0.50 CY
CANADA + DOSE MEASUREMENT, EXTERNAL + RADIATION EFFECT + RADIATION SAFETY AND CONTROL

3-12519 WHITE JO + PICHEY CR
NEUTRON INTERACTION BETWEEN MULTIPLYING MEDIA SEPARATED BY VARIOUS MATERIALS
BATTELLE-NORTHWEST
BNWL-193 +. 11 PAGES, 1964, PP. 57-67

THE QUANTITY OF MATERIAL NECESSARY TO EFFECTIVELY ISOLATE A MULTIPLYING MEDIA IS OF PRIMARY CONCERN TO THE DESIGN OF SHIPPING CONTAINERS AND FORMULATION OF STORAGE REGULATIONS FOR FISSIONABLE MATERIALS. THE RESULTS ARE GIVEN OF A SERIES OF CRITICAL EXPERIMENTS IN WHICH THE ISOLATING PROPERTIES OF VARIOUS MATERIALS WERE INVESTIGATED. THOSE MATERIALS TESTED WERE PLACED AT THE INTERFACE BETWEEN TWO ARRAYS OF MULTIPLYING MEDIA THAT COMPRISED THE CORE OF A CRITICAL ASSEMBLY. THE CRITICAL LENGTH OF THE FUEL CORE WAS THEN DETERMINED AS A FUNCTION OF THE TEST-MATERIAL THICKNESS. THE EFFECTIVE ISOLATION THICKNESS OF A MATERIAL WAS TAKEN TO BE THAT THICKNESS FOR WHICH THE FUEL-CORE CRITICAL LENGTH APPROACHED AN ASYMPTOTIC VALUE. COMPARATIVE DATA WERE ALSO OBTAINED ON THE REFLECTOR SAVINGS ASSOCIATED WITH THE VARIOUS TEST MATERIALS, WHERE THE REFLECTOR SAVINGS IS DEFINED AS THE DECREASE IN CRITICAL LENGTH DUE TO THE PRESENCE OF THE REFLECTOR.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.00 CY, \$0.75 MN

CRITICALITY EXPERIMENT + CRITICALITY SAFETY + NEUTRON INTERACTION

3-12521 POMAROLA J + SAVOYAUD J
HANDLING AND TRANSPORT PROBLEMS
CENTRE D ETUDES NUCLEAIRES, SACLAY, COMMISSARIAT A L ENERGIE ATOMIQUE
CEA-1434 +. 19 PAGES, 1959

THE HANDLING AND TRANSPORT OF RADIOACTIVE WASTES INVOLVES THE DANGER OF IRRADIATION AND CONTAMINATION. IT IS NECESSARY TO LAY DOWN A SPECIAL SET OF RULES GOVERNING THE REMOVAL AND TRANSPORT OF WASTES WITHIN CENTERS OR FROM ONE CENTER TO ANOTHER AND TO GIVE CHARGE OF THIS TRANSPORTATION TO A GROUP CONTAINING TEAMS OF SPECIALISTS. THE ORGANIZATION, EQUIPMENT, AND OUTPUT OF THESE TEAMS ARE BEING EXAMINED. CERTAIN MATERIALS ARE PARTICULARLY DANGEROUS TO TRANSPORT. FOR THESE, SPECIAL VEHICLES AND FIXED INSTALLATIONS ARE NECESSARY. THIS IS TRUE ESPECIALLY FOR THE EVACUATION OF VERY ACTIVE LIQUIDS. A TRANSPORT VEHICLE IS DESCRIBED, CONSISTING OF A TRACTOR AND TRAILER AND A CONTAINER HOLDING 500 LITERS OF LIQUID OF WHICH THE ACTIVITY CAN REACH 1000 C/LITER. THE DECANTING OPERATION, THE ROUTE TO BE FOLLOWED BY THE VEHICLE, AND THE PRECAUTIONS TAKEN ARE ALSO DESCRIBED.

AVAILABILITY - MICROCARD EDITIONS, INC. (FOR SALE), ACCOUNTING AND SHIPPING DEPARTMENT, WEST SALEM, WISCONSIN, 54669

EMERGENCY PROCEDURE + FRANCE + RADIATION SAFETY AND CONTROL + WASTE TRANSPORTATION

3-12522 ARTHUR MG
MULTIPLICATION OF MEASUREMENTS OF ARCO SHIPPING CONTAINERS
CD-55-1948 +. DECEMBER 30, 1955

ABSTRACT IS NOT AVAILABLE FOR THIS DOCUMENT.

CRITICALITY EXPERIMENT + CRITICALITY SAFETY + NEUTRON INTERACTION + SHIPPING CONTAINER

3-12523 SANITARY REGULATION FOR THE TRANSPORT OF RADIOACTIVE SUBSTANCES
CEA-TR-R-627 +. 22 PAGES, TRANSLATED FROM A RUSSIAN PUBLICATION, MOSCOW, 1957

RULES AND REGULATIONS FOR THE RECEIPT, LOADING, AND TRANSPORTATION OF RADIOACTIVE MATERIALS ARE PRESENTED. THE REGULATIONS CONSIDER PERMISSIBLE DOSE FOR PERSONNEL, CLASSIFICATION OF RADIATION SOURCES, CLASSIFICATION OF TRANSPORTATION CONTAINERS, REQUIRED CHARACTERISTICS OF CONTAINERS AND PACKING CASES, MARKING OF PACKING CASES FOR TRANSPORTATION, TRANSPORTATION CONDITIONS, TRANSPORTATION OF RADIOACTIVE SUBSTANCES BY DIFFERENT TYPES OF TRANSPORT, TRANSPORTATION BY AUTOMOBILE, RAILWAY, AIR, MAIL, AND SHIP, ARRANGEMENTS IN CASE OF THE DETERIORATION OF THE PACKING CASE, RETURN OF THE EMPTY PACKING CASES, ARRANGEMENT FOR THE DELIVERY AND RECEIPT OF THE RADIOACTIVE SUBSTANCES, AND ARRANGEMENTS FOR THE TRANSPORTATION.

AVAILABILITY - MICROCARD EDITIONS, INC. (FOR SALE), ACCOUNTING AND SHIPPING DEPARTMENT, WEST SALEM, WISCONSIN 54669

REGULATION, GENERAL + TRANSPORTATION AND HANDLING + UNION OF SOVIET SOCIALIST REPUBLICS

3-12524 THE TRANSPORTATION OF RADIOACTIVE MATERIALS
COMMISSARIAT A L ENERGIE ATOMIQUE, FRANCE
CEA-1869 +. 1964

ABSTRACT IS NOT AVAILABLE FOR THIS DOCUMENT.

TRANSPORTATION AND HANDLING

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12525 KALINOVA RS
SANITARY PROBLEMS RELATIVE TO THE TRANSPORT OF RADIOACTIVE ISOTOPES
CEA-TR-R-1312 +. 18 PAGES, GIGIENA I SANIT., 23, PP. 41-6 (OCTOBER 1958)

PRESENTS THE RESULTS OF INVESTIGATIONS OF VARIOUS TYPES OF TRANSPORT CONTAINERS WITH RESPECT TO SANITARY-HYGIENIC REQUIREMENTS AND DATA FROM DOSIMETRIC EXAMINATIONS OF A GROUP OF WORKMEN EMPLOYED IN THE TRANSPORTATION OF RADIOISOTOPES. VARIOUS DEFECTS WERE NOTED IN SOME TYPES OF CONTAINERS. THE DATA SHOW THAT IT IS NECESSARY TO IMPROVE THE SYSTEM FOR RADIOISOTOPE TRANSPORTATION AND TO CONSTRUCT CONTAINERS IN ACCORDANCE WITH SANITARY-HYGIENIC REQUIREMENTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

FRANCE + OPERATING EXPERIENCE + RADIATION SAFETY AND CONTROL + SHIPPING CONTAINER + TRANSPORTATION AND HANDLING

3-12526 JOHNSON DM
HRT SAMPLE CARRIER SHIELDING CALCULATIONS
OAK RIDGE NATIONAL LABORATORY
ORNL-CF-56-1-122 +. 8 PAGES, JANUARY 24, 1956

PRESENTS CALCULATIONS FOR DETERMINING RADIATION LEAKING FROM A LEAD CARRIER USED FOR TRANSPORTING SAMPLES OF HRT FUEL SOLUTIONS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.80 CY, \$1.80 MN

CONTAMINATION + LIQUID FUEL + SHIELDING

3-12527 BINFORD FT
CRITERIA FOR USE IN THE ESTIMATION OF THE COST OF SHIPPING CONTAMINATED REACTOR FUELS
OAK RIDGE NATIONAL LABORATORY
ORNL-CF-54-5-229 +. 25 PAGES, MAY 20, 1954

A PROCEDURE FOR ESTIMATING THE QUANTITIES OF FISSION PRODUCTS IN DISCHARGED FUEL FROM A REACTOR WHICH HAS BEEN OPERATED AT STEADY STATE FOR AN EXTENDED PERIOD AND HAS DECAYED FOR A SPECIFIED TIME IS GIVEN. THE PROCEDURE IS EXTENDED TO INCLUDE THE FISSION PRODUCTS PRESENT IN THE BLANKET OF A BREEDER REACTOR. THE SHIELD WEIGHT REQUIRED TO PERMIT SHIPMENT OF DAILY BATCHES OF THIS MATERIAL CAN BE COMPUTED BY CONVENTIONAL METHODS, USING THE VALUES OBTAINED FOR THE QUANTITIES OF FISSION PRODUCTS PRESENT. CURVES SHOWING APPROXIMATE SHIPPING COSTS VIA RAIL EXPRESS AND VIA MOTOR FREIGHT FOR VARIOUS TYPICAL DISTANCES ARE SHOWN. IT IS RECOMMENDED THAT CONTAINERS FOR UNPROCESSED FUEL AND BLANKET MATERIAL BE IDENTICAL WITH THOSE USED FOR THE SHIPMENT OF PROCESSED FUEL.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$0.35 CY

CONTAMINATION + ECONOMIC STUDY + FUEL ELEMENT + FUEL HANDLING

3-12528 DAVIS DM + HART JC + WARDEN AD
RADIATION DOSE RECEIVED BY PASSENGERS AND CREW ON PLANES CARRYING THE MAXIMUM NUMBER OF RADIATION UNITS
OAK RIDGE NATIONAL LABORATORY
ORNL-CF-57-3-152 +. 22 PAGES, MARCH 1, 1957

DIRECT MEASUREMENTS WERE MADE TO DETERMINE RADIATION EXPOSURES WHICH MIGHT OCCUR UNDER CURRENT REGULATIONS GOVERNING THE TRANSPORTATION OF RADIOACTIVE MATERIALS BY AIR. MEASUREMENTS WERE MADE ON FIVE TYPES OF AIRPLANES, DC-3, DC-6, DC-7, CONVAIR 340, AND VISCOUNT. CESIUM-137 AND COBALT-60 SOURCES IN SHIPPING CONTAINERS AND PACKAGED IN THE SAME MANNER AS A REGULAR ISOTOPE SHIPMENT WERE PLACED IN THE CARGO COMPARTMENT. MEASUREMENTS WERE MADE IN ALL LOCATIONS WHICH WOULD BE OCCUPIED IN FLIGHT BY PASSENGERS OR CREW MEMBERS. DATA ARE TABULATED. IT IS CONCLUDED THAT EXPOSURES IN EXCESS OF 10 MR/HR MAY RESULT WHEN 40 UNITS OF COBALT-60 OR CESIUM-137 ARE CARRIED ON SOME TYPES OF PLANES. UNLESS DUE CAUTION IS TAKEN IN LOADING THE ISOTOPE, EXPOSURES IN EXCESS OF HANDBOOK 59 VALUES WILL BE ENCOUNTERED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA, \$4.80 CY, \$2.70 MF

AIRCRAFT + CESIUM + COBALT + DOSE MEASUREMENT, EXTERNAL + PERSONNEL EXPOSURE, RADIATION

3-12529 BURCHSTED CA + SEGASER CL
HRT SOURCE HANDLING FACILITIES
OAK RIDGE NATIONAL LABORATORY
ORNL-CF-56-11-58 +. 5 PAGES, NOVEMBER 15, 1956

A PORTABLE SHIELD IS DESCRIBED WHICH MAY BE USED TO TRANSPORT THE HRT ANTIMONY-BERYLLIUM SOURCE FROM THE LITR TO THE HRT REACTOR SITE, AND TO STORE THE SOURCE DURING CRITICAL EXPERIMENTS PRELIMINARY TO BRINGING THE REACTOR TO POWER. THE SHIELD CONSISTS OF A 16-IN. DIAM. LEAD PIG (THE EXISTING HRT FLUID SAMPLE CARRIER) CENTERED IN A 50-IN. DIAM. BY 42-IN. DEEP STEEL TANK FILLED WITH BORATED WATER.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.80 CY, \$1.80 MF

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12529 *CONTINUED*
SHIPPING CONTAINER + SOURCE, NEUTRON + TRANSPORTATION AND HANDLING

3-12530 SUDDATH JC
NUCLEAR AND RADIATION HAZARDS EVALUATION OF SRE FUEL PROCESSING AND STORAGE
OAK RIDGE NATIONAL LABORATORY
ORNL-CF-59-5-90 +. 3 PAGES, MAY 20, 1959

RESULTS ARE PRESENTED OF AN EVALUATION OF NUCLEAR SAFETY AND RADIATION CONTROL RELATED TO THE SHIPMENT, MECHANICAL PROCESSING, AND STORAGE OF SRE-1 FUEL ELEMENTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.10 CY, \$0.80 MF

FUEL ELEMENT + HAZARDS ANALYSIS + REACTOR, GRAPHITE MODERATED + REACTOR, LIQUID METAL COOLED + SRE (SODIUM REACTOR EXPERIMENT)

3-12531 CULLER FL
COMMENTS ON THE TRANSPORTATION OF IRRADIATED FUEL AND RADIOACTIVE WASTES FROM M. LOUIS ARMAND, EURATOM GROUP
OAK RIDGE NATIONAL LABORATORY
ORNL-CF-57-5-24 +. 32 PAGES, MAY 6, 1957

GENERAL CONSIDERATIONS INVOLVING THE TRANSPORTATION OF IRRADIATED FUEL AND RADIOACTIVE WASTES ARE REVIEWED. IT IS ASSUMED THAT MANY REACTORS WILL SUPPLY FEED TO A FEW LARGE MULTIPURPOSE CHEMICAL PLANTS WHICH ULTIMATELY SEND RADIOACTIVE WASTE TO A FEW DISPOSAL SITES. GENERAL ECONOMIC CONSIDERATIONS OF IRRADIATED FUEL REPROCESSING, ECONOMIC ASPECTS OF THE NUCLEAR ECONOMY COMPLEX, GROWTH PREDICTIONS OF THE NUCLEAR POWER ECONOMY IN THE U.S., GENERAL REQUIREMENTS FOR THE SHIPMENT OF FUEL AND WASTE, REGULATIONS APPLICABLE TO FUEL SHIPMENTS, AND PERMISSIBLE RADIATION LEVELS ARE DISCUSSED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$6.30 CY, \$3.00 MF

EURATOM + FUEL ELEMENT + REGULATION, GENERAL + WASTE TRANSPORTATION

3-12532 SCHAFER WF
REACTOR FUEL CARRIERS - ORSOPT LECTURE
OAK RIDGE NATIONAL LABORATORY
ORNL-CF-60-1-85 +. 43 PAGES, JANUARY 4, 1960

FUNDAMENTAL FACTORS INFLUENCING CASK DESIGN, SUCH AS SHIELDING, CRITICALITY, HEAT TRANSFER, AND ECONOMICS ARE DISCUSSED. TYPICAL CASKS USED IN THE PAST ARE DESCRIBED.

FUEL HANDLING + SAFETY PRINCIPLES AND PHILOSOPHY + SHIPPING CONTAINER

3-12533 SUDDATH JC
DECAY HEAT IN SHIPPING CONTAINERS
OAK RIDGE NATIONAL LABORATORY
ORNL-CF-59-11-30 +. 6 PAGES, NOVEMBER 6, 1959

A TEST EMPLOYING A SIMULATED SRE FUEL ELEMENT IN THE SHIPPING CARRIER INDICATED THAT THE MAXIMUM SURFACE TEMPERATURE OF THE ACTUAL SRE ELEMENTS WILL NOT EXCEED 532 F WHEN 10 OF THE MOST ACTIVE ELEMENTS ARE IN THE CARRIER. USING MEASURED SURFACE TEMPERATURES AND HEAT FLUXES, THE AIR FILM COEFFICIENT WAS CALCULATED TO BE 2.9 BTU/(HR)(SQ FT)(DEG F).

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.80 CY, \$1.00 MF

DECAY HEAT + HEAT TRANSFER + REACTOR, GRAPHITE MODERATED + REACTOR, LIQUID METAL COOLED + SHIPPING CONTAINER + SRE (SODIUM REACTOR EXPERIMENT)

3-12534 JAYE S + BENNETT LL
CRITICALITY IN THE H.R.T. TRANSFER VESSEL
OAK RIDGE NATIONAL LABORATORY
ORNL-CF-60-7-81 +. 7 PAGES, JULY 26, 1960

THE POSSIBILITY OF A CRITICALITY ACCIDENT IN TRANSFERRING IRRADIATED FUEL SOLUTION FROM THE HRT HAS BEEN INVESTIGATED. THE VESSEL (A CYLINDER 19-1/4 IN. IN DIAMETER, 30-1/2 IN. HIGH, AND SHIELDED WITH 9 IN. OF LEAD) WILL BE LOADED WITH 100 LITERS OF SOLUTION CONTAINING 8 KG OF ENRICHED URANIUM AND 250 GM OF GADOLINIUM. THE INFINITE MULTIPLICATION CONSTANT OBTAINED IN THE SOLUTION IS LESS THAN UNITY WHEN THE URANIUM IS UNIFORMLY DISTRIBUTED. HOWEVER, IF THE URANIUM WERE TO SETTLE, THE CONSTANT EXCEEDS UNITY WHEN THE CONCENTRATION IS 180 GM U/LITER. ALTHOUGH THERE IS A CORRESPONDING INCREASE IN THE EFFECTIVE MULTIPLICATION CONSTANT INITIALLY, A MAXIMUM VALUE OF 0.86 IS ACHIEVED WHEN THE URANIUM CONCENTRATION REACHES 400 GM/LITER.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.80 CY, \$1.80 MF

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12534 *CONTINUED*
CRITICALITY SAFETY + LIQUID FUEL + SHIPPING CONTAINER

3-12535 KING LJ
CONTAMINATION OF SHIPPING CASK AND STORAGE CANAL WATER BY FUELS IRRADIATED IN PRESSURIZED WATER
REACTORS--A REVIEW OF PERTINENT SUBJECTS
OAK RIDGE NATIONAL LABORATORY
ORNL-CF-60-3-49 +. 21 PAGES, MARCH 17, 1960

THE SUBJECTS OF FUEL ELEMENT FAILURES, RATES OF RELEASE AND REDEPOSITION OF RADIOACTIVE MATERIALS FROM RUPTURED AND INTACT FUEL ELEMENTS IN PRESSURIZED WATER REACTORS, CORROSION RATES OF FUELS IN CANAL WATER AND IN CONTACT WITH PRESSURIZED WATER, ACTIVITY IN STORAGE CANAL WATER, FUEL MELTDOWN STUDIES, AND DECONTAMINATION ARE REVIEWED AND EVALUATED IN RELATION TO THE SHIPMENT AND STORAGE OF IRRADIATED FUEL ELEMENTS. RADIOACTIVE CRUD DEPOSITED ON FUEL ELEMENT SURFACES IS A POTENTIAL SOURCE OF EXCESSIVE FUEL ELEMENT CARRIER AND STORAGE CANAL CONTAMINATION AND MUST BE EVALUATED IN RELATION TO IRRADIATED FUEL ELEMENT SHIPMENT AND STORAGE. FUEL ELEMENTS WHICH HAVE SMALL CLADDING PENETRATIONS ARE NOT LIKELY TO CAUSE SIGNIFICANT CONTAMINATION OF CARRIER AND STORAGE CANAL WATER.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

CONTAMINATION + FAILURE, FUEL ELEMENT + RADIOACTIVITY, RELEASE

3-12536 WIGGIN EA
A MANAGEMENT APPROACH TO REDUCING SHIPPER-RECEIVER DIFFERENCES
CONF-80-2 +. 10 PAGES, INST. OF NUCLEAR MATERIALS MANAGEMENT 4TH ANNUAL MEETING, BUFFALO, JUNE 1963

AS A RESULT OF A DECISION BY THE PITTSBURGH NAVAL REACTORS OPERATIONS (AEC) TO SHIP SEVERAL BATCHES OF COLD REACTOR FUEL SCRAP TO OAK RIDGE RATHER THAN TO COMMERCIAL PROCESSING FACILITIES, THE ATOMIC INDUSTRIAL FORUM CALLED A SERIES OF MEETINGS TO STUDY SHIPPER-RECEIVER (SR) DIFFERENCES. OUT OF THE MEETINGS CAME A DUAL SET OF PROCEDURES THAT CAN BE USED TO ADVANTAGE BY BOTH FABRICATORS AND PROCESSORS IN MINIMIZING SR DIFFERENCES. IN AN EFFORT TO EMPHASIZE THE DUAL RESPONSIBILITY, PROCEDURES WERE DEVELOPED ALONG AS CLOSELY PARALLEL LINES AS THEIR RESPECTIVE OPERATIONS WOULD PERMIT. SIX ADDITIONAL PRECAUTIONARY STEPS THAT APPLY TO BOTH FABRICATOR AND PROCESSOR WERE DERIVED AS A TRANSITION. PROCEDURES ISSUING FROM THE MEETINGS WERE DESIGNED TO BE EQUALLY APPLICABLE TO THE HANDLING OF AEC CONTRACTOR SCRAP AND AEC LICENSED SCRAP.

OAK RIDGE ASSOCIATED UNIVERSITIES, BADGER AVENUE, OAK RIDGE, TENNESSEE

RELIABILITY ANALYSIS + TRANSPORTATION AND HANDLING + WASTE HANDLING + WASTE MANAGEMENT

3-12537 SADOWSKI GS
DETERMINATION OF THE S.S.N.M. CONTENT OF THE SHIPMENT TO THE DAVISON CHEMICAL COMPANY, ERWIN, TENNESSEE, DECEMBER 20, 1960
OAK RIDGE NATIONAL LABORATORY
ORNL-CF-61-1-33 +. 12 PAGES, JANUARY 11, 1961

A CARRIER CONTAINING 138.89 LITERS OF SOLUTION, URANIUM CONCENTRATION 202.04 G/LITER WITH AN ISOTOPIC CONCENTRATION OF 97.3 PERCENT U-233, WAS PREPARED FOR SHIPMENT. THE TOTAL URANIUM WAS 28,062 PLUS-OR-MINUS 60 G (95 PERCENT CONFIDENCE LEVEL) AND THE U-233 27,305 PLUS-OR-MINUS 66 G (95 PERCENT CONFIDENCE LEVEL). TESTING AND CALIBRATION OF THE CARRIER SHOWED THAT ITS CAPACITY TO OVERFLOW WAS 173 LITERS, THE UPPER LIQUID LEVEL PROBE WAS COVERED AT 153 LITERS, AND 15 TO 200 ML OF SOLUTION REMAINED IN THE CARRIER AFTER IT WAS VACUUMED EMPTY THROUGH THE SOLUTION WITHDRAWAL PIPE. SPARGING FOR ADEQUATE MIXING REQUIRED 90 MIN AT 4 PSIG AND 0.8 SCFM OF AIR.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.30 CY, \$2.40 MF

INSTRUMENTATION, LIQUID LEVEL DETECTION + LIQUID FUEL + OPERATING EXPERIENCE

3-12538 BROWN SH
SHIPPING IRRADIATED FUELS FROM NUCLEAR REACTORS
CONF-524-3 +. 12 PAGES, AMERICAN INSTITUTE OF MINING, METALLURGICAL AND PETROLEUM ENGINEERS ANNUAL MEETING, NEW YORK, FEBRUARY 1964

SHIPMENT OF IRRADIATED FUELS FROM NUCLEAR REACTORS AND PROCESSING PLANTS IS DISCUSSED IN REGARD TO REGULATIONS AND CONTROLS, PRESENT PRACTICE, TECHNOLOGICAL DEVELOPMENTS, ECONOMICS OF FUELS, AND SHIPPING OPERATIONS.

OAK RIDGE ASSOCIATED UNIVERSITIES, BADGER AVENUE, OAK RIDGE, TENNESSEE

DESIGN CRITERIA + REGULATION, GENERAL + SAFETY PRINCIPLES AND PHILOSOPHY + TRANSPORTATION AND HANDLING

3-12539 RITCHEY N
TRANSPORTING SPENT FUEL
KNAPP MILLS, INC.
CONF-504-13 +. 13 PAGES, AMERICAN POWER CONFERENCE 26TH ANNUAL MEETING, CHICAGO, APRIL 1964

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12539 *CONTINUED*

THE EVOLUTION OF SPENT-FUEL SHIPPING CASKS AND ASSOCIATED SERVICES IS DISCUSSED.

OAK RIDGE ASSOCIATED UNIVERSITIES, BADGER AVENUE, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SAFETY PRINCIPLES AND PHILOSOPHY

3-12540 BAKER R

STATUS OF PROPOSED TRANSPORTATION REGULATION

CONF-620-3 +. 14 PAGES, INSTITUTE OF NUCLEAR MATERIALS MANAGEMENT 5TH ANNUAL MEETING, PITTSBURGH, MAY 1964

MOST INTERNATIONAL SHIPMENTS OF RADIOACTIVE MATERIAL, PARTICULARLY THOSE TO EUROPE, GREAT BRITAIN AND AUSTRALIA, ARE SUBJECT TO RULES BASED ON REGULATIONS DEVELOPED BY THE IAEA. THE IAEA RULES AND MANY OF THE RULES OF THOSE COUNTRIES MENTIONED ARE UNDERGOING SOME REVISION AT PRESENT. THE REVISION OF THE IAEA RULES WAS PROPOSED TO THEIR BOARD OF GOVERNORS AND WILL LIKELY BE CONSIDERED BY THEM IN TIME. THE INTERNATIONAL AIR TRANSPORT ASSOCIATION ALSO IS REVISING THEIR RULES BASED ON THE LATEST IAEA PROPOSALS. THE AEC REGULATIONS (10 CFR PART 71) APPLICABLE TO THE SHIPMENT OF SPECIAL NUCLEAR MATERIAL, HAS BEEN IN EFFECT SINCE 1958. A PROPOSED REVISION WAS ISSUED IN MARCH 1963 AND A REDRAFT OF THAT PROPOSAL IS BEING DEVELOPED. FOR IRRADIATED FUEL SHIPPING CONTAINERS, THE AEC ISSUED 10 CFR PART 72 PROPOSED IN SEPTEMBER 1961 AND THE CRITERIA IN THAT PROPOSAL ARE BEING USED FOR LICENSING. THE ICC REGULATIONS HAVE BEEN IN EFFECT SINCE 1948. MAJOR CHANGES, PROPOSED IN 1963, ARE CURRENTLY BEING REDRAFTED, TAKING INTO ACCOUNT A NUMBER OF COMMENTS AND THE FURTHER WORK OF THE IAEA. A PROPOSED REVISION, APPLICABLE ONLY TO FISSIONABLE MATERIAL, WAS ISSUED IN JANUARY 1964.

OAK RIDGE ASSOCIATED UNIVERSITIES, BADGER AVENUE, OAK RIDGE, TENNESSEE

REGULATION, AEC + REGULATION, IAEA + TRANSPORTATION AND HANDLING

3-12541 WILLIAMS IG

TRANSPORT REGULATIONS - THE NEED FOR COMPATIBILITY

UNITED KINGDOM ATOMIC ENERGY AUTHORITY, LONDON

CONF-539-1 +. 8 PAGES, CANADIAN NUCLEAR ASSOCIATION CONFERENCE ON THE CANADIAN ROLE IN A WORLD OF EXPANDING NUCLEAR INDUSTRY, TORONTO, MAY 1964

THE DEVELOPMENT OF INTERNATIONAL REGULATIONS GOVERNING THE TRANSPORT OF RADIOACTIVE MATERIALS IS REVIEWED.

OAK RIDGE ASSOCIATED UNIVERSITIES, BADGER AVENUE, OAK RIDGE, TENNESSEE

REGULATION, GENERAL + REGULATION, IAEA + TRANSPORTATION AND HANDLING

3-12543 PIPER WH + LANGHAAR JW

70-TON SHIPPING CASK FOR THE SAVANNAH RIVER PLANT--DESIGN AND FABRICATION

E. I. DU PONT DE NEMOURS AND COMPANY, WILMINGTON, DEL.

DP-357 +. 71 PAGES, JANUARY 1959

SEVERAL CASKS EXTERNALLY FINNED FOR HEAT DISSIPATION, WITH AN INTERNAL LENGTH OF 15 FEET AND WEIGHING ABOUT 70 TONS, WERE CONSTRUCTED FOR OFF-PLANT SHIPMENT OF RADIOACTIVE MATERIAL. BASIC SAFETY CONSIDERATIONS LEADING TO THE SELECTION OF THIS TYPE OF CASK ARE DISCUSSED. UNUSUAL DESIGN AND FABRICATION PROBLEMS, AND OPERATING EXPERIENCE WITH THE CASKS, ARE DESCRIBED. THE PRINCIPAL FABRICATION DIFFICULTIES WERE MAINTAINING THE REQUIRED DIMENSIONAL TOLERANCES IN VIEW OF THE LARGE AMOUNT OF WELDING AND PRODUCING THE DESIRED DEGREE OF METALLURGICAL BOND BETWEEN THE LEAD FIL AND THE STEEL BOX. SPECIAL TECHNIQUES WERE DEVELOPED BY THE VENDOR TO OVERCOME THESE DIFFICULTIES. A FLOATING-LOAD PRINCIPLE IS USED FOR ATTACHING THE CASK TO THE RAILROAD CAR, IN ORDER TO AVOID EXCESSIVE STRESS FROM THERMAL EXPANSION. MEASUREMENTS OF SHIELDING EFFECT AND HEAT DISSIPATION HAVE AGREED REASONABLY WELL WITH DESIGN VALUES.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.00 CY

CONTAINER TIEDOWN + EQUIPMENT DESIGN + FABRICATION + HEAT TRANSFER + LEAD + OPERATING EXPERIENCE + SHIPPING CONTAINER

3-12544 ERNEST FA + MAHER R

SHIPMENT OF A LARGE LIQUID SOURCE - A CASE HISTORY

SAVANNAH RIVER PLANT, E. I. DU PONT DE NEMOURS AND COMPANY

CONF-641201-2 +. 13 PAGES, DECEMBER 1964, AMERICAN INSTITUTE OF CHEMICAL ENGINEERS ANNUAL MEETING, BOSTON, CHEMICAL ENG. PROGRESS SYMPOSIUM SERIES, 61(56), PP. 63-73 (1965)

EQUIPMENT WAS DESIGNED FOR SHIPMENT OF 150 GALLONS OF NITRIC ACID SOLUTION CONTAINING 26,000 CURIES OF ALPHA ACTIVITY FROM AMERICIUM AND CURIUM ISOTOPES AND 200,000 CURIES OF ASSOCIATED RARE EARTH FISSION PRODUCTS. SOME OF THE DESIGN FEATURES WERE (A) A PRESSURE VESSEL, RATED FOR 1200 PSI AT 560 F, PLACED WITHIN THE CASK TO CONTAIN THE PRODUCT SOLUTION, (B) A CATALYTIC RECOMBINER IN THE PRESSURE VESSEL TO RECOMBINE RADIOLYTICALLY DECOMPOSED PRODUCT SOLUTION, (C) ALUMINUM HONEYCOMB SHOCK ABSORBERS WITHIN THE CASK, SURROUNDING THE PRESSURE VESSEL, (D) A SPECIALLY MODIFIED EXISTING 40-TON LEAD AND STEEL CASK, AND (E) MASSIVE EXTERNAL CRASH AND ROLLOVER SHROUDS ON THE DEPRESSURED-CENTER RAILROAD CAR WHICH CARRIES THE CASK.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF

ACCESSION NUMBER 3-12539 TO 3-12544

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12544 *CONTINUED*
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.00 CY

ACCIDENT ANALYSIS + EQUIPMENT DESIGN + HAZARDS ANALYSIS + LIQUID FUEL + OPERATING EXPERIENCE

3-12545 CLARKE HC
IMPACT RESISTANCE OF CASKS
FRANKLIN INSTITUTE, PHILADELPHIA, PA.
CONF-641201-16 +. 41 PAGES, 1963, AMERICAN INSTITUTE OF CHEMICAL ENGINEERS ANNUAL MEETING, BOSTON,
CHEMICAL ENG. PROGRESS SYMPOSIUM SERIES, 61(56), PP. 30-41 (1965)

RESULTS FROM EXPERIMENTAL STUDIES DESIGNED TO REVEAL THE EFFECTS OF IMPACTS ON CONTAINERS FOR IRRADIATED FUEL ARE PRESENTED ALONG WITH QUANTITATIVE DATA FOR IMPROVED MECHANICAL DESIGN OF SUCH CONTAINERS. THE TECHNIQUES OF DIMENSIONAL ANALYSIS WERE EMPLOYED TO SHOW THAT IF A MODEL AND A PROTOTYPE CASK WERE GEOMETRICALLY SIMILAR, MADE OF IDENTICAL MATERIALS, AND WERE SUBJECTED TO IMPACT AT EQUAL VELOCITIES, THEY WOULD UNDERGO IDENTICAL STRAINS UNLESS THE STRESS-STRAIN RELATIONS OF THE MATERIALS DEPENDED UPON RATE OF STRAINING. LEAD CASKS WERE USED. THE RESULTS SHOWED THAT CORNER OR EDGE IMPACTS ARE MOST LIKELY TO CAUSE RUPTURE OF THE OUTER SHELL. AN EDGE IMPACT IN THE CLOSURE REGION IS PARTICULARLY DAMAGING, AND SPECIAL MEASURES ARE NEEDED TO PROTECT THE COVER.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.00 CY

IMPACT SHOCK + MOCKUP + MODEL TESTING + SHIPPING CONTAINER + TEST, DROP + TESTING

3-12546 HAFF KW
RADIOISOTOPE SHIPPING CONTAINER DEVELOPMENT
OAK RIDGE NATIONAL LABORATORY
ORNL-P-856 + CONF-641201-13 +. 6 PAGES, 1964, CHEM. ENG. SYMPOSIUM SERIES 61(56), PP. 74-77, AMERICAN INSTITUTE OF CHEMICAL ENGINEERS ANNUAL MEETING, BOSTON

A LOW-COST FIRE AND IMPACT SHIELD WAS DEVELOPED FOR RADIOISOTOPE SHIPPING CARRIERS WEIGHING UP TO 1.25 TONS. THE SHIELD IS CONSTRUCTED OF MAPLE WOOD AND A STEEL FRAME. THE FIRE AND STRUCTURAL TESTS THAT LED TO THE FINAL DESIGN ARE DESCRIBED TOGETHER WITH THE RESULTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.00 CY.

FIRE + IMPACT SHOCK + SHIPPING CONTAINER

3-12547 PETERSON RW
DESIGN OF CONTAINERS FOR SHIPMENT OF RADIOACTIVE MATERIAL INCLUDING IRRADIATED REACTOR FUEL
KNAPP MILLS, INC., WILMINGTON, DEL.
13 PAGES, CHEMICAL ENGINEERING PROGRESS, SYMPOSIUM SERIES, 61(56), PP. 16-29 (1965)

DESIGN REQUIREMENTS AND SPECIAL FEATURES REQUIRED IN CONTAINERS FOR SHIPPING RADIOACTIVE MATERIAL ARE REVIEWED. CRITICALITY CONTROL, SHIELDING, DECAY HEAT REMOVAL, STRUCTURAL INTEGRITY, FIRE RESISTANCE, ACCESSORY EQUIPMENT, AND DECONTAMINATION ARE DISCUSSED. CHARACTERISTICS OF A NUMBER OF DIFFERENT TYPES OF CASKS ARE DESCRIBED.

CRITICALITY SAFETY + EQUIPMENT DESIGN + HEAT TRANSFER + REVIEW + SHIELDING + SHIPPING CONTAINER + STRUCTURAL INTEGRITY

3-12548 GLYNN JC
HEAT REMOVAL FROM CASKS
U. S. ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.
5 PAGES, CHEMICAL ENGINEERING PROGRESS, SYMPOSIUM SERIES, 61(56), PP. 58-62 (1965)

THE HEAT-REMOVAL ASPECTS IN THE DESIGN OF FUEL-ELEMENT SHIPPING CASKS ARE DISCUSSED. THE AMOUNT OF FISSION PRODUCT DECAY HEAT, WHICH WILL BE GENERATED WITHIN THE IRRADIATED FUEL ELEMENTS, MUST BE ESTABLISHED. A METHOD OF DISPOSING OF THIS HEAT MUST BE DECIDED ON AND A SAFETY ANALYSIS MADE.

HEAT TRANSFER + SHIPPING CONTAINER

3-12549 AIKENS AE
PRACTICES AND PROCEDURES FOR LICENSING
U. S. ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.
7 PAGES, CHEMICAL ENGINEERING PROGRESS, SYMPOSIUM SERIES, 61(56), PP. 42-9 (1965)

TRANSPORT REGULATIONS FOR RADIOACTIVE MATERIALS ARE DISCUSSED. PROCEDURES FOR OBTAINING APPROVAL OF AN IRRADIATED FUEL SHIPMENT ARE OUTLINED. SAFETY ASSESSMENTS OF FAILURE TEMPERATURE, DAMAGE DUE TO IMPACT, AND DAMAGE DUE TO FIRE ARE CONSIDERED. ACCEPTABLE CONTAINER DESIGNS ARE DESCRIBED.

EQUIPMENT DESIGN + REGULATION, AEC + SAFETY ANALYSIS + TRANSPORTATION AND HANDLING

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12550 ZAHN LL + JUNKINS RL
SAFETY ASPECTS OF TRANSPORT OF RADIOACTIVE MATERIALS
HANFORD ATOMIC PRODUCTS OPERATION
6 PAGES, CHEMICAL ENGINEERING PROGRESS, SYMPOSIUM SERIES, 61(56), PP. 1-6 (1965)

THE CAUSES AND RESULTS OF POTENTIAL ACCIDENTS INVOLVING RADIOACTIVE MATERIALS ARE CONSIDERED AND SAFEGUARDS, WHICH CAN BE EFFECTIVE AGAINST EACH ABNORMAL CONDITION, ARE DISCUSSED. SAFEGUARDS FOR USE IN TRANSPORTING FISSILE MATERIALS, IRRADIATED FUELS, AND RADIOISOTOPES ARE DESCRIBED. EQUIVALENT RISK IS DISCUSSED.

ACCIDENT ANALYSIS + SAFETY STUDY + TRANSPORTATION AND HANDLING

3-12551 SMILEY SD + LANGHAAR JW + MAHER R
SHIPPING AND STORING POWER FUELS PRIOR TO REPROCESSING
E. I. DU PONT DE NEMOURS AND COMPANY, INC., AIKEN, S.C.
9 PAGES, CHEMICAL ENGINEERING PROGRESS, SYMPOSIUM SERIES, 60(51), PP. 65-73 (1964)

CONDITIONS AND REGULATIONS FOR STORING AND PROCESSING SPENT FUELS AND BLANKET MATERIALS FROM NUCLEAR REACTORS ARE DISCUSSED. DESIGNS OF CASKS FOR SHIPPING IRRADIATED FUELS ARE REVIEWED FOR HAZARDS TO THE PUBLIC. TECHNICAL DESIGN CONSIDERATIONS OF FACILITIES AT THE SAVANNAH RIVER PLANT FOR RECEIPT AND STORAGE OF CERTAIN ASSIGNED FUELS ARE DISCUSSED. PHYSICAL LAYOUT, SERVICES OFFERED, AND PLANT OPERATION ARE DESCRIBED.

EQUIPMENT DESIGN + FUEL HANDLING + HAZARDS ANALYSIS

3-12553 LEE PB
SPECIAL PROBLEMS FROM THE VIEWPOINT OF BRIDGE, TUNNEL AND TURNPIKE AUTHORITIES
NEW YORK STATE THRUWAY AUTHORITY
CONF-650103-8 + SC-RR-65-98 (P. 55-65) +. 21 PAGES, 1965, INTERNATIONAL SYMPOSIUM ON PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIAL, ALBUQUERQUE, N. MEX.

SPECIAL PROBLEMS INVOLVED IN THE TRANSPORTATION OF RADIOACTIVE MATERIALS IN TRUCK USING TOLL ROADS, BRIDGES, AND TUNNELS IN THE U.S. AND OTHER COUNTRIES ARE DISCUSSED. IT IS POINTED OUT THAT PRESENT REGULATIONS GENERALLY PERMIT THE SHIPMENT OF RADIOACTIVE MATERIALS ON TOLL ROADS AND BRIDGES, BUT NOT THROUGH TUNNELS. PACKAGING REQUIREMENTS FOR RESISTANCE TO THE HIGH-POWERED SHOCK AND THE GASOLINE FIRES THAT MUST BE ANTICIPATED IN ACCIDENTS UNDER MODERN HIGH-SPEED TRAVEL CONDITIONS ARE DISCUSSED. SPECIAL PRECAUTIONS TO REDUCE ACCIDENT HAZARDS DURING THE TRANSPORT OF RADIOACTIVE MATERIALS ARE OUTLINED. IT IS POINTED OUT THAT PRESENT PACKAGING STANDARDS FOR RADIOACTIVE MATERIALS EVINCE FOR MORE CONCERN WITH THE PREVENTION OF RADIATION INJURY TO PERSONS THAN WITH THE PREVENTION OF CONTAMINATION OF PROPERTY. IT IS SUGGESTED THAT MATERIALS PARTICULARLY HAZARDOUS TO TOLL FACILITIES MUST BE PACKAGED IN WHATEVER MANNER IS NECESSARY TO PREVENT THE DESTRUCTION OF PROPERTY IF THEY ARE TO TRAVEL ON TOLL FACILITIES UNDER HIGH-SPEED ACCIDENT CONDITIONS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

HAZARDS ANALYSIS + RADIATION SAFETY AND CONTROL + RADIOACTIVITY, RELEASE + REGULATION, GENERAL + SAFETY PRINCIPLES AND PHILOSOPHY

3-12554 ROWE WE + FREDRICKSON RH
TESTING OF 3M SHIPPING CONTAINERS FOR ENRICHED URANIUM
MINNESOTA MINING AND MFG. CO., ST. PAUL
CONF-650103-9 + SC-RR-65-98 (P. 399-410) +. 19 PAGES, 1965, INTERNATIONAL SYMPOSIUM ON PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIAL, ALBUQUERQUE, N. MEX.

THE CONTAINERS USED FOR SHIPPING OF ENRICHED URANIUM FUEL MATERIALS WERE TESTED BY SUBJECTING TWO CONTAINERS TO THE TEST SEQUENCE PRESCRIBED BY THE AEC. THE CONTAINERS UTILIZE 55-GALLON TYPE ICC-17H STEEL DRUMS WITH A NOMINAL 5 IN. ID CENTER TUBE OF STAINLESS STEEL. THE TUBE IS SEALED WITH A GASKET AND FLANGE. THE CONTAINERS UTILIZE A STEEL PYRAMID ON EACH DRUM TO PREVENT STACKING DURING SHIPMENT OR STORAGE. ONE COMPLETE CYCLE OF TESTS WAS RUN ON EACH OF THE TWO CONTAINERS TESTED. THE FIRST CONTAINER UTILIZED A NEOPRENE GASKET IN THE FLANGE, AND THE SECOND UTILIZED A SPECIAL INCONEL-ASBESTOS GASKET. LESS THAN A PINT OF WATER WAS OBSERVED TO LEAK INTO THE INNER CONTAINER IN EACH CASE AFTER COMPLETION OF THESE TESTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

SHIPPING CONTAINER + TEST, PROOF

3-12555 HORN LH
FIRE TESTING OF ISOTOPES SHIPPING CONTAINERS
UNDERWRITERS LABS., INC., CHICAGO
CONF-650103-10 + SC-RR-65-98 (P. 119-132) +. 10 PAGES, 1965, INTERNATIONAL SYMPOSIUM ON PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIAL, ALBUQUERQUE, N. MEX.

RESULTS OF SEVERAL FIRE TESTS ON SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS ARE PRESENTED. TESTING FACILITIES AND PROCEDURES ARE DESCRIBED. DATA ARE PRESENTED IN GRAPHS AND PICTURES TAKEN DURING THE TESTS ARE INCLUDED. IT WAS CONCLUDED THAT A PROPERLY DESIGNED WOOD SHIELD CAN GIVE GOOD PROTECTION TO A LEAD-SHIELDED SHIPPING CONTAINER FOR A STANDARD 1 HR FIRE EXPOSURE.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12555 *CONTINUED*

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

FIRE + SHIPPING CONTAINER + TEST, DESTRUCTIVE

3-12556 AIKENS AE + LINDBERG BG

REGULATORY STANDARDS FOR IRRADIATED FUEL SHIPMENTS

CONF-650103-11 + SC-RR-65-98 (P. 651-661) +. 12 PAGES, 1965, INTERNATIONAL SYMPOSIUM ON PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIAL, ALBUQUERQUE, N. MEX.

THE DESIGN AND PERFORMANCE STANDARDS FOR CONTAINERS FOR SHIPPING IRRADIATED FUELS, AS SET OUT IN THE AEC TRANSPORTATION REGULATIONS, ARE CONSIDERED. THE DESIGN STANDARDS SPECIFY MINIMUM NUMERICAL LIMITS OR FACTORS OF SAFETY, WHICH MUST BE OBSERVED DURING THE DESIGN OF THE PACKAGE. THE PERFORMANCE STANDARDS ESSENTIALLY SPECIFY SAFETY REQUIREMENTS, WHICH MUST BE MET DURING POSTULATED NORMAL OR ACCIDENT TEST CONDITIONS. THE THINGS AN APPLICATION FOR LICENSE SHOULD CONTAIN IN ORDER TO SHOW THAT THE REGULATORY REQUIREMENTS ARE MET ARE LISTED. THE REGULATORY SAFETY ASSESSMENT IS DISCUSSED. THREE REPETITIVE PROBLEM AREAS ARE - AN ADEQUATE DETERMINATION OF FAILURE TEMPERATURE OF THE CONTENTS, THE EXTENT OF CASK DAMAGE DUE TO IMPACT, AND THE EXTENT OF CASK DAMAGE IN A SEVERE THERMAL ENVIRONMENT.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

CODES AND STANDARDS + DESIGN CRITERIA + HAZARDS ANALYSIS + REGULATION, AEC

3-12557 JOHNSON WA + PRYOR WA

NUCLEAR SAFETY COORDINATION WITHIN OAK RIDGE OPERATIONS FACILITIES

OAK RIDGE OPERATIONS OFFICE, USAEC

CONF-651103-2 + SM-70/38 (P. 609-627) +. 20 PAGES, 1965, IAEA SYMPOSIUM ON CRITICALITY CONTROL OF FISSILE MATERIALS, STOCKHOLM, NOVEMBER 1, 1965, IAEA, VIENNA, 1966

THE ROLE OF THE AEC OAK RIDGE OPERATIONS OFFICE IN NUCLEAR SAFETY COORDINATION AMONG ITS MANY CONTRACTORS IS DISCUSSED. THE BROAD SPECTRUM OF NUCLEAR SAFETY APPLICATIONS FOR THE MANIFOLD OPERATIONS INVOLVED IS REVIEWED. TOPICS DISCUSSED INCLUDE THE APPROVAL OF SHIPPING CONTAINERS AND METHODS FOR FISSILE MATERIALS, SUPPORT OF CRITICALITY RESEARCH AND THE COMPILATION OF CRITICALITY DATA, THE BULK TRANSPORT OF UF₆, THE BULK TRANSPORT OF LOW U-235 ENRICHED METAL, U-233 PROCESSING, THE USE OF FIXED NEUTRON ABSORBERS AS PRIMARY AND SECONDARY CRITICALITY CONTROL DEVICES, AND BATCH AND CONCENTRATION MONITORING OF FISSILE MATERIALS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.00 CY, \$0.50 MN

CRITICALITY EXPERIMENT + CRITICALITY SAFETY + SAFETY PRINCIPLES AND PHILOSOPHY + SHIPPING ANALYSIS

3-12558 HORN LH

FIRE TESTS OF SHIPPING CONTAINERS AND COBALT-60 TELETHERAPY HEAD

UNDERWRITERS LABS., INC., CHICAGO

COO-274 +. 77 PAGES, MARCH 31, 1963

FIRE TESTS OF SEVERAL ISOTOPE SHIPPING CONTAINERS AND A COBALT-60 TELETHERAPY HEAD WERE CONDUCTED UNDER CONTROLLED CONDITIONS EQUIVALENT TO SIMILAR TESTS CONDUCTED UPON RECORD-PROTECTION EQUIPMENT SUCH AS SAFES AND FILING CABINETS. FIRE-TEST EXPOSURES WERE LIMITED TO 1 HR MAXIMUM, AND TEST FURNACES WERE CONTROLLED TO PRODUCE INTERIOR TEMPERATURES IN ACCORDANCE WITH THE STANDARD TIME-TEMPERATURE CURVE ADOPTED BY UNITED STATES FIRE PROTECTION AUTHORITIES, ALSO AS SET FORTH IN PROPOSED PART 72 OF FEDERAL REGULATIONS. THE LEAD-SHIELDED DEVICES FAILED TO COMPLY WITH THE PROPOSED REGULATION BECAUSE OF MELTING OF THE LEAD, RUPTURE OF THE STEEL BODY SHELLS ENCLOSING AND SUPPORTING THE SHIELDING MATERIAL, AND CONSEQUENT LOSS OF THE SHIELDING MEDIA. THE ALL-STEEL SHIPPING CONTAINER, WHICH CAN BE USED FOR THE SHIPMENT OF LIQUIDS, FAILED BY DESTRUCTION OF THE SEALING GASKETS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.25 CY

COBALT + CONTAINMENT INTEGRITY + FIRE + SHIPPING CONTAINER + TEST, DESTRUCTIVE

3-12559 HORN LH

FIRE TESTING OF SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS

UNDERWRITERS LABORATORIES, INC., CHICAGO

TID-7635 (PP. 32-45) +. 13 PAGES, AUGUST 1962

PROCEDURES USED IN FIRE EXPOSURE TESTS ARE REVIEWED. RESULTS ARE REPORTED FROM FIRE TESTS ON TWO TYPES OF ORNL SHIPPING CONTAINERS AND A PROTOTYPE CO-60 TELETHERAPY HEAD. THE TELETHERAPY HEAD AND SMALL SHIPPING CONTAINER SHOWED NO APPRECIABLE DAMAGE. A LARGER TYPE 55 UNIT EXPLODED DURING FIRE TESTING. DESIGN MODIFICATIONS ARE SUGGESTED FOR THIS CONTAINER. REPORTED IN DETAIL IN COO-274.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75 CY

COBALT + FIRE + HEAT TRANSFER + SHIPPING CONTAINER + TEST, DESTRUCTIVE

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12560 CLARKE HG + ONDERKO WE
MODEL IMPACT TESTS PERTAINING TO SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS
FRANKLIN INSTITUTE, PHILADELPHIA
TID-7651 (PP. 238-64) +. 26 PAGES, DECEMBER 1962

ACTIVITIES IN A PROGRAM TO DEVELOP QUANTITATIVE METHODS FOR ASSESSING THE STRUCTURAL INTEGRITY OF SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS ARE REPORTED. MODELS WERE USED IN IMPACT TESTS WHICH LED TO THE CONCLUSION THAT SUCH INVESTIGATIONS CAN REVEAL QUALITATIVELY THOSE CONFIGURATIONS, MATERIALS AND FABRICATION TECHNIQUES WHICH INCREASE INTEGRITY. TEST DATA ARE INCLUDED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

MODEL TESTING + STRUCTURAL INTEGRITY + TEST, DROP

3-12561 ADLER LB
HEAT TRANSFER STUDY OF COBALT-60 SHIPPING CONTAINER. PROGRESS REPORT NO. 1
BROOKHAVEN NATIONAL LABORATORY
BNL-657 + BNL-T-213 +. 23 PAGES, MARCH 1961

HEAT-TRANSFER STUDIES WERE MADE OF A 7-TON COBALT-60 SHIPPING CONTAINER WITH APPROXIMATE 83,000-CURIE COBALT LOADING. SURFACE TEMPERATURES INDICATE THAT HEAT REMOVAL ASPECTS OF THE CONTAINER WILL NOT LIMIT ITS USAGE, I.E., THE LOADING STUDIED WILL BE SAFE AS REGARDS POSSIBLE ACTIVITY LEAKAGE DUE TO HEAT GENERATION UNDER NORMAL SHIPPING CONDITIONS AND IN ANY SITUATION WHEREIN A REASONABLE NATURAL-CONVECTIVE HEAT TRANSFER CONDITION IS MAINTAINED AT THE CONTAINER SURFACE. THE IMPORTANT HEAT FLOWS CONTROLLING HEAT DISSIPATION WERE ALSO DEFINED. IN ADDITION TO THE EXPECTED CONVECTIVE AND RADIATIVE EFFECTS, IT APPEARS THAT CONTACT HEAT CONDUCTION THROUGH THE COBALT HOLDER ASSEMBLY MAY BE A SIGNIFICANT HEAT REMOVAL FACTOR.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.60 CY, \$0.83 MF

*HEAT TRANSFER + COBALT + SHIPPING CONTAINER

3-12562 ADLER LB
HEAT TRANSFER STUDY OF COBALT-60 SHIPPING CONTAINER
BROOKHAVEN NATIONAL LABORATORY
TID-7635 (PP. 59-71) +. 18 PAGES, AUGUST 1962

RESULTS ARE REPORTED FOR A SERIES OF HEAT REMOVAL EXPERIMENTS MADE ON LEAD SHIPPING CONTAINERS USED FOR TRANSPORTING TENS OF KILOCURIES OF CO-60. MEASUREMENTS WERE MADE OF INTERNAL TEMPERATURES IN A CASK LOADED WITH 83-KC AMOUNTS OF CO-60. HEAT TRANSFER MECHANISMS ARE DISCUSSED. ALSO REPORTED IN BNL-657 AND BNL-684.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75

COBALT + HEAT TRANSFER + SHIPPING CONTAINER

3-12563 ADLER LB
HEAT TRANSFER STUDY OF COBALT-60 SHIPPING CONTAINER
BROOKHAVEN NATIONAL LABORATORY
1 PAGE, TRANSACTIONS AMERICAN NUCLEAR SOCIETY, 4(2), P. 361 (NOVEMBER 1961)

AN EXPERIMENTAL STUDY WAS CONDUCTED TO DETERMINE MAXIMUM TEMPERATURES DEVELOPED WITHIN A 7-TON LEAD SHIPPING CARRIER CONTAINING 83 KILOCURIES OF CO-60. PRIMARY OBJECTIVES WERE TO DETERMINE TEMPERATURE SAFETY OF THE CONTAINER UNDER VARIOUS SHIPPING CONDITIONS, ALSO, TO DEFINE HEAT-REMOVAL PATHS IMPORTANT AS GENERAL CONTAINER DESIGN CRITERIA. THE EXPERIMENTAL DATA SHOW THAT THE MELTING POINT OF EITHER OF THE PRIMARY CONTAINER METALS IS NOT SERIOUSLY APPROACHED UNDER THE CONDITIONS STUDIED. ADDITIONAL TEMPERATURES MEASURED WITHIN THE CLOSE-PACKED SOURCE LATTICE DENOTE THAT WATER AND AIR-FLOW CONDITIONS BETWEEN SOURCES ARE RELATIVELY STAGNANT. FLAT TEMPERATURE PROFILES WERE OBTAINED ACROSS INTERNAL FLOW AREAS, ALSO, LITTLE TEMPERATURE DIFFERENCE WAS NOTED BETWEEN CONSTRUCTED FLOW SPACES AND ADJACENT LARGER REGIONS. SINCE RADIANT HEAT FLOW IS MINIMAL DUE TO SLIGHT TEMPERATURE DIFFERENCES, CONCLUSION IS THUS THAT THE PRIMARY HEAT-REMOVAL MECHANISM WITHIN THE CONTAINER CORE IS CONDUCTIVE. ALSO REPORTED IN DETAIL IN BNL-657 AND BNL-684.

COBALT + HEAT TRANSFER + SHIPPING CONTAINER

3-12564 FUEL SHIPPING CONTAINER TEST. CORE 1, SEED 1. SECTION 1. TEST RESULTS T-643717-A
DUQUESNE LIGHT CO., SHIPPINGPORT, PA.
DLCS-3250101 +. 15 PAGES, APRIL 24, 1961, FIRST ISSUE

A TEST WAS PERFORMED AT THE SHIPPINGPORT PWR, THE PURPOSE BEING TO DETERMINE THE AMOUNT OF HEAT THE FUEL SHIPPING CONTAINER COOLING SYSTEM WAS CAPABLE OF REMOVING WHILE IN A STATE OF EQUILIBRIUM. STUDIES WERE ALSO CONDUCTED TO DETERMINE IF AFTER FOUR HOURS OF OPERATION, THE INCREASE OF THE INTERNAL WALL TEMPERATURE WAS LESS THAN 30 F, AND FINALLY, TO DETERMINE THE EFFECTS OF LOSS OF COOLING WATER FROM THE FUEL SHIPPING CONTAINER.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12564 *CONTINUED*
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.60 CY, \$0.80 MF

ACCIDENT, LOSS OF COOLANT + HEAT TRANSFER + MAIN COOLING SYSTEM + REACTOR, PRESSURIZED WATER + SHIPPINGPORT

3-12565 ANTHONY JD
NEUTRON BLACKNESS TESTER FOR USE UNDER WATER
SAVANNAH RIVER LABORATORY, E. I. DU PONT DE NEMOURS AND CO.
DP-373 +. 9 PAGES, DECEMBER 1961

A NEUTRON BLACKNESS TESTER FOR USE UNDER WATER WAS DEVELOPED FOR ENSURING THE CONTINUITY OF CADMIUM IN CADMIUM-LINED STEEL DIVIDER PLATES OF RAILROAD CASKS THAT ARE USED TO SHIP REACTOR FUEL ELEMENTS. THE INSTRUMENT WILL DETECT HOLES IN THE CADMIUM AS SMALL AS 1.25 INCHES IN DIAMETER.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$0.50 CY

CADMIUM + CRITICALITY SAFETY + INSTRUMENTATION, NUCLEAR + NEUTRON INTERACTION

3-12566 FARMER FR
THE PACKAGING, TRANSPORT AND RELATED HANDLING OF RADIOACTIVE MATERIALS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, RISLEY
DPR/INF/264 +. 13 PAGES, SEPTEMBER 1961

SOME OF THE REQUIREMENTS FOR THE SAFE HANDLING AND TRANSPORT OF RADIOACTIVE AND FISSILE MATERIALS ARE REVIEWED. TOPICS DISCUSSED INCLUDE THE PROPERTIES OF RADIOACTIVE MATERIALS, THE RANGE OF HAZARDS ASSOCIATED WITH RADIOACTIVE MATERIAL, THE CONTROL OF RADIATION EMITTED FROM PACKAGES OF RADIOACTIVE MATERIAL, TYPES OF TRANSPORT CONTAINERS, ACCEPTED TESTS FOR CONTAINERS, AND THE STATUS OF NATIONAL AND INTERNATIONAL REGULATIONS FOR THE SAFE HANDLING OF RADIOACTIVE MATERIALS DURING TRANSPORT.

AVAILABILITY - MICROCARD EDITIONS, INC. (FOR SALE) ACCOUNTING AND SHIPPING DEPARTMENT, WEST SALEM, WISCONSIN, 54669

HAZARDS ANALYSIS + RADIATION SAFETY AND CONTROL + REGULATION, GENERAL + SAFETY PRINCIPLES AND PHILOSOPHY + UNITED KINGDOM

3-12567 THISSELL WI + LANGHAAR JW
STATIC AND IMPACT TESTS ON 15-TON CASK FOR SHIPPING IRRADIATED FUEL
E. I. DU PONT DE NEMOURS AND COMPANY, WILMINGTON, DEL.
DP-843 +. 152 PAGES, AUGUST 1963

RESULTS OF STATIC AND DYNAMIC TESTS ON A LEAD-SHIELDED STEEL CASK WEIGHING 15 TONS AND USED FOR RAIL SHIPMENT OF RADIOACTIVE FUEL ARE REPORTED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75 CY

IMPACT SHOCK + LEAD + SHIPPING CONTAINER + TEST, DESTRUCTIVE + TEST, NONDESTRUCTIVE

3-12568 STUDY OF IRRADIATED FUELS SHIPMENT FROM THE EUROPEAN POWER REACTORS TO THE UNITED STATES
LEBON ET CIE., PARIS + SOCIETE GENERALE D EXPLOITATIONS INDUSTRIELLES, PARIS + STANRAY CORP., CHICAGO
EUR-112.E,F (VOL. 1) + EURAEC-374 (VOL. 1) +. 35 PAGES, NOVEMBER 1962

TRANSPORTATION FROM EUROPE TO THE UNITED STATES OF FUELS IRRADIATED IN THE SENN AND SENA REACTORS IS CONSIDERED. THE PROBLEMS RESULTING FROM THE TRANSPORTS CONSIDERED WERE EVALUATED AND EXAMINED FROM A GENERAL VIEWPOINT AND IN THE LIGHT OF CONCRETE STUDIES.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.60 FS, \$1.25 MF

EURATOM + FUEL HANDLING + SENN (SOCIETA ELETTRONUCLEARE NAZIONALE) + TRANSPORTATION AND HANDLING

3-12569 STUDY OF IRRADIATED FUELS SHIPMENT FROM THE EUROPEAN POWER REACTORS TO THE UNITED STATES
LEBON ET CIE., PARIS + SOCIETE GENERALE D EXPLOITATIONS INDUSTRIELLES, PARIS + STANRAY CORP., CHICAGO
EUR-112.E,F (VOL. 3) + EURAEC-374 (VOL. 3) +. 507 PAGES, 1962

THE EUROPEAN PART OF THE SHIPMENT OF IRRADIATED FUELS FROM THE SENN AND SENA REACTORS TO THE UNITED STATES IS CONSIDERED. LAWS AND REGULATIONS CONCERNING TRANSPORT IN EUROPE ARE LISTED. SAFETY PRECAUTIONS ARE DESCRIBED. THE METHODS EMPLOYED ARE EXAMINED. THE ASSURANCES, NECESSARY APPROBATIONS, FORMALITIES OF ACCOMPLISHMENT, MEASURES TO BE TAKEN IN CASE OF ACCIDENT, COSTS, AND APPLICATIONS TO THE SPECIFIC REACTORS ARE DISCUSSED. TRANSPORT ON THE SEA IS ALSO CONSIDERED. THE GENERAL PROGRAM OF COSTS FOR TRANSPORT IS OUTLINED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$26.00 FS, \$15.41 MF

ECONOMIC STUDY + EURATOM + REGULATION, GENERAL + SAFETY PRINCIPLES AND PHILOSOPHY + SENN (SOCIETA ELETTRONUCLEARE NAZIONALE) + TRANSPORTATION AND HANDLING

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12570 A STUDY OF THE TRANSPORT OF IRRADIATED RESEARCH REACTOR FUEL. FINAL REPORT
LEBON ET CIE., PARIS + SOCIETE GENERALE D EXPLOITATIONS INDUSTRIELLES, PARIS + ALLGEMEINE
ELEKTRIZITATSGESELLSCHAFT, FRANKFURT AM MAIN + EDLOW LEAD CO., COLUMBUS, OHIO
EUR-185.F,D,E +. 114 PAGES, 1963, IN ENGLISH, FRENCH, AND GERMAN

IN CONNECTION WITH THE PREPARATION BY THE COMMISSION OF AN INVITATION TO TENDER FOR THE
TRANSPORT TO A CHEMICAL REPROCESSING PLANT OF FUEL ELEMENTS DISCHARGED FROM THE COMMUNITY'S
RESEARCH REACTOR, THREE PRIVATE FIRMS WERE COMMISSIONED TO CARRY OUT STUDIES WITH THE OBJECT
OF DETERMINING THE VARIOUS ASPECTS OF THESE TRANSPORT OPERATIONS IN THE LIGHT OF CURRENT KNOW
HOW IN EUROPE AND THE UNITED STATES. THE RESULTS OF THESE STUDIES ARE PRESENTED IN THE FORM
OF THIS BACKGROUND FILE, WHICH CONSISTS OF THREE PARTS REPRESENTING THE RESPECTIVE
CONTRIBUTIONS OF THE FIRMS COMMISSIONED FOR THE STUDIES.

AVAILABILITY - MICROCARD EDITIONS, INC. (FOR SALE) ACCOUNTING AND SHIPPING DEPARTMENT, WEST SALEM,
WISCONSIN, 54669

EURATOM + INSURANCE + LIABILITY + REGULATION, GENERAL + SAFETY STUDY + TRANSPORTATION AND HANDLING

3-12571 DA NOVI P
COMPARATIVE ANALYSIS OF THE REGULATIONS IN FORCE IN THE EURATOM MEMBER STATES GOVERNING THE TRANSPORTATION
OF RADIOACTIVE MATERIALS AND THOSE DRAWN UP BY THE INTERNATIONAL ATOMIC ENERGY AGENCY
EUROPEAN ATOMIC ENERGY COMMUNITY
EUR-2747.F +. 242 PAGES, FEBRUARY 1966

THE REGULATIONS APPLYING IN THE VARIOUS COUNTRIES OF THE EUROPEAN ATOMIC ENERGY COMMUNITY WITH
REGARD TO THE TRANSPORTATION OF RADIOACTIVE MATERIALS ARE COMPARED AS TO THE POINTS IN WHICH
THEY ARE SIMILAR TO OR DIVERGE FROM THE REGULATIONS FOR THE SAFE TRANSPORT OF RADIOACTIVE
MATERIALS, INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, 1965.

AVAILABILITY - MICROCARD EDITIONS, INC. (FOR SALE) ACCOUNTING AND SHIPPING DEPARTMENT, WEST SALEM,
WISCONSIN, 54669

EURATOM + REGULATION, GENERAL + REGULATION, IAEA

3-12572 SCALLIET R
PROBLEMS RELATING TO THE TRANSPORTATION OF MTR-TYPE IRRADIATED FUELS
EUROPEAN ATOMIC ENERGY COMMUNITY
EUR-1850.E (P. 195-200) +. 5 PAGES, 1965

AN ACCOUNT IS GIVEN OF ACTIONS TAKEN BY THE COMMISSION TO ENSURE PROPER CONDITIONS FOR
TRANSPORTATION OF IRRADIATED FUELS FROM THE HFR, BR-2, AND ISPRA 1 REACTORS TO PROCESSING
PLANTS. THE ASPECTS CONSIDERED INCLUDE DESTINATION OF THE FUEL, PROVISION OF TRANSPORTATION
CONTAINERS, AND COSTS RELATED TO TRANSPORTATION AND THIRD-PARTY NUCLEAR LIABILITY INSURANCE
COVERAGE.

AVAILABILITY - MICROCARD EDITIONS, INC. (FOR SALE) ACCOUNTING AND SHIPPING DEPARTMENT, WEST SALEM,
WISCONSIN, 54669

BR 2 (BELGIAN RESEARCH REACTOR, CEN) + EURATOM + INSURANCE + LIABILITY + MTR (MATERIAL TESTING REACTOR) +
REACTOR, TEST + SHIPPING CONTAINER

3-12573 FISHER G
DESIGN AND ECONOMIC STUDY OF SPENT FUEL SHIPPING. QUARTERLY REPORT NO. 2, JULY 1 TO SEPTEMBER 30, 1961
STANRAY CORP., CHICAGO
EURAE-167 +. 6 PAGES, SEPTEMBER 28, 1961

ACTIVITIES ARE DESCRIBED IN INVESTIGATIONS OF SHIPMENT OF SPENT RADIOACTIVE FUEL ELEMENTS FROM
EURATOM REACTORS TO U.S. REPROCESSING PLANTS. SHIPMENT REGULATIONS WERE ACQUIRED AND
CLARIFIED, AND A PORT OF ENTRY WAS TENTATIVELY SELECTED. AN INVESTIGATION WAS INITIATED
CONCERNING FREIGHT RATES AND INSURANCE REQUIREMENTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.10 CY, \$0.80 MF

ECONOMIC STUDY + EURATOM + INSURANCE + OCEAN AND SEA + REGULATION, GENERAL + TRANSPORTATION AND HANDLING

3-12574 FISHER G
DESIGN AND ECONOMIC STUDY OF SPENT FUEL SHIPPING. QUARTERLY REPORT, MAY 1, 1961 TO JUNE 28, 1960
STANRAY CORP., CHICAGO
EURAE-164 +. 8 PAGES, JUNE 28, 1960

AN INVESTIGATION IS BEING MADE OF THE PROBLEMS INVOLVED IN THE SHIPMENT OF SPENT RADIOACTIVE
FUEL ELEMENTS FROM A REACTOR LOCATED IN ONE OF THE EURATOM NATIONS TO A REPROCESSING SITE IN
THE UNITED STATES. A GENERAL LIST OF ALL THE FACTORS AND AGENCIES THAT MIGHT COME TO BEAR ON
THE PROBLEM WAS DRAWN UP.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.10 CY, \$0.80 MF

ECONOMIC STUDY + EURATOM + OCEAN AND SEA + SAFETY REVIEW (OPERATIONS, EXPERIMENTS) +
TRANSPORTATION AND HANDLING

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12575 FISHER G
DESIGN AND ECONOMIC STUDY OF SPENT FUEL SHIPPING. QUARTERLY REPORT NO. 4, JANUARY 1, 1962 TO MARCH 31, 1962
STANRAY CORP., CHICAGO
EURAC-292 +. 7 PAGES, MARCH 26, 1962

A STUDY OF THE PROBLEMS INVOLVED IN THE SHIPMENT OF SPENT RADIOACTIVE FUEL ELEMENTS FROM THE SENN REACTOR LOCATED IN ITALY TO A REPROCESSING SITE IN THE UNITED STATES IS DISCUSSED. ALL APPLICABLE RULES, REGULATIONS, AND MATTERS OF PROCEDURE LIMITED TO UNITED STATES TERRITORY AND THE HIGH SEAS IS INCLUDED IN THIS STUDY.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.10 CY, \$0.80 MF

EURATOM + ITALY + OCEAN AND SEA + REGULATION, GENERAL + SENN (SOCIETA ELETTRONUCLEARE NAZIONALE)

3-12576 REPORT CONCERNING THE STUDY OF THE TRANSPORTATION OF IRRADIATED FUEL FROM THE SENN REACTOR AT GARIGLIANO, ITALY. SPECIAL REPORT NO. 1
LEBON ET CIE., PARIS + SOCIETE GENERALE D EXPLOITATIONS INDUSTRIELLES, PARIS
EURAC-215 +. 49 PAGES, OCTOBER 1961, (A TRANSLATION)

IRRADIATED FUEL IS TO BE SHIPPED FROM THE SENN REACTOR IN ITALY TO SAVANNAH RIVER PLANT IN U.S. FOR REPROCESSING AT THE END OF 1964. ONE POSSIBLE SOLUTION TO THE NUMEROUS PROBLEMS INVOLVED IN SUCH TRANSFER IS SELECTED AS AN EXAMPLE AND ITS ASPECTS EXAMINED IN DETAIL. THE OPERATIONS AND MEANS OF TRANSPORTATION ARE DESCRIBED IN DETAIL, ALONG WITH THE STEPS TO BE TAKEN IN CASE OF ACCIDENT. LEGAL, INSURANCE, AND COST QUESTIONS ARE CONSIDERED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$4.60 CY, \$1.67 MF

ECONOMIC STUDY + EURATOM + INSURANCE + ITALY + OCEAN AND SEA + REGULATION, GENERAL + SAFETY REVIEW (OPERATIONS, EXPERIMENTS) + SENN (SOCIETA ELETTRONUCLEARE NAZIONALE)

3-12577 CRAIG ER
DECAY HEAT CALCULATION METHODS FOR LOW-ENRICHMENT ROD TYPE FUEL ELEMENTS
GENERAL ELECTRIC CO., VALLECITOS ATOMIC LAB., SAN JOSE, CALIFORNIA
GEAP-4704 + EURAC-1188 +. 31 PAGES, AUGUST 1964

METHODS OF CALCULATING THE DECAY HEAT OF LOW-ENRICHMENT, ROD-TYPE FUEL ELEMENTS, AS WELL AS HOW RESULTS ARE APPLIED IN TRANSFER AND HOT CELL OPERATIONS, ARE GIVEN. THE LIMITING PARAMETER IN ALL CASES IS THE SURFACE TEMPERATURE OF THE CLADDING, WHICH MUST BE KEPT BELOW 400 F TO PREVENT POST-IRRADIATION METALLURGICAL CHANGES WHICH COULD CAUSE CONFUSION IN THE INTERPRETATION OF THE RESULTS OF THE HOT CELL EXAMINATION. THE DECAY HEAT OF AN AEC-EURATOM FUEL ASSEMBLY (EPW 6/8 V), WHICH WAS IRRADIATED FOR ONE CYCLE IN THE PRESSURIZED WATER LOOP (PWL) AT GENERAL ELECTRIC TEST REACTOR (GETR), IS REPORTED. A SERIES OF TESTS WERE PERFORMED TO CHECK THE HEAT TRANSFER IN THE VALLECITOS BOILING WATER REACTOR (VBWR) SINGLE-ELEMENT CASK. THESE TESTS PROVIDE A REASONABLE APPROXIMATION OF MAXIMUM CLADDING SURFACE TEMPERATURE IF AN ELEMENT IS SHIPPED DRY.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.00 CY, \$1.00 MN

EURATOM + HEAT TRANSFER + HIGH TEMPERATURE + OPERATING EXPERIENCE + REACTOR, BOILING WATER + TEST, NONDESTRUCTIVE + VBWR (VALLECITOS BOILING WATER REACTOR)

3-12578 KETZLACH N
NUCLEAR SAFETY OF IRON-ENCASED FUEL ELEMENTS
HANFORD ATOMIC PRODUCTS OPERATION
HW-56423 +. JUNE 17, 1958, NUCLEAR SCI. AND ENG. 6, PP. 187-90 (1959)

A STUDY HAS BEEN MADE OF THE REACTIVITY OF WATER FLOODED ARRAYS OF 0.59 PERCENT ENRICHED U-235 FUEL ELEMENTS ENCASED IN IRON PIPE. TWO FUEL ELEMENTS WERE STUDIED - (1) 1.34 INCH O.D. SOLID FUEL ELEMENT, AND (2) I. AND E. FUEL ELEMENTS HAVING A 1.37 INCH O.D. AND A 0.48 INCH I.D. THE THEORETICAL STUDY CONSISTED OF MAKING LATTICE CALCULATIONS FOR THE ABOVE FUEL ELEMENTS WHEN BARE, ENCASED IN 1/8 INCH AND 1/4 INCH THICK IRON PIPE.

CRITICALITY SAFETY

3-12579 KETZLACH N
NUCLEAR SAFETY OF VESSELS IN ARRAYS
HANFORD ATOMIC PRODUCTS OPERATION
HW-41899 +. 9 PAGES, MARCH 13, 1956, DECL. JUNE 10, 1960

THE EFFECTS OF INTERACTION BETWEEN VESSELS OR UNITS CONTAINING FISSIONABLE MATERIALS ARE IMPORTANT FOR SAFE HANDLING, STORAGE, AND SHIPPING. EXPRESSIONS FOR THE EFFECT OF NEUTRON INTERACTION ON CRITICALITY WERE DERIVED FOR CASES OF BARE AND TAMPED SPHERES AS WELL AS TAMPED, INFINITELY TALL CYLINDERS CONTAINING FISSIONABLE MATERIAL.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA, \$1.80 CY, \$1.80 MF

CRITICALITY SAFETY + NEUTRON INTERACTION + TRANSPORTATION AND HANDLING

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12580 MCLENEGAN DW
HEAT DISSIPATION FROM A SHIELDED CASK WITH EXTERNAL IMPACT BUFFERS
HANFORD ATOMIC PRODUCTS OPERATION
HW-64696 +. APRIL 1960

ABSTRACT IS NOT AVAILABLE FOR THIS DOCUMENT.

HEAT TRANSFER + STRUCTURAL INTEGRITY

3-12581 KETZLACH N
PRTR FUEL ELEMENT NUCLEAR SAFETY
HANFORD ATOMIC PRODUCTS OPERATION
HW-59786 +. 5 PAGES, MARCH 30, 1959

NUCLEAR SAFETY CRITERIA ARE REVIEWED FOR THE STORAGE AND TRANSPORTATION OF FUEL ELEMENTS FOR THE PRTR BOTH FOR IMMERSION IN AIR AND WATER. THE CRITERIA ARE PRESENTED IN THE FORM OF TABLES FOR SPACING AND SAFE NUMBER OF CLUSTERS. FOUR STORAGE SYSTEMS AND THEIR CRITICAL PARAMETERS ARE DISCUSSED - NEW FUEL STORAGE PIT (H-3-11078), FUEL TRANSFER STORAGE PIT (H-3-11097), STORAGE BASIN (HW-3-11030), AND A LEAD SHIELDED FUEL TRANSFER CASK (UNNUMBERED).

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.80 CY, \$1.80 MF

CRITICALITY SAFETY + PRTR (PLUTONIUM RECYCLE TEST REACTOR) + REACTOR, HEAVY WATER + REACTOR, PRESSURE TUBE

3-12582 SMITH CW
HAPO IN FISSION PRODUCT SHIPPING CASK DESIGN EVALUATION REPORT
HANFORD ATOMIC PRODUCTS OPERATION
HW-65268 (REV. 1) +. 72 PAGES, DECEMBER 28, 1962

THE HAPO-I SHIPPING CASK WAS DESIGNED TO MEET THE APPLICABLE PORTIONS OF THE PROPOSED FUEL ELEMENT SHIPPING REGULATIONS, TO MEET THE REQUIREMENTS OF THE BUREAU OF EXPLOSIVES, AND TO WITHSTAND TWO HOURS IMMERSION IN A FIRE (FLAME TEMPERATURE 2500 F). THE DESIGN CRITERIA FOR THE CASKS ARE COMPLETE CONTAINMENT OF THE FISSION PRODUCTS, RADIATION SHIELDING TO REDUCE THE EXTERNAL DOSE RATE TO ICC LIMITS, AND ADEQUATE HEAT DISSIPATION FOR ALL NORMAL SHIPPING SITUATIONS AND FOR EMERGENCY CONDITIONS WHICH ARE DESCRIBED AS IMPACT WITH AN UNYIELDING SURFACE WHILE TRAVELING AT 44 FPS FOLLOWED BY EITHER COMPLETE LOSS OF HEAT DISSIPATION FOR 48 HOURS OR TOTAL IMMERSION IN A FIRE (FLAME TEMPERATURE 2500 F) FOR TWO HOURS. IT WAS CALCULATED THAT THE CASKS WILL WITHSTAND SATISFACTORILY THESE CONDITIONS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$7.60 FS, \$2.36 MF

EQUIPMENT DESIGN + FIRE + HAZARDS ANALYSIS + HEAT TRANSFER + IMPACT SHOCK + STRUCTURAL INTEGRITY

3-12583 SMITH CW
STRONTIUM-90 SHIPPING CASK DESIGN CRITERIA AND HAZARDS EVALUATION
HANFORD ATOMIC PRODUCTS OPERATION
HW-68081 +. 59 PAGES, JANUARY 13, 1961

A CASK WAS DESIGNED FOR SHIPPING A MAXIMUM OF 168,000 CURIES OF SR-90 ALONG WITH THE ASSOCIATED IMPURITIES FROM HANFORD TO THE MARTIN NUCLEAR COMPANY AND OAK RIDGE NATIONAL LABORATORIES. THE CASK WAS DESIGNED TO COMPLETELY CONTAIN THE SR-90 WHILE BEING DECELERATED AT GREATER THAN 50 G. THE CASK IS PROTECTED BY AN EXTERNAL BUFFER TO ASSURE THAT THE DECELERATION DOES NOT EXCEED 50 G AND ALSO DISTRIBUTE THE FORCES ARISING FROM STRIKING SHARP OBJECTS OR SOLID SURFACES. THE CASK HAS SUFFICIENT SHIELDING TO REDUCE THE RADIATION LEVELS TO THOSE REQUIRED BY THE ICC. THE CASK SURFACE TEMPERATURE WILL BE ABOUT 230 F AND THE MAXIMUM FISSION PRODUCT TEMPERATURE WILL BE ABOUT 453 F DURING NORMAL OPERATION.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.60 FS, \$1.97 MF

EQUIPMENT DESIGN + HEAT TRANSFER + HIGH TEMPERATURE + IMPACT SHOCK + STRONTIUM + STRUCTURAL INTEGRITY

3-12584 SMITH CW
FISSION PRODUCT SHIPPING CASK. DESIGN CRITERIA AND HAZARDS EVALUATION
HANFORD ATOMIC PRODUCTS OPERATION
HW-65268 +. 48 PAGES, MAY 20, 1960

TO PROVIDE A CASK DESIGN WHICH IS CONSERVATIVE WITH RESPECT TO RADIATION HAZARDS AND AT THE REQUEST OF THE ATOMIC ENERGY COMMISSION, A SHIPPING CASK WAS DESIGNED TO CONFORM TO THE APPLICABLE SECTIONS OF THE PROPOSED FUEL ELEMENT SHIPPING REGULATIONS AND TO MEET THE REQUIREMENTS OF THE BUREAU OF EXPLOSIVES. THE CASK WAS DESIGNED FOR A SHIPMENT OF 500,000 CURIES OF CE-144 AND THE ASSOCIATED IMPURITIES FROM HANFORD TO ORNL. THE STRUCTURAL INTEGRITY OF THE CASK WAS ASSURED BY PROVIDING A PROTECTIVE BUFFER TO DISTRIBUTE FORCES FROM IMPACTS WITH SOLID SURFACES OR SHARP OBJECTS OVER THE CASK SURFACE. WITH THIS DISTRIBUTION OF FORCES AND THE STIFFNESS PROVIDED BY THE EXTERNAL FINS, THE CASK WILL STAND A FORCE OF 50 G WITHOUT RUPTURE.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$4.60 FS, \$1.64 MF

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12584 *CONTINUED*
ACCIDENT ANALYSIS + CERIUM + EQUIPMENT DESIGN + HAZARDS ANALYSIS + IMPACT SHOCK + STRUCTURAL INTEGRITY

3-12585 KENDALL WR + MCLENEGAN DW
STRONTIUM-90 SHIPPING CASK AND PROTECTIVE BUFFER
HANFORD ATOMIC PRODUCTS OPERATION
HW-68274 +. 22 PAGES, JUNE 14, 1961

EQUIPMENT DESIGNED FOR TRANSPORTING HIGH-ENERGY RADIOACTIVE MATERIAL, PARTICULARLY SR-90, BY RAILROAD OVER LONG DISTANCES IS DESCRIBED. DESIGN PERMITS USE OF ROUTES REPRESENTING VARIATIONS OF TOPOGRAPHY AND CLIMATE. DIAGRAMS AND SPECIFICATIONS ARE PRESENTED FOR A SHIELDED CASK AND THE CASK BUFFER.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA, \$2.60 FS, \$0.86 MF

EQUIPMENT DESIGN + IMPACT SHOCK + STRONTIUM + TRANSPORTATION AND HANDLING

3-12586 DEMIER WV
NON-RADIOACTIVE TESTING OF THE HAP0 II STRONTIUM CARBONATE FILTER CASK INSERT
HANFORD ATOMIC PRODUCTS OPERATION
HW-69781 +. 4 PAGES, MAY 29, 1961

TESTS WERE CARRIED OUT ON A FILTER INSERT FOR A CASK DESIGNED FOR SHIPPING PURIFIED STRONTIUM CARBONATE-SR-90 IN MULTI-KILOCURIE QUANTITIES. STRONTIUM CARBONATE IS PRECIPITATED FROM NEUTRAL SODIUM NITRATE SOLUTIONS WITH POTASSIUM BICARBONATE. THE TESTS INCLUDED FILTER CAPACITY, FILTRATE LOSSES, WASHING, PRODUCT REMOVAL PROCEDURES, AND INTERNAL HEATER TESTS. SATISFACTORY PERFORMANCE WAS OBTAINED IN ALL TESTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.10 FS, \$0.80 MF

FILTER SAFETY EVALUATION + STRONTIUM + TEST, FILTER + TEST, PROOF

3-12587 WATSON EC + JUNKINS RL + FUQUAY JJ + ZAHN LL
THE CONSEQUENCES OF ACCIDENTAL RELEASES DURING SHIPMENTS OF RADIOACTIVE CESIUM AND STRONTIUM
HANFORD ATOMIC PRODUCTS OPERATION
HW-69561, REV., DEL. +. JUNE 1961

THE ESTIMATED DAMAGES RESULTING FROM THE RELEASE OF RADIONUCLIDES BY VARIOUS POSTULATED MECHANISMS ARE SUMMARIZED. IN THE CASE OF RELEASE OF RADIONUCLIDES TO A RIVER, IT WAS ASSUMED THAT PROMPT AND EFFECTIVE ACTION WOULD BE TAKEN BY THE COURIER, THE TRAIN CREW, AND MUNICIPAL OFFICIALS. THE LACK OF PROMPT ACTION WOULD RESULT IN A HIGHER DAMAGE ESTIMATE. THE ESTIMATED DAMAGES ARE ALSO DEPENDENT UPON THE ROUTING OF THE SHIPMENT. BECAUSE THE DISTRIBUTION OF DOSE WITH TIME AND IN THE BODY DIFFERS MARKEDLY, IT WAS NECESSARY TO CHOOSE CRITERIA (FOR EXPOSURE TO CESIUM AND STRONTIUM) WHICH DIFFER FROM THOSE DERIVED FOR ACCIDENTAL EXPOSURES INVOLVING MIXED FISSION PRODUCTS. THE DAMAGE CRITERIA AND THE RESULTING ZONES DERIVED IN THIS REPORT ARE COMPARED WITH SIMILAR CRITERIA WHICH HAVE BEEN USED IN NUCLEAR REACTOR ANALYSES.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA, \$1.25 COPY

ACCIDENT ANALYSIS + CONTAMINATION + FIRE + HAZARDS ANALYSIS + RADIOACTIVITY, RELEASE

3-12588 SMITH FM
A LABORATORY STUDY TO DEFINE CONDITIONS FOR LOADING STRONTIUM-90 ON DECALSO FOR HAP0-1A CASK SHIPMENT
HANFORD ATOMIC PRODUCTS OPERATION
HW-71574 +. 31 PAGES, NOVEMBER 30, 1961

ONE OF THE MAJOR TASKS INVOLVED IN THE RECENT HANFORD STRONTIUM-90 RECOVERY PROGRAM WAS THE DEFINING OF CONDITIONS NECESSARY TO CONTAIN AND HOLD STRONTIUM-90 FOR SHIPMENT FROM HANFORD TO OAK RIDGE, WHERE IT WOULD BE PELLETIZED AND PACKAGED. OF THE METHODS CONSIDERED FOR SHIPMENT, THAT ACCEPTED WAS THE ABSORPTION OF THE STRONTIUM ONTO AN INORGANIC EXCHANGER CONTAINED IN SOME SUITABLE VESSEL. DECALSO, A SYNTHETIC SODIUM ALUMINOSILICATE, SHOWED THIS TO BE FEASIBLE. TO PROTECT THE CASK AGAINST BOTH MECHANICAL SHOCK AND EXCESSIVE HEAT IN EVENT OF A FIRE, IT WAS PLACED IN AN INSULATED BUFFER FOR SHIPMENT ACROSS COUNTRY. A SERIES OF EXPERIMENTS ARE DESCRIBED THAT WERE PERFORMED TO DEFINE THE CONDITIONS NECESSARY FOR LOADING THE CASK FROM THE DIFFERENT TYPES OF STRONTIUM PRODUCT SOLUTIONS OBTAINED FROM THE RECOVERY PROCESS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.60 CY, \$1.13 MF

LIQUID FUEL + SAFETY PRINCIPLES AND PHILOSOPHY + STRONTIUM + TRANSPORTATION AND HANDLING

3-12589 CADWELL JJ
SEMI REMOTE CONNECTOR FOR FISSION PRODUCT CASKS
HANFORD ATOMIC PRODUCTS OPERATION
HW-70316 +. 10 PAGES, JULY 11, 1961

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12589 *CONTINUED*

A SEALING MECHANISM WITH HIGH TEMPERATURE AND CORROSION RESISTANCE ALONG WITH A ZERO LEAKAGE RATE IS DESIRED FOR USE IN THE SHIPMENT OF LARGE QUANTITIES OF FISSION PRODUCTS. THE MECHANISM MUST PROVIDE A LEAK PROOF, PROCESS-LINE CONNECTION AND CLOSURE, THAT IS REMOTELY OPERABLE, SMALL, INEXPENSIVE, AND READILY DECONTAMINATED. TO MEET THESE REQUIREMENTS, A MINIATURE HANFORD CONNECTOR, USING A MARCON COROSEAL GASKET, WAS DESIGNED. THIS REPORT SUMMARIZES THE RESULTS OF TESTS OF THIS CONNECTOR.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.10 CY, \$0.80 MF

CONTAINMENT DESIGN + EQUIPMENT DESIGN + TEST, LEAK RATE

3-12590 JUNKINS RL
THE CONSEQUENCES OF ACCIDENTAL RELEASES DURING SHIPMENT OF RADIOACTIVE CERIUM
HANFORD ATOMIC PRODUCTS OPERATION
HW-72163 +. 1962

THE CONSEQUENCES OF A RELEASE FROM THE HAP0-1B CASK BY VOLATILIZATION AND EXPLOSIVE FORCE WERE ESTIMATED. THESE ASSUMED INCIDENTS PRESUPPOSE HIGH-SEVERITY, LOW-PROBABILITY ACCIDENT MECHANISMS. INHALATION IS THE PRINCIPAL PATH OF EXPOSURE IN THE CASE OF CERIUM-144. THE ESTIMATED DOSE TO BONES IS HIGH.

ACCIDENT, TRANSPORTATION + CERIUM + CONTAMINATION + RADIOACTIVITY, RELEASE

3-12591 DEMIER WV
NON-RADIOACTIVE TESTING OF THE HAP0 I-2 FISSION PRODUCT SHIPPING CASK
HANFORD ATOMIC PRODUCTS OPERATION
HW-71744 +. 6 PAGES, FEBRUARY 19, 1962

A CERIUM-SODIUM SULFATE PRECIPITATE, $\text{Na}_2\text{SO}_4\text{-CO}_2(\text{SO}_4)_3$ WAS SUCCESSFULLY FILTERED ON THE HAP0 I-2 SHIPPING CASK FILTER WITHOUT RECOURSE TO FILTER AID. THE SELF-LIMITING FLOW FEATURE OF THE CASK WAS DEMONSTRATED. THE CAPACITY OF THE FILTER WAS DETERMINED TO BE 1000 PLUS-OR-MINUS GRAMS OF CERIUM. RECOVERY AS FILTER CAKE WAS ABOUT 97 PERCENT. THE 4600-WATT, 230-VOLT HEATER OPERATED SUCCESSFULLY DURING DRYING OF THE CAKE IN THE FIRST RUN, BUT DEVELOPED AN INTERNAL SHORT UPON COOLING, PREVENTING ITS USE DURING THE SECOND RUN.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.00 CY, \$1.00 MF

CERIUM + TEST, FILTER

3-12592 STEWART KB
RAIL ACCIDENT STATISTICS PERTINENT TO THE SHIPMENT OF RADIOACTIVE MATERIALS
HANFORD ATOMIC PRODUCTS OPERATION
HW-76299 + 73 PAGES, JANUARY 21, 1963

REPORT INCLUDES STATISTICS ON ACCIDENTS THAT OCCURRED ON MAJOR CLASS-I RAILROADS FROM 1958 THROUGH 1960 AND WHICH HAD TOTAL DAMAGES IN EXCESS OF 2000 DOLLARS. DATA INDICATE THAT, ON THE AVERAGE, FREIGHT-TRAIN DAMAGE CAUSED BY DERAILMENTS GOES UP SHARPLY FOR SPEEDS IN EXCESS OF 30 MPH AND THAT PASSENGER TRAINS HAVE A MUCH LOWER ACCIDENT FREQUENCY THAN FREIGHTS. IN ADDITION, FREIGHT-TRAIN DAMAGE INCREASES DIRECTLY AS SPEED TO THE 1.5 POWER.

ACCIDENT ANALYSIS + ACCIDENT, TRANSPORTATION + ENVIRONMENTAL CONDITION + IMPACT SHOCK + STATISTICAL ANALYSIS + STRUCTURAL INTEGRITY

3-12593 DEMIER WV
DEMONSTRATION OF UNLOADING TECHNIQUE FOR THE HAP0 II-2 STRONTIUM FILTER CASK
HANFORD ATOMIC PRODUCTS OPERATION
HW-72295 +. 3 PAGES, JANUARY 17, 1962

NON-RADIOACTIVE TESTING OF THE HAP0 II-2 CASK FOR SHIPMENT OF PRECIPITATED STRONTIUM CARBONATE WAS CARRIED OUT. THE CAPACITY OF THE FILTER UNIT WAS DETERMINED TO BE 1250 G STRONTIUM, ABOUT 2/3 OF THAT FOR THE HAP0 II-1 CASK. THE DRIED STRONTIUM CARBONATE FILTER CAKE DISSOLVED COMPLETELY IN 3 M NITRIC ACID AFTER SOAKING FOR 15 MIN AT 100 F, AND NO CASK PRESSURIZATION OCCURRED. THE CARTRIDGE-TYPE HEATER WITH COLD-END AND LEAD TERMINATIONS EXTENDED BEYOND THE TOP OF THE CASK WAS BETTER THAN THAT OF THE HAP0 II-1 CASK.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.10 FS, \$0.80 MF

STRONTIUM + TEST, FILTER

3-12594 RIPPERGER EA
MODEL STUDIES OF BUFFERED SHIPPING CONTAINERS FOR FISSION PRODUCTS. FINAL REPORT
TEXAS UNIVERSITY, AUSTIN
HW-77963 +. 111 PAGES, MAY 1963

RESULTS ARE REPORTED OF SOME IMPACT TESTS OF QUARTER-SCALE MODELS OF A BUFFERED SHIPPING CONTAINER FOR FISSION PRODUCTS. IN THESE TESTS, THE MODELS WERE DROPPED IN VARIOUS

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12594 *CONTINUED*

ORIENTATIONS ON A HARD UNYIELDING SURFACE. ALSO, SOME MODELS WERE DROPPED ON OBSTRUCTIONS, SUCH AS A SHORT STIFF STAKE, AND THE EDGE OF A STEEL PLATFORM. ACCELERATIONS WERE MEASURED AT OR NEAR THE CG OR THE CONTAINER DURING IMPACT. THE RESULTS OF TESTS OF RUBBER-BUFFERED CONTAINERS INDICATED THAT THESE CONTAINERS ARE QUITE RUGGED AND CAN WITHSTAND IMPACT AT 44 FPS ON A HARD UNYIELDING SURFACE WITHOUT EXCEEDING THE 50-G DESIGN ACCELERATION. ALUMINUM-HONEYCOMB-BUFFERED CONTAINERS WERE EQUALLY RUGGED, BUT THE TESTS INDICATED THAT SOME MODIFICATION OF THE HONEYCOMB ARRANGEMENT IS NECESSARY IF THE DESIGN ACCELERATION IS NOT TO BE EXCEEDED. THE DROPS ON OBSTRUCTIONS INDICATED THAT WITH THE EXCEPTION OF THE SHORT STIFF STAKES, IMPACTS ON OBSTRUCTIONS PRODUCE NO GREATER ACCELERATIONS THAN IMPACTS ON FLAT SURFACES. THE BUFFERING SYSTEM WAS SOMEWHAT VULNERABLE, HOWEVER, TO PENETRATION BY STAKES AND PINS. STATIC LOADING TESTS OF A ONE-HALF-SCALE FILTER UNIT INDICATED THAT THE FILTER IS MORE THAN RUGGED ENOUGH TO WITHSTAND ACCELERATIONS OF 50 G.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$9.60 FS, \$3.53 MF

IMPACT SHOCK + MODEL TESTING + STRUCTURAL INTEGRITY + TEST, DESTRUCTIVE + TEST, FILTER

3-12595 ZAHN LL + SMITH CW + JUNKINS RL + WATSON EC
SHIPMENT OF GROSS QUANTITIES OF RADIOSTRONTIUM
HANFORD ATOMIC PRODUCTS OPERATION
HW-SA-2514 +. 15 PAGES, AUGUST 13, 1962

THE DEVELOPMENT, DESIGN, AND APPRAISAL OF SHIPPING SYSTEMS WHICH ARE OR HAVE BEEN USED FOR THE SHIPMENT OF SR-90 ARE DISCUSSED. DATA ARE TABULATED ON THE SHIPMENT OF 1.5 MC OF SR-90 FROM HANFORD TO VARIOUS DESTINATIONS WITHIN THE U.S. IN ONE OF THREE BASIC SYSTEMS. IT IS POINTED OUT THAT SR-90 IS A HEAT PRODUCING, BETA-EMITTING NUCLIDE OF 28-YEAR HALF-LIFE, THAT IT MAY ENTER MAN BY INGESTION OR INHALATION, THAT IT IS DEPOSITED IN BONE, AND THAT THE MEAN SKELETAL DOSE OF SR-89 AND SR-90 SHOULD NOT EXCEED 0.5 REM A YEAR. THIS LEVEL CORRESPONDS TO A CONTAMINATION LEVEL OF ABOUT 0.6 MICRON C/SQ. METER OF COMBINED SR-89 AND SR-90. THE HAZARDS FROM ACCIDENTAL SPILLS OF SR-90 ARE DISCUSSED. SPECIAL SHIPPING CASKS FOR SR-90 ARE DESCRIBED IN DETAIL.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.60 FS, \$0.80 MF

CONTAMINATION + EQUIPMENT DESIGN + HAZARDS ANALYSIS + SAFETY PRINCIPLES AND PHILOSOPHY + STRONTIUM + STRUCTURAL INTEGRITY

3-12596 SMITH CW
DEVELOPMENT AND DESIGN OF OFF-SITE FISSION PRODUCT SHIPPING CASKS AT HANFORD
HANFORD ATOMIC PRODUCTS OPERATION
HW-SA-2295 +. 28 PAGES, 1962, PREPRINT PAPER NO. 16, NEW YORK, ENGINEERS JOINT COUNCIL

TWO CASKS WERE DESIGNED FOR SHIPPING FISSION PRODUCTS AS STABLE, DRIED SOLIDS, ONE FOR CE-144 AND ONE FOR SR-90. ONE OF THESE WAS MODIFIED TO PERMIT SHIPPING SR-90 ADSORBED ON AN INORGANIC ION-EXCHANGE MATERIAL. ALL CASKS WERE DESIGNED TO WITHSTAND IMPACT AT 44 FPS FOLLOWED BY EITHER LOSS OF HEAT DISSIPATION FOR 48 HR OR IMMERSION IN A FIRE FOR 2 HR. ALL CASKS USE WOODS METAL FOR THE PRIMARY COOLANT AND ALL HAVE A SUFFICIENT THICKNESS OF PB SHIELDING TO REDUCE RADIATION TO THE LEVELS REQUIRED BY THE ICC. AN EXTERNAL CASK CONTAINER IS USED TO ABSORB IMPACT ENERGY.

CERIUM + EQUIPMENT DESIGN + HAZARDS ANALYSIS + IMPACT SHOCK + STRONTIUM + STRUCTURAL INTEGRITY

3-12597 ZAHN LL + JUNKINS RL
DESIGN VERIFICATION TEST PROGRAM, HANFORD DESIGNED SHIPPING SYSTEMS
HANFORD ATOMIC PRODUCTS OPERATION
HW-SA-2655 +. 31 PAGES, JULY 5, 1962

THE HANFORD CASK TESTING PROGRAM FOR DESIGN VERIFICATION OF CERTAIN CRITICAL FEATURES OF THE HAPO-I AND II TYPE SHIPPING SYSTEMS IS DESCRIBED. THE CASKS ARE USED FOR SR-90 SHIPMENTS. THE CASK SYSTEM HAS THREE PRIMARY COMPONENTS - THE PRODUCT FILTER CONTAINER, THE CASK PROPER, AND THE CASK CONTAINER. DESIGN CRITERIA FOR NORMAL AND EMERGENCY CONDITIONS ARE DESCRIBED. MODEL-SCALE TESTING WAS USED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.60 CY, \$1.13 MF

DESIGN CRITERIA + FILTER + MODEL TESTING + SHIPPING CONTAINER + STRONTIUM

3-12598 WATSON EC
THE POTENTIAL HAZARDS OF SHIPPING GROSS QUANTITIES OF RADIONUCLIDES
HANFORD ATOMIC PRODUCTS OPERATION
HW-SA-2518 +. 21 PAGES, MAY 29, 1962

DURING 1961, SEVERAL SHIPMENTS OF ISOLATED FISSION PRODUCT ISOTOPES WERE MADE FROM HANFORD. THESE SHIPMENTS WERE OF THREE TYPES - CS-137 ADSORBED AS A CATION ON AN INORGANIC ALUMINA SILICATE ION EXCHANGE RESIN (DECALSO), SR-90 AS AN ADSORBED CATION ON THE SAME TYPE OF RESIN, AND SR-90 SHIPPED AS A DRIED STRONTIUM CARBONATE. THE ENVIRONMENTAL CONSEQUENCES HAVE BEEN ESTIMATED FOR POSTULATED ACCIDENTS INVOLVING EACH OF THESE THREE TYPES OF SHIPMENTS. IN THIS REPORT, THE STRONTIUM ADSORBED ON DECALSO SHIPMENTS WAS DISCUSSED.

ACCESSION NUMBER 3-12594 TO 3-12598

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12598 *CONTINUED*
AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.60 CY, \$0.83 MF

ACCIDENT, TRANSPORTATION + CESIUM + HAZARDS ANALYSIS + STRONTIUM

3-12599 MCLENEGAN DW + SMITH CW + RIPPERGER EA + BREEN JE
APPLICATION OF EXTERNAL ENERGY ABSORBERS TO LARGE FISSION PRODUCT SHIPPING CASKS
HANFORD ATOMIC PRODUCTS OPERATION + TEXAS UNIVERSITY, AUSTIN
HW-SA-2845 + TID-7651 (P. 265-303) +. 50 PAGES, NOVEMBER 27, 1962, SYMPOSIUM ON PACKAGING AND REGULATORY STANDARDS FOR SHIPPING RADIOACTIVE MATERIALS, GERMANTOWN, MD., DECEMBER 3-5, 1962

DESIGN OF FISSION PRODUCT SHIPPING CONTAINERS PROVIDED WITH MATERIALS OF KNOWN CRUSHING STRENGTH BETWEEN THE CASK AND THE IMPACT SURFACE IS DESCRIBED. THE CASK CONTAINERS THUS PROVIDE A METHOD FOR PREDICTING THE FORCES IMPOSED ON A CASK FOR ALMOST ANY DROP HEIGHT AND ANY IMPACT ATTITUDE. IT IS THEN POSSIBLE TO PREDICT CASK DAMAGE UNDER SPECIFIED CONDITIONS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

EQUIPMENT DESIGN + IMPACT SHOCK + STRUCTURAL INTEGRITY

3-12600 MCLENEGAN DW
FISSION PRODUCT CASKS AND CONTAINERS PROTOTYPE DESIGN, SCALING OF MODELS FOR IMPACT TESTING
HANFORD ATOMIC PRODUCTS OPERATION
HW-SA-2807 +. 14 PAGES, OCTOBER 18, 1962

VARIOUS ASPECTS OF CASK DESIGN ARE DISCUSSED THAT CONCERN PROTECTION AGAINST IMPACT FORCES. PROVISIONS ARE DESCRIBED FOR NORMAL HEAT DISSIPATION AND PROTECTION AGAINST EXCESSIVE HEAT INPUT FROM AN EXTERNAL FIRE. DESIGN CRITERIA FOR MODEL SCALING FOR DROP TESTS ARE DETAILED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.60 CY, \$0.80 MF

DESIGN CRITERIA + FIRE + HEAT TRANSFER + IMPACT SHOCK + MODEL TESTING + STRUCTURAL INTEGRITY

3-12601 BROWN CL
CLASS I SHIPPING CONTAINER FOR FISSILE MATERIAL
HANFORD ATOMIC PRODUCTS OPERATION
HW-SA-3995 + CONF-650103-4 + SC-RR-65-98 (P. 377-398) +. 45 PAGES, DECEMBER 22, 1964, INTERNATIONAL SYMPOSIUM ON PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIAL, ALBUQUERQUE, N. MEX.

A CLASS I SHIPPING CONTAINER FOR FISSILE MATERIAL THAT WILL MEET USAEC, ICC, AND OTHER GOVERNMENT REGULATIONS HAS BEEN DESIGNED AND TESTED. THE OUTER JACKET IS AN ICC-6A 55-GALLON DRUM, AND THE INNER CONTAINER IS A 9 IN. ID, 19-IN. LONG 304 L STAINLESS STEEL CYLINDER. THE INNER CONTAINER IS SURROUNDED BY THREE-INCH THICK POLYPROPYLENE, WITH 0.02 IN. CD ON BOTH SIDES FOR NEUTRON SHIELDING, AND THREE-INCH THICK THERMAL INSULATION FOR FIRE PROTECTION. THE CONTAINER HAS PASSED ALL TESTS RELATED TO NORMAL TRANSPORT AND ACCIDENT CONDITIONS. DIMENSIONS WILL BE SUCH THAT K-EFFECTIVE IS 0.9 OR THAT THE MASS OF FISSILE MATERIAL IS LESS THAN 80 PERCENT. SAFE CONTAINER LOADINGS UNDER CONSIDERATION ARE GIVEN. SINCE THE D19-9-20 CONTAINER MEETS CLASS I REQUIREMENTS, ANY NUMBER MAY BE SHIPPED (OR STORED) TOGETHER BY THE TRUCK OR RAIL CARRIER, AND NO SPECIAL CONTROLS FOR NUCLEAR SAFETY ARE REQUIRED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.00 CY, \$2.00 MF

CRITICALITY SAFETY + EQUIPMENT DESIGN + SHIPPING CONTAINER + STRUCTURAL INTEGRITY + TEST, DESTRUCTIVE + THERMAL INSULATION

3-12602 BOYER LH
SHIELDING REQUIREMENTS FOR SHIPMENT OF METALLURGICAL SAMPLES
PHILLIPS PETROLEUM COMPANY, IDAHO FALLS
IDO-16066 +. 24 PAGES, FEBRUARY 12, 1953, DECL. JULY 27, 1956

IT IS PLANNED THAT TENSILE AND CORROSION SAMPLES WILL BE IRRADIATED FOR LONG PERIODS IN LATTICE POSITION 43 OF THE MTR. UPON REMOVAL, THE SAMPLES ARE TO BE SHIPPED IN A CARRIER TO TESTING LABORATORIES. IT IS RECOMMENDED THAT A LEAD-SHIELDED CARRIER BE PROVIDED THAT HAS A MINIMUM LEAD THICKNESS OF 6 IN. FOR THE SIDE WALLS, 6 IN. FOR THE TOP, AND 5 IN. FOR THE BOTTOM. THE INSIDE CONTAINER SPACE SHOULD HAVE A MINIMUM DIAMETER OF 1 1/2 IN. AND A HEIGHT OF 9 3/4 IN. THIS CARRIER WILL PROVIDE SPACE AND SHIELDING FOR THE SHIPMENT OF TWO SAMPLES. AN EXCEPTION PERMIT MUST BE OBTAINED FOR THE SHIPMENT OF THESE SAMPLES WHICH HAVE A MUCH GREATER ACTIVITY THAN 2.7 CURIES NORMALLY ALLOWED BY THE INTERSTATE COMMERCE COMMISSION (ICC).

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$0.25 CY

EQUIPMENT DESIGN + MTR (MATERIAL TESTING REACTOR) + REACTOR, TEST + SHIELDING

3-12603 BRAY DT + MORRIS WL
FUEL ASSEMBLY HEAT EVOLUTION IN TRANSFER COFFIN

ACCESSION NUMBER 3-12598 TO 3-12603

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12603 *CONTINUED*
PHILLIPS PETROLEUM COMPANY, IDAHO FALLS
ID0-16008 +. 11 PAGES, MARCH 31, 1952, DECL. JANUARY 7, 1956

FOR CERTAIN RESEARCH PURPOSES IT IS DESIRABLE TO MOVE A HOT MTR FUEL ASSEMBLY TO THE CPP FOR PROCESSING AS SOON AS POSSIBLE. THE FUEL ASSEMBLIES GIVE OFF CONSIDERABLE HEAT IN THE FORM OF BETA AND SOFT GAMMA RAYS AND THE THERMAL BEHAVIOR OF FUEL ASSEMBLY AND CONTAINER MUST BE CONSIDERED. THE CONTAINER PROPOSED FOR THE FUEL ASSEMBLIES CONSISTS OF A LEAD COFFIN INSIDE WHICH IS A STAINLESS STEEL CYLINDER FILLED WITH WATER IN WHICH THE FUEL ASSEMBLY IS TO BE PLACED. RESULTS ARE PRESENTED OF THE CALCULATIONS FOR THE TIME IT WILL TAKE FOR THE WATER TO REACH BOILING DUE TO THE HEAT LIBERATED BY THE MTR FUEL ASSEMBLY COOLED ONE DAY AFTER 30 PERCENT BURNUP IN 30 DAYS. BOTH THE CASE IN WHICH THERE IS WATER BETWEEN LEAD AND STAINLESS STEEL, AND THE CASE IN WHICH THERE IS AIR IN THAT SPACE IS CONSIDERED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.80 CY, \$1.80 MF

HEAT GENERATION, INTERNAL + HEAT TRANSFER + HIGH TEMPERATURE + MTR (MATERIAL TESTING REACTOR) + REACTOR, TEST + SHIPPING CONTAINER

3-12604 MCMURRY HL + HANSON BL
SAFETY OF MTR FUEL SHIPPING BOXES
PHILLIPS PETROLEUM COMPANY, IDAHO FALLS
ID0-16360 +. 15 PAGES, OCTOBER 15, 1956

MTR FUEL IS NOW SURROUNDED BY RUBBER PADDING AND SHIPPED IN WOODEN BOXES. THE POSSIBILITY OF GETTING A CRITICAL ASSEMBLY OF THESE BOXES IS EXAMINED. CONCLUSIONS AND RECOMMENDATIONS ARE - (1) AS FEW AS 12 BOXES MIGHT FORM A CRITICAL ARRAY. (2) SUBCRITICALITY CAN PROBABLY BE ASSURED BY PUTTING A CD PLATE IN THE TOP OF EACH FUEL BOX. (3) THE ONLY CERTAIN SAFETY ANALYSIS IN THIS AND SIMILAR CASES IS TO MEASURE THE MULTIPLICATION AS A FUNCTION OF THE NUMBER OF BOXES ASSEMBLED IN A GROUP.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.30 CY, \$2.40 MF

CADMIUM + CRITICALITY SAFETY + MTR (MATERIAL TESTING REACTOR) + REACTOR, TEST + SHIPPING CONTAINER

3-12605 WEBSTER JW
EFFECT OF NEUTRON INTERACTION ON CRITICAL SIZE
PHILLIPS PETROLEUM COMPANY, IDAHO FALLS
ID0-16201 +. 22 PAGES, NOVEMBER 1954

IT HAS RECENTLY BEEN PROPOSED TO INCREASE THE DIAMETER AND LENGTH OF THE ICPP PRODUCT SHIPPING CONTAINERS. THE NEW DIAMETER WILL BE ABOUT 6.08 INCHES O.D. THIS DECREASE, IN THE DIAMETER DIFFERENCE BETWEEN THE BOTTLE DIAMETER AND THE DIAMETER AT WHICH IT IS BELIEVED THE SOLUTION WOULD BE CRITICAL, HAS MADE THE QUESTION OF NEUTRON INTERACTION BETWEEN THE CONTAINERS IN STORAGE AND TRANSIT A MORE SENSITIVE ONE. IN THIS REPORT A METHOD IS DERIVED FOR CALCULATING CRITICAL SIZE WITH INTERACTION AND THE METHOD IS APPLIED TO VARIOUS POSSIBLE ARRAYS. IT IS CONCLUDED THAT ALL THE ARRAYS STUDIED ARE SAFE EXCEPT FOR ONE. IN THIS ONE THE CONTAINERS ARE ASSUMED TO BE IN TWO ROWS, TWO BOTTLES HIGH, 8 FEET APART, AND WITH A 2-FOOT CENTER-TO-CENTER SPACING IN A ROW. TWO BOTTLES (ONE ON TOP OF THE OTHER) ARE THEN MOVED BETWEEN THE ROWS. THE MARGIN BETWEEN THE CALCULATED CRITICAL DIAMETER FOR THIS CASE AND THE BOTTLE DESIGN DIAMETER WAS NOT CONSIDERED ADEQUATE IN THE LIGHT OF UNCERTAINTIES IN THE METHOD AND OTHER IMponderables.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.60 FS, \$0.80 MF

CRITICALITY SAFETY + NEUTRON INTERACTION + SHIPPING CONTAINER

3-12606 GUIDE TO SAFE HANDLING OF RADIATION. REFERENCE DOCUMENT NO. 7
JAPAN ATOMIC ENERGY RESEARCH INSTITUTE, TOKYO
JAERI-6007 +. 82 PAGES, MARCH 1961, IN JAPANESE

THE SAFE HANDLING OF RADIOACTIVE MATERIALS IS DISCUSSED. TOPICS COVERED INCLUDE EMERGENCY MEASURES, PERMISSIBLE RADIATION DOSAGE TO EMPLOYEES, PERMISSIBLE DENSITY OF RADIOACTIVE MATERIALS, STANDARD CONTROL OVER SURFACE CONTAMINATION, SPECIAL AREA AND CONTROL FACILITIES, ESTABLISHMENT AND INDICATION OF SPECIAL AREA, ACCESS TO CONTROL AND PURIFIED AREAS, HANDLING OF INDIVIDUAL EXPOSURE MEASURING INSTRUMENTS, PRECAUTIONS IN HANDLING RADIOACTIVE MATERIALS AND OPERATING REACTORS AND ACCELERATORS, TREATMENT OF RADIOACTIVE WASTES, DECONTAMINATION, STORING AND TRANSPORT OF RADIOACTIVE MATERIALS, AND A SUMMARY OF RESPONSIBILITY REGARDING RADIATION SAFETY.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA.

EMERGENCY PROCEDURE + JAPAN + SAFETY PRINCIPLES AND PHILOSOPHY + TRANSPORTATION AND HANDLING + WASTE HANDLING

3-12607 KELLER FR
GAMMA DAMAGE TO ETHYLENE GLYCOL IN MTR 90-DAY COOLED FUEL ELEMENT SHIPMENT
PHILLIPS PETROLEUM COMPANY, IDAHO FALLS

ACCESSION NUMBER 3-12603 TC 3-12607

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12607 *CONTINUED*
IDO-16441 +. 3 PAGES, FEBRUARY 20, 1958

A SHIPMENT OF 90-DAY OLD SPENT MTR FUEL ELEMENTS WAS MADE IN LATE NOVEMBER 1957, USING ETHYLENE GLYCOL AS AN ANTI-FREEZE AGENT IN THE WATER SURROUNDING THE FOUR ELEMENTS WITHIN THE SHIPPING CASK. RADIATION DAMAGE TO THE ETHYLENE GLYCOL WAS APPARENT AFTER FIVE DAYS. AN OIL PHASE AND AN AQUEOUS PHASE WERE PRESENT IN THE LIQUID DRAINED FROM THE CASK, AND SOME GELATINOUS MATERIAL WAS OBSERVED ON THE FUEL ELEMENTS AND THE CASK WALLS. AS A CONSEQUENCE OF THIS EXPERIENCE, THE USE OF ETHYLENE GLYCOL AS AN ANTIFREEZE HAS BEEN DISCONTINUED IN SHIPMENTS OF MTR FUEL ELEMENTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$0.50 CY

HEAT TRANSFER + MTR (MATERIAL TESTING REACTOR) + RADIATION DAMAGE + REACTOR, TEST

3-12608 MAHAR JT + BEEBE RL + GASPER GW
RADIOLOGICAL SERVICES STANDARD PRACTICE MANUAL
KNOLLS ATOMIC POWER LABORATORY
KAPL-A-HP-2 (REV.1) +. 145 PAGES, AUGUST 22, 1960

PERSONNEL EXPOSURE LIMITS AND CONTAMINATION LIMITS FOR MATERIAL AND EQUIPMENT ARE GIVEN. THE OPERATION AND DESCRIPTION OF RADIATION MONITORING EQUIPMENT ARE PRESENTED. RADIATION PROTECTION PROCEDURES ARE GIVEN FOR VARIOUS SITUATIONS INCLUDING SLAVE REMOVAL FROM RML CELL, ENTRY INTO RML CELLS, WASTE TRANSFER, EVENT OF RADIOACTIVE SPILL, ETC. ICC SHIPPING REGULATIONS FOR RADIOACTIVE MATERIALS ARE SUMMARIZED. THE KAPL AIR-MONITORING PROGRAM IS OUTLINED, THE INSTRUMENTS USED IN THIS PROGRAM ARE DESCRIBED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$22.80 FS, \$7.20 MF

CONTAMINATION + PERSONNEL EXPOSURE, RADIATION + REGULATION, ICC

3-12609 BIGGS BB
DESIGN CRITERIA FOR THE TYPE M-130 STANDARDIZED SHIELDED SHIPPING CONTAINER
KNOLLS ATOMIC POWER LABORATORY
KAPL-M-BBB-2 +. 10 PAGES, JANUARY 17, 1958

THE DESIGN OBJECTIVES AND CRITERIA FOR THE TYPE M-130 SHIELDED SHIPPING CONTAINER ARE PRESENTED. THE INFORMATION IS PRESENTED TO ENSURE COMPATIBILITY WITH SPENT FUEL MODULES.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.30 CY, \$2.40 MF

DESIGN CRITERIA + SHIPPING CONTAINER

3-12611 NASH JL
EVALUATION OF M-130 HEAT TRANSFER TEST
KNOLLS ATOMIC POWER LABORATORY
KAPL-M-S3G-RES-74 +. 37 PAGES, DECEMBER 5, 1960

THE M-130 THERMAL TEST WAS DESIGNED TO PROVE THE ABILITY OF THE CASK TO OPERATE AT DESIGN LIMITS. ALTHOUGH THE TEST PROCEDURE DID NOT LEND ITSELF TO A DIRECT EXTRAPOLATION OF THE DATA, THE OPERATING MARGIN IS SUFFICIENT TO INSURE THAT THE CASK WILL MEET ALL THERMAL DESIGN REQUIREMENTS. THE THERMAL DESIGN ANALYSIS WAS USED TO PREDICT CASK TEMPERATURES DURING THE TEST. THE MAXIMUM PRIMARY COOLANT TEMPERATURE MEASURED DURING THE SHIPPING TEST WAS WITHIN 3.6 F OF THE CALCULATED TEMPERATURE. MAKING USE OF THE TEST DATA, THE MAXIMUM PRIMARY TEMPERATURES WERE CALCULATED FOR BOTH SHIPPING AND STANDBY OPERATION AT THE DESIGN AMBIENT TEMPERATURE OF 110 F. THE MAXIMUM PRIMARY TEMPERATURE DURING SHIPPING IS APPROXIMATELY 192 F. THIS COMPARES TO A MAXIMUM ALLOWABLE PRIMARY TEMPERATURE OF 267 F. THE MAXIMUM PRIMARY TEMPERATURE DURING STANDBY OPERATION WAS CALCULATED TO BE 171 F. THIS COMPARES TO AN ALLOWABLE PRIMARY TEMPERATURE DURING LOADING OF 212 F.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$6.30 CY, \$3.00 CY

HEAT TRANSFER + TEST, PROOF

3-12612 LARRICK CV
SOME CRITERIA FOR SAFE STORAGE OF U-235 FUEL
KNOLLS ATOMIC POWER LAB.
KAPL-M-CVL-4 (DEL.) +. 12 PAGES, JANUARY 19, 1956, DECL. MARCH 14, 1957

CRITERIA ARE DERIVED FOR SAFE STORAGE OF U-235 IN ARRAYS THAT APPROXIMATE A PORTION OF AN INFINITE SLAB. THIS INCLUDES STORAGE ON THE FOUR WALLS OF ROOM. CRITERIA ARE ALSO GIVEN FOR SAFE SHIPPING BOXES.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.30 CY, \$2.40 MF

CRITICALITY SAFETY + DESIGN CRITERIA + SHIPPING CONTAINER

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12613 MIRALDI FD + ROSSIN AD
CARRIER DESIGN OF IRRADIATED APPR FUEL ELEMENTS
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
KT-178 +. 34 PAGES, NOVEMBER 17, 1954, DECL. FEBRUARY 22, 1957

IRRADIATION TESTS ARE TO BE RUN ON APPR FUEL ELEMENTS IN THE STR AT ARCO. EVALUATION OF THE TESTS WILL BE MADE AT ORNL. THE DESIGN OF A CARRIER FOR SHIPPING FUEL ELEMENT SAMPLES FROM ARCO TO ORNL IS GIVEN. BOTH GAMMA SHIELDING AND HEAT DISSIPATION ARE CONSIDERED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$6.30 FS, \$3.00 MF

EQUIPMENT DESIGN + HEAT TRANSFER + SHIELDING

3-12614 MALLET AJ
UF-6 CONTAINER TEST AND DEVELOPMENT PROGRAM AT THE OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE GASEOUS DIFFUSION PLANT, TENNESSEE
K-D-1845 + SC-RR-65-98 (P. 567-579) + CONF-650103-5 +. 34 PAGES, JANUARY 7, 1965, INTERNATIONAL SYMPOSIUM ON PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIAL, ALBUQUERQUE, N. MEX.

TESTS WERE MADE ON SEVERAL CYLINDER CONTAINERS FOR SHIPMENT OF UF₆ AND OTHER URANIUM MATERIALS. THE TESTS INCLUDED BURST STRENGTH, PACKAGE DROP, CONTAINER DROP, FIRE, AND TIE-DOWN TESTS. THE RESULTS OF THE TESTS ARE SHOWN IN PHOTOGRAPHS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.00 CY, \$1.00 MF

FIRE + SHIPPING CONTAINER + TEST, DESTRUCTIVE + TEST, DROP

3-12615 NOYES HE
PROBLEMS PERTAINING TO PACKAGING AND TRANSPORTATION REGULATORY STANDARDS APPLICABLE TO SHIPMENTS OF RADIOACTIVE MATERIALS
LOS ALAMOS SCIENTIFIC LAB.
LA-DC-6866 + SC-RR-65-98 (PP. 66-73) + CONF-650103-1 +. 10 PAGES, 1965, INTERNATIONAL SYMPOSIUM ON PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIAL, ALBUQUERQUE, N. MEX.

REGULATIONS AND ORGANIZATIONS PERTINENT TO THE SAFETY OF PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS ARE DESCRIBED. THE PROBLEM OF INEXPENSIVE BUT SAFE CONTAINERS IS CONSIDERED. CLASSIFICATION OF RADIOACTIVE SHIPMENTS IS GIVEN. THE NEED FOR AMENDMENTS TO REGULATIONS AND FOR ECONOMICAL BUT SAFE SHIPMENTS IS POINTED OUT. RESULTS OF AN EVALUATION OF FISSILE MATERIAL SHIPMENT PRACTICES ARE DESCRIBED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.00 CY, \$1.00 MF

HAZARDS ANALYSIS + REGULATION, GENERAL + SAFETY PRINCIPLES AND PHILOSOPHY

3-12616 HANDBOOK OF FEDERAL REGULATIONS APPLYING TO TRANSPORTATION OF RADIOACTIVE MATERIALS
M-6682 +. 48 PAGES, MAY 1958

THIS HANDBOOK IS DESIGNED TO BE OF ASSISTANCE IN LOCATING AND UNDERSTANDING FEDERAL REGULATIONS APPLYING TO THE SHIPMENT OF RADIOACTIVE MATERIALS. PORTIONS OF PERTINENT REGULATIONS PROMULGATED BY THE INTERSTATE COMMERCE COMMISSION, CIVIL AERONAUTICS BOARD, U.S. COAST GUARD, AND POST OFFICE AUTHORITIES ARE REPRODUCED IN THE HANDBOOK TOGETHER WITH COMMENTS BELIEVED TO BE HELPFUL IN DETERMINING THE PROPER APPLICATION OF THE REGULATIONS. AN EXPLANATION OF TECHNICAL TERMS NOT DEFINED IN THE REGULATIONS IS ALSO GIVEN. THE LAST CHAPTER CONTAINS AUXILIARY INFORMATION TO SHIPPERS AND INCLUDES A NUMBER OF MISCELLANEOUS ITEMS THAT SHOULD BE HELPFUL IN DETERMINING THE MANNER OF SHIPMENT AND SHIPPING RESPONSIBILITIES.

CODES AND STANDARDS + REGULATION, GENERAL + TRANSPORTATION AND HANDLING

3-12617 HAASS WP
SPENT FUEL SHIPPING CASK FOR PM-1 AND PM-3A NUCLEAR POWER PLANTS HAZARDS SUMMARY EVALUATION
MARTIN COMPANY, BALTIMORE
MND-M-1856 +. 108 PAGES, MAY 1961

THE DESIGN OF THE SPENT FUEL SHIPPING CASK PROPOSED FOR USE IN TRANSPORTING IRRADIATED CORES FROM BOTH THE PM-1 AND PM-3A NUCLEAR POWER PLANTS HAS BEEN EVALUATED UNDER NORMAL AND ACCIDENT CONDITIONS. SPECIFICALLY, THE FOLLOWING ASPECTS OF THE DESIGN WERE ANALYZED AND EVALUATED. (1) THE LEAD SHIELDING IS ADEQUATE. (2) A RUGGED CRASH FRAME, CASK SHROUD, AND SHIPPING PALLET COMBINATION COMPLETELY ENVELOPES THE CASK. (3) THE FUEL BUNDLES, CONTROL RODS, AND POISON PLATES ARE SECURELY LOCKED WITHIN THE CORE SHROUD TO GUARANTEE NO POSSIBLE CHANGE IN CORE GEOMETRY. (4) BASED ON AN UNIRRADIATED CORE, ADEQUATE POISONING IS PROVIDED TO OBTAIN A K-EFFECTIVE OF LESS THAN 0.9 DURING SHIPMENT. (5) SUFFICIENT HEAT TRANSFER CAPABILITY HAS BEEN PROVIDED IN THE SHIPPING CASK TO DISSIPATE 2 KW OF HEAT WITH COOLANT TEMPERATURES LESS THAN 192 F AND CASK SURFACE TEMPERATURES LESS THAN 180 WITH WATER COOLANT PRESENT. (6) UNDER LOSS OF COOLANT CONDITIONS, IT IS SHOWN THAT THE PEAK FUEL TEMPERATURE IS 732 F, WHICH IS 218 BELOW THE TEMPERATURE AT WHICH SOUND FUEL ELEMENTS WOULD RUPTURE. (7) IN THE EVENT OF THE REMOTE ACCIDENT CONDITION IN WHICH 5 PERCENT OF THE FUEL ELEMENTS ARE POSTULATED TO BREAK INTO ONE FOOT LONG SECTIONS, IT IS SHOWN THAT NEGLIGIBLE QUANTITIES OF ACTIVITY ARE RELEASED TO THE SURROUNDING ENVIRONMENT.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12617 *CONTINUED*
AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$9.10 FS, \$3.44 MF

ACCIDENT ANALYSIS + CONTAMINATION + CRITICALITY SAFETY + DESIGN CRITERIA + EQUIPMENT DESIGN + HAZARDS ANALYSIS + RADIOACTIVITY, RELEASE

3-12618 MALLON PJ + DUNCAN DS + NOYES RC
OMRE FUEL REMOVAL AND SHIPPING EQUIPMENT
ATOMICS INTERNATIONAL
NAA-SR-3337 +. 39 PAGES, APRIL 1960

NO ABSTRACT AVAILABLE FOR THIS DOCUMENT.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA, \$4.60 COPY, \$1.58 MICROFILM

EQUIPMENT DESIGN + TRANSPORTATION AND HANDLING

3-12619 SCIALDONE JJ
A METHOD FOR ESTIMATING ACCELERATIONS OF SHIPPING CONTAINERS MOUNTED ON AN IMPACTING RAILROAD CAR
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
N66-18344 + NASA-TM-X-56537 +. 1955, 35TH SHOCK AND VIBRATION SYMPOSIUM, OCTOBER 26-28, 1965

A METHOD IS PRESENTED FOR ESTIMATING THE RESPONSE OF A CONTAINER AND ITS CONTENTS WHEN A RAILROAD CAR ON WHICH THEY ARE MOUNTED RUNS INTO A GROUP OF BROKEN CARS. EQUATIONS ARE DERIVED FOR THE IMPACT EQUIVALENT VELOCITY, ACCELERATION, AND TRANSMISSIBILITY. THE NATURAL FREQUENCY OF THE CAR CAN BE CALCULATED. INPUT ACCELERATIONS OF THE CAR AND SHIPPING CONTAINER ARE CALCULATED OVER A 1-14 MPH RANGE OF INPUT VELOCITIES.

IMPACT SHOCK + STRUCTURAL INTEGRITY + VIBRATION

3-12620 NOYES RC
PERMISSIBLE FUEL HEAT GENERATION RATES FOR OMRE SHIPPING CASK
ATOMICS INTERNATIONAL
NAA-SR-MEMO-2658 +. 10 PAGES, APRIL 14, 1958

THE PERMISSIBLE HEAT GENERATION RATES ARE 0.378 KW/ELEMENT FOR AN AIR FILLED CASK AND 0.540 KW/ELEMENT FOR A HELIUM FILLED CASK. THESE HEAT GENERATION RATES ARE BASED ON THE FOLLOWING ASSUMPTIONS - AXIAL PEAK/AVERAGE HEAT GENERATION EQUALS 1.4, EFFECTIVE RADIAL (WITHIN THE ELEMENT) PEAK/AVERAGE HEAT GENERATION EQUALS 1.3, HEAT REMOVAL EFFICIENCY OF THE END PLATES EQUALS 80 PERCENT, AND MAXIMUM FUEL PLATE TEMPERATURE MUST BE LESS THAN 500 F. NO SAFETY FACTOR IS INCLUDED IN THE CALCULATION. A METHOD IS ESTABLISHED BY WHICH THE NECESSARY DELAY TIME BEFORE INSERTION IN THE CASK IS ESTABLISHED FOR A GIVEN FUEL ELEMENT.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.10 FS, \$0.80 MF

FUEL ELEMENT + HEAT GENERATION, INTERNAL + HEAT TRANSFER + HELIUM

3-12621 SLETTEN HL
HEAT TRANSFER ANALYSIS OF 19-ROD FUEL ELEMENT IN HANDLING CASK
ATOMICS INTERNATIONAL
NAA-SR-MEMO-1745 +. 1956

AN ANALYSIS IS MADE OF THE SURFACE TEMPERATURE OF THE IRRADIATED 19-ROD FUEL ELEMENT, WHICH IS CONSIDERED FOR THE SGR TYPE POWER REACTORS, IN THE HELIUM ATMOSPHERE OF A HANDLING CASK. STEADY-STATE ENERGY-BALANCE EQUATIONS FOR THE RADIATION AND CONVECTION HEAT TRANSFER FROM RODS OF THE ELEMENT AND THE CASK WALL WERE DERIVED. A SIMPLIFIED MODEL OF THE FUEL ELEMENT WAS USED TO OBTAIN IN REPRESENTATION OF THE RADIATION INTERCHANGE BETWEEN THE RODS OF THE ELEMENT. SOLUTIONS OF THE FOUR SIMULTANEOUS NONLINEAR ALGEBRAIC EQUATIONS FOR VARIOUS VALUES OF HEAT GENERATION AND EMISSIVITY WERE OBTAINED BY IBM-701 COMPUTER.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$6.30 CY, \$3.00 MF

FUEL ELEMENT + HEAT TRANSFER + HELIUM + HIGH TEMPERATURE + SHIPPING CONTAINER

3-12622 REAM JT
PRELIMINARY HEAT TRANSFER AND COOLING STUDIES FOR FUEL TRANSFER OPERATIONS
ATOMICS INTERNATIONAL
NAA-SR-MEMO-3034 +. 33 PAGES, OCTOBER 1, 1958

A PRELIMINARY HEAT TRANSFER AND COOLING ANALYSIS OF THE HNPf FUEL ELEMENTS DURING TRANSFER OPERATIONS WITH THE FUEL HANDLING CASK IS CONDUCTED. OPERATING POWER LEVEL AND IRRADIATION TIME ARE CONSIDERED AS INDEPENDENT PARAMETERS. THE FOLLOWING ARE DETERMINED - LIMITING TEMPERATURES, TEMPERATURE GRADIENTS OF FUEL ELEMENTS, TEMPERATURES IN FUEL, CLADDING, SPACERS, AND CASK, MINIMUM DECAY TIME BEFORE FIRST ELEMENTS CAN BE REMOVED WITHOUT EXCEEDING SPECIFIED STEADY-STATE TEMPERATURE AND STRESS LIMITS WITHOUT FORCED COOLING, AND FACTORS WHICH AFFECT COOLING TIME TO THE HIGHEST DEGREE SUCH AS GEOMETRY, POWER LEVEL, OPERATING

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12622 *CONTINUED*
TIME, AND FUEL.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.60 CY, \$1.19 MF

FUEL ELEMENT + HALLAM + HEAT TRANSFER + HIGH TEMPERATURE

3-12623 KETZLACH N
NUCLEAR SAFETY CRITERIA IN USE OF RMDF TRANSFER CASK
ATOMICS INTERNATIONAL
NAA-SR-MEMO-6415 +. 6 PAGES, MAY 16, 1961

CRITERIA WERE ESTABLISHED FOR THE STORAGE AND TRANSPORTATION OF A MAXIMUM OF ONE KG CONTAINED U-235 SCRAP IN EACH 55-GAL DRUM. THESE DRUMS ARE STORED FOUR DRUMS PER PALLET IN A SQUARE LATTICE ARRAY. AN ARRAY OF SUCH PALLETS, TWO PALLETS WIDE BY TWO PALLETS HIGH BY SIX PALLETS LONG CONTAINING A TOTAL OF 96 DRUMS, IS SAFE INDEPENDENT OF THE DEGREE OF WATER FLOODING. TWO KG CONTAINED U-235 IS ALLOWABLE PER DRUM IN A 180-DRUM, SINGLE-PLANE ARRAY. THESE ARRAYS MAY BE REPEATED WITH AN EDGE-TO-EDGE SEPARATION OF AT LEAST 6 FT.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.10 FS, \$0.80 MF

CRITICALITY SAFETY + NEUTRON INTERACTION

3-12624 WILDE JD
NATURAL CONVECTION COOLING SYSTEM FOR THE FUEL HANDLING CASK
ATOMICS INTERNATIONAL
NAA-SR-MEMO-4178 +. 19 PAGES, JULY 27, 1959

STUDIES WERE MADE TO DETERMINE WHETHER THE PRESENT FUEL HANDLING CASK DESIGN IS ADEQUATE TO PROTECT THE FUEL ELEMENT WHEN POWER FOR FORCED CIRCULATION COOLING IS LOST DURING TRANSFER. THE MAXIMUM TEMPERATURES IN THE FUEL ELEMENT AND CASK WERE DETERMINED. ALSO DETERMINED WAS THE PRESSURE DROP AND POWER CONSUMPTION WHEN MONOISOPROPYL-DIPHENYL IS CIRCULATED THROUGH THE SYSTEM AT THE RATE OF 5 GPM.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.30 CY, \$2.40 MF

CIRCULATION, NATURAL (LOOPS AND REACTORS) + HEAT TRANSFER

3-12625 GARDNER EL
VIBRATION AND SHOCK, HIGHWAY TRANSPORT BETWEEN SANTA SUSANA MOUNTAINS AND EDWARDS AIR FORCE BASE
ATOMICS INTERNATIONAL
NAA-SR-MEMO-8074 +. 23 PAGES, JANUARY 25, 1963

A ROAD TEST, PERFORMED ON A SNAP 10A MASS MOCKUP SYSTEM, INDICATED THAT SHOCK AND VIBRATION INPUTS UNDER ACTUAL CONDITIONS WERE NOT EXCESSIVE. DURING THE COURSE OF TRAVEL FROM THE SANTA SUSANA FIELD LABORATORY TO EDWARDS AIR FORCE BASE, AND DURING FIELD TRIALS AT SANTA SUSANA, THE TEST SYSTEM WAS SUBJECTED TO ONLY TWO ACCELERATIONS EXCEEDING 2 G, AND NO INPUTS EXCEEDED 2.4 G. IT WAS CONCLUDED THAT SHOCK AND VIBRATION TO SNAP SYSTEMS FROM HIGHWAY TRANSPORTATION CAN BE ADEQUATELY CONTROLLED BY SELECTING THE APPROPRIATE VEHICLE, PROVIDING PROPER PACKAGING, SPECIFYING ROUTE AND SPEED LIMITS FOR VARIOUS DRIVING CONDITIONS, USING ORDINARY CARE IN LOADING AND UNLOADING, AND INCLUDING SUITABLE SHOCK MONITORING INSTRUMENTS WITH THE SHIPMENT.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.60 FS, \$0.89 MF

IMPACT SHOCK + REACTOR, SPACE + SNAP 10A (SYSTEMS FOR NUCLEAR AUXILIARY POWER) + STRUCTURAL INTEGRITY + VIBRATION

3-12626 JONES C + LEW D + ADLER K + MARRON J
SINGLE ELEMENT SHIPPING CASK FOR PNPf, OMRE, AND EOGR IRRADIATED FUEL ELEMENTS
ATOMICS INTERNATIONAL
NAA-SR-MEMO-7844 +. 87 PAGES, JUNE 7, 1963

A SHIPPING CASK SYSTEM WAS DESIGNED FOR SHIPPING ONE FUEL ASSEMBLY FROM EITHER THE EOGR, OMRE, OR PIQUA REACTOR PLANTS. THE SHIPMENT WILL BE DRY WITHOUT LIQUID COOLANT BETWEEN THE CASK AND THE FUEL ELEMENT SHIPPING CONTAINER AFTER 30 DAYS DECAY. SHIELDING IS DESIGNED TO LIMIT RADIATION FROM THE CASK TO 10 MR/HR AT ONE METER FROM THE CASK SURFACE AND 200 MR/HR ON CONTACT WITH ANY POINT ON THE CASK EXTERIOR SURFACE. SYSTEM DESCRIPTION, GENERAL CALCULATIONS, FIRE TEST ANALYSIS, SHIELDING ANALYSIS, CRITICALITY ANALYSIS, THERMAL ANALYSIS, STRESS ANALYSIS, LOADING AND UNLOADING PROCEDURES, AND TEST PROGRAM ARE INCLUDED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$8.10 FS, \$2.81 MF

FIRE + FUEL ELEMENT + HAZARDS ANALYSIS + HEAT TRANSFER + OMRE (ORGANIC MODERATED REACTOR EXPERIMENT) + PIQUA + REACTOR, ORGANIC COOLED + SHIELDING + STRESS ANALYSIS

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12627 MCKINLEY JC + DAWSON RK + BURNS HM + MEAD JC
REPORT OF FIRE RESISTANCE TESTS, FUEL CORE SHIPPING CONTAINER NO. 1
NATIONAL LEAD COMPANY OF OHIO
NLCO-899 +. 17 PAGES, DECEMBER 16, 1963

URANIUM FUEL CORES ARE PRODUCED AT THE NATIONAL LEAD COMPANY OF OHIO FOR THE PRODUCTION REACTORS AT HANFORD (HAPO) AND SAVANNAH RIVER (SRP). THE CORES HAVE BEEN SHIPPED FOR SEVERAL YEARS IN WOOD CONTAINERS WHICH ARE CONSTRUCTED ACCORDING TO THE DESIGN DESCRIBED. THE DESIGN HAS BEEN PROVED ADEQUATE THROUGH A SERIES OF INTEGRITY TESTS TO WHICH SIMILAR CONTAINERS WERE SUBJECTED SOME YEARS AGO. THIS REPORT CONCERNS RECENT FIRE TESTS TO WHICH THE CONTAINERS WERE SUBJECTED. THEY WERE PLACED IN A FURNACE WHOSE TEMPERATURE WAS 1300 F. MOST CONTAINERS REMAINED ONLY FOR 10 MINUTES. ONE CONTAINER REMAINED FOR 30 MINUTES AND ITS INTERNAL TEMPERATURE REACHED 600 F.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.00 CY, \$0.50 MF

FIRE + HIGH TEMPERATURE + SHIPPING CONTAINER + TEST, PROOF

3-12628 EVANS RD
PHYSICAL, BIOLOGICAL, AND ADMINISTRATIVE PROBLEMS ASSOCIATED WITH THE TRANSPORTATION OF RADIOACTIVE SUBSTANCES, NUCLEAR SCIENCE SERIES PRELIMINARY REPORT NO. 11
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
NP-3824 (PREL. REPORT NO. 11) +. 76 PAGES, 1951

PROBLEMS OF PACKAGING, HANDLING, STORAGE, AND TRANSPORTATION OF RADIOACTIVE MATERIALS ARE DISCUSSED. NUCLEAR DATA AND METHODS OF CALCULATING SHIELDING REQUIREMENTS ARE PRESENTED WHICH SHOULD BE A USEFUL GUIDE TO THOSE RESPONSIBLE FOR THE PACKAGING AND SHIPMENT OF RADIOACTIVE MATERIALS. BIOLOGICAL DATA COMPILED AS A CONVENIENCE TO COMMERCIAL PRODUCERS AND SHIPPERS OF RADIOACTIVE MATERIALS, WHOSE LEGAL DEPARTMENTS REQUEST PROOF OF THE ADVISABILITY OF IMPOSING UPPER LIMITS ON THE SURFACE RADIATION FROM FINISHED PARCELS, AND QUANTITATIVE DATA ON PHOTOGRAPHIC MATERIALS USEFUL TO MANUFACTURERS, SHIPPERS, AND USERS OF PHOTOGRAPHIC MATERIALS ARE INCLUDED. THE NEED IS STRESSED FOR INTERNATIONAL REGULATIONS REGARDING THE SHIPMENT OF RADIOACTIVE MATERIALS IN ORDER TO PROVIDE SMOOTH AND UNINTERRUPTED INTERNATIONAL TRANSPORTATION.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA.

RADIATION SAFETY AND CONTROL + SAFETY PRINCIPLES AND PHILOSOPHY + SHIELDING

3-12629 MARCUS FR
PRESENT TRENDS IN FUEL TRANSPORTATION. EUROCHEMIC TECHNICAL REPORT NO. 109
EUROPEAN COMPANY FOR THE CHEMICAL PROCESSING OF IRRADIATED FUELS, MOL, BELGIUM
NP-12393 + EUROCHEMIC-TR-109 +. 27 PAGES, JUNE 6, 1961

A REVIEW IS PRESENTED OF THE STATUS OF IRRADIATED FUEL TRANSPORTATION IN EUROPE TODAY, WITH SPECIAL REGARD TO EUROCHEMIC SHIPMENTS. SHIPPING REGULATIONS PREPARED BY IAEA AND USA ARE DESCRIBED BRIEFLY, AND THE TYPES OF SHIPMENTS TO, FROM, AND IN EUROPE ARE CONSIDERED. CONSTRUCTIONS AND PROPOSED DESIGNS OF CASKS ARE DISCUSSED. OPINIONS ON THE REGULATIONS ET AL. DISCUSSED IN THE REPORT ETR-94 ARE GIVEN.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.60 CY, \$1.01 MF

EQUIPMENT DESIGN + REGULATION, AEC + REGULATION, IAEA + TRANSPORTATION AND HANDLING

3-12630 ROMETSCH R
TRANSPORT OF IRRADIATED FUEL ELEMENTS. SECTION V OF ADVANCED COURSE ON FUEL ELEMENTS FOR WATER COOLED POWER REACTORS
EUROPEAN COMPANY FOR THE CHEMICAL PROCESSING OF IRRADIATED FUELS, MOL, BELGIUM
NP-9340 (VOL. II) (SECT. VI) +. 20 PAGES, 1960

SOME OF THE PROBLEMS ENCOUNTERED IN THE NORMAL TRANSPORTATION OF IRRADIATED POWER REACTOR FUELS ARE OUTLINED. THREE PRINCIPAL CONDITIONS FOR THE TRANSPORT OF THESE FUELS ARE TO PROVIDE FOR ADEQUATE RADIATION SHIELDING, TO ALLOW FOR SUFFICIENT HEAT DISSIPATION SO THAT THE ELEMENTS STAY AT A TEMPERATURE NOT AFFECTING THEIR MECHANICAL STABILITY, AND TO AVOID ANY CONDITIONS RESULTING IN ANY NEUTRON CHAIN REACTION. REGULATIONS ESTABLISHED BY THE IAEA AND THE USAEC ARE DISCUSSED.

AVAILABILITY - MICROCARD EDITIONS, INC. (FOR SALE) ACCOUNTING AND SHIPPING DEPARTMENT, WEST SALEM, WISCONSIN, 54669

CRITICALITY SAFETY + HEAT TRANSFER + REGULATION, AEC + REGULATION, IAEA + SAFETY PRINCIPLES AND PHILOSOPHY + SHIELDING

3-12631 ROMETSCH R
STORAGE AND MECHANICAL HANDLING OF NUCLEAR FUEL ELEMENTS. SECTION VI OF ADVANCED COURSE OF FUEL ELEMENTS FOR WATER COOLED POWER REACTORS
EUROPEAN COMPANY FOR THE CHEMICAL PROCESSING OF IRRADIATED FUELS, MOL, BELGIUM
NP-9340 (VOL. II) (SECT. VI) +. 25 PAGES, 1960

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12631 *CONTINUED*

HANDLING, STORAGE, AND PROCESSING OF IRRADIATED FUEL ELEMENTS AT A CHEMICAL REPROCESSING PLANT ARE TREATED. CASK TESTING AND UNLOADING, INTERMEDIATE STORAGE, MECHANICAL PREPARATION, MECHANICAL DECANING, CHOPPING AND LEACHING, AND DISSOLVER LOADING ARE DISCUSSED IN DETAIL.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

FUEL STORAGE + TESTING

3-12632 SCHRAIDT JH + VOGEL RC

A CONSIDERATION OF FUEL CYCLES. SECTION II OF ADVANCED COURSE ON FUEL ELEMENTS FOR WATER COOLED POWER REACTORS

ARGONNE NATIONAL LABORATORY

NP-9340 (VOL. IV) (SECT. III) +. 71 PAGES, 1960

THE OPTIMIZATION OF FUEL CYCLE COSTS REQUIRES THE CONSIDERATION OF VARIOUS REACTOR VARIABLES SUCH AS THE ACHIEVABLE BURN-UP, SPECIFIC POWER, THERMAL EFFICIENCY, LOAD FACTOR, AND THE DEGREE OF ENRICHMENT OF THE FUEL. THERE ARE ALSO VARIOUS IMPORTANT FACTORS IN THE NET FUEL COST SUCH AS FABRICATION, INVENTORY, REPROCESSING, FUEL TRANSPORTATION CHARGES, AND CREDIT FOR FISSIONABLE MATERIAL PRODUCED. VARIOUS STEPS IN TWO TYPES OF FUEL CYCLES AND THE CURRENT RESEARCH DIRECTED AT IMPROVEMENT OF THESE VARIOUS STEPS ARE DISCUSSED.

AVAILABILITY - MICROCARD EDITIONS, INC. (FOR SALE) ACCOUNTING AND SHIPPING DEPARTMENT, WEST SALEM, WISCONSIN, 54669

ECONOMIC STUDY + TRANSPORTATION AND HANDLING

3-12633 ALLEN JW + FISHER G + BARNETT RL

TRANSPORTATION OF IRRADIATED FUEL FROM N.S. SAVANNAH REACTOR. SAFEGUARDS REPORT ST-SI

STANRAY CORPORATION, CHICAGO

NP-13235 +. 149 PAGES, JUNE 19, 1961

PRESENTED ARE THE COMPLETE DESIGN, OPERATING PROCEDURES, AND EVALUATION OF THE HEALTH-SAFETY ASPECTS FOR SHIPMENT OF IRRADIATED FUEL FROM THE TEMPORARY STORAGE SITE OPERATED BY TODD SHIPYARDS TO THE AEC REPROCESSING SITE. EXCEPT FOR MINOR DIFFERENCES, THE PROPOSED SHIPMENTS MEET THE RULES PROPOSED BY THE AEC IN THE MAY 17, 1961, DRAFT OF PART 72 REGULATIONS FOR TRANSPORTATION OF IRRADIATED MATERIALS. THE ONLY EXCEPTION OF IMPORTANCE IS THE ELIMINATION OF A PARTICULATE FILTER IN THE RUPTURE DISC PRESSURE RELIEF SYSTEM WHICH IS PROVIDED FOR EXTREME EMERGENCIES ONLY. THE RESULTS OF THE CALCULATIONS AND EVALUATION OF THE VARIOUS FACTORS ARE GIVEN. SAFETY IN OPERATION GOVERNED THE PROCEDURES OUTLINED FOR THIS TRANSPORTATION. A STEEL GRANULAR COOLANT CAN BE USED IN THIS CASK BUT DUE TO HIGH TEMPERATURES OF THE FUEL AND OTHER OPERATIONAL PROBLEMS, IT IS FELT THAT THE PROPOSED ATMOSPHERIC PRESSURE-WATER COOLED CASK IS THE BEST SOLUTION.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

EQUIPMENT DESIGN + FILTER + HAZARDS ANALYSIS + HEAT TRANSFER + MAIN COOLING SYSTEM + N S SAVANNAH + REACTOR, MARITIME + REACTOR, PRESSURIZED WATER

3-12634 REPORT ON SHIPPING CONTAINERS AND CASKS FOR RADIOACTIVE WASTE MATERIALS

NEW YORK CENTRAL RAILROAD COMPANY, NEW YORK

NP-12997 +. 28 PAGES, APRIL 1960

THE EXTERIOR CONSTRUCTION AND DESIGN FEATURES OF TWELVE DIFFERENT SHIPPING CONTAINERS AND CASKS ARE EVALUATED IN TERMS OF THEIR PROVISIONS FOR HANDLING EASE AND SAFETY. SUGGESTED METHODS FOR FASTENING THEM TO GONDOLA OR FLAT CARS ARE ILLUSTRATED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA.

EQUIPMENT DESIGN + HAZARDS ANALYSIS + SAFETY ANALYSIS + SHIPPING CONTAINER

3-12635 DATA FROM RADIATION PROTECTION PROGRAMS. VOLUME 2, NO. 9

DEPARTMENT OF NATIONAL HEALTH AND WELFARE, OTTAWA, CANADA

NP-14394 +. 46 PAGES, SEPTEMBER 1964, IN ENGLISH AND FRENCH

DATA ARE PRESENTED ON RADIOACTIVITY DUE TO FALLOUT IN SAMPLES OF AIR, PRECIPITATION, AND MILK COLLECTED AT VARIOUS LOCATIONS THROUGHOUT CANADA DURING AUGUST 1964. RESULTS ARE INCLUDED FROM RADIOLOGICAL SURVEYS OF REACTOR SITES AND FILM BADGE MONITORING PROGRAMS FOR RADIATION WORKERS. THE CANADIAN REGULATIONS GOVERNING THE SHIPPING OF RADIOISOTOPES AND SAFETY PROCEDURES REQUIRED FOR A RADIOISOTOPE LICENSE ARE DISCUSSED.

AVAILABILITY - MICROCARD EDITIONS, INC. (FOR SALE) ACCOUNTING AND SHIPPING DEPARTMENT, WEST SALEM, WISCONSIN, 54669

CANADA + CONTAMINATION + FALLOUT + RADIATION SAFETY AND CONTROL + REGULATION, GENERAL

3-12636 LEAD FOR RADIATION SHIELDING. NO. 2. THE DESIGN AND CONSTRUCTION OF LEAD SHIELDED CONTAINERS

ACCESSION NUMBER 3-12631 TO 3-12636

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12636 *CONTINUED*
LEAD DEVELOPMENT ASSOCIATION, LONDON
NP-13691 +. 18 PAGES, JULY 1963

NOTES ON THE DESIGN AND CONSTRUCTION OF LEAD-SHIELDED CONTAINERS ARE PRESENTED FOR THE GUIDANCE OF DESIGNERS. EMPHASIS IS ON THE COMBINATION OF THE PROPERTIES OF THE METAL, GOOD DESIGN, AND CORRECT MANUFACTURING TECHNIQUE TO PROVIDE AN EFFICIENT SHIELD AT REASONABLE COST.

AVAILABILITY - MICROCARD EDITIONS, INC. (FOR SALE) ACCOUNTING AND SHIPPING DEPARTMENT, WEST SALEM, WISCONSIN, 54669

EQUIPMENT DESIGN + LEAD + SHIELDING + SHIPPING CONTAINER

3-12637 SALLERON C
INTERNATIONAL REGULATION OF TRANSPORT OF RADIOACTIVE MATERIALS. PRESENT TRENDS
PARIS UNIVERSITY, FRANCE. INSTITUT DE DROIT COMPARÉ
NP-15620 +. 45 PAGES, 1964

THE MODIFICATIONS AND ALTERATIONS MADE IN 1963 BY THE INTERNATIONAL AGENCY FOR ATOMIC ENERGY IN THE REGULATIONS FOR THE TRANSPORT OF RADIOACTIVE MATERIALS ARE SUMMARIZED. THE DEFINITIONS OR TERMS ARE FIRST GIVEN AND THE MATERIALS EXEMPT FROM INTERNATIONAL REGULATION ARE DESCRIBED. THE CONDITIONS FOR PACKAGING AND PERMISSION FOR TRANSPORTATION ARE OUTLINED. THE REGULATIONS CONCERNING STORAGE AND TRANSPORTATION ARE THEN INDICATED.

AVAILABILITY - MICROCARD EDITIONS, INC. (FOR SALE) ACCOUNTING AND SHIPPING DEPARTMENT, WEST SALEM, WISCONSIN, 54669

FRANCE + REGULATION, IAEA + TRANSPORTATION AND HANDLING

3-12640 SANFORD RG
STRUCTURAL ANALYSIS AND DESIGN CONSIDERATIONS FOR SHIPPING CONTAINERS OF HIGHLY RADIOACTIVE MATERIALS
JOHNS HOPKINS UNIVERSITY, BALTIMORE
NYO-9374 +. 78 PAGES, MAY 1961

AN ANALYSIS IS MADE OF THE STATIC FORCES NECESSARY TO CAUSE SERIOUS DAMAGE TO CONTAINERS USED IN THE SHIPMENT OF IRRADIATED FUEL ELEMENTS AND FISSION PRODUCT SOLUTIONS, THREE OF THE FORMER AND ONE OF THE LATTER. BECAUSE OF THESE FACTS AND BECAUSE NO THEORETICAL BASIS IS AVAILABLE FOR ANALYSIS, ATTENTION WAS FOCUSED INSTEAD ON THE MUCH GREATER POSSIBILITY OF DAMAGE TO CLOSURES AND PROTRUDING FITTINGS. IN ADDITION TO THE EVALUATION OF DAMAGING FORCES, A COMPARISON IS MADE OF THE RELATIVE ADVANTAGES OF USING LEAD, IRON, AND URANIUM AS SHIELDING MATERIALS. FINALLY, TIE-DOWN METHODS AND PRACTICES ARE DISCUSSED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$7.60 CY, \$2.60 MF

CONTAINER TIEDOWN + SHIELDING + STRUCTURAL INTEGRITY

3-12641 THOMPSON JT + LEIMKUHLER FF
AN OPERATIONS RESEARCH STUDY OF THE TRANSPORTATION OF HIGHLY RADIOACTIVE MATERIALS, A PROGRESS REPORT
NYO-7832 +. 63 PAGES, APRIL 1959, PP. 1724-1787 OF HEARINGS ON INDUSTRIAL WASTE MANAGEMENT, VOLUME 2

THE TRANSPORTATION OF HIGHLY RADIOACTIVE MATERIALS IS TREATED AS AN OPERATIONS RESEARCH PROBLEM OF SELECTING THOSE FACTORS THAT MINIMIZE COST AND MAXIMIZE SAFETY. EXAMPLES AND APPLICATIONS ARE PRESENTED.

OPERATIONS REPORT, ANALYSIS + SAFETY REVIEW (OPERATIONS, EXPERIMENTS) + TRANSPORTATION AND HANDLING

3-12642 MORGAN JM + KNAPP JW + THOMPSON JT
A STUDY OF THE POSSIBLE CONSEQUENCES AND COSTS OF ACCIDENTS IN THE TRANSPORTATION OF HIGH LEVEL RADIOACTIVE MATERIALS
JOHNS HOPKINS UNIVERSITY, BALTIMORE
NYO-9772 +. 116 PAGES, AUGUST 1961

EVALUATIONS ARE MADE OF THE POSSIBLE CONSEQUENCES OF ACCIDENTAL RELEASES OF HIGH-LEVEL RADIOACTIVE MATERIALS DURING SHIPMENT. TRUCK ACCIDENT SITUATIONS ARE VISUALIZED, UNIT COSTS FOR REMEDIAL OPERATIONS CITED, AND LOSSES ESTABLISHED. ITEMS PERTINENT TO COST ANALYSIS SUCH AS TRANSPORTATION PRACTICES, SHIPPING CONTAINERS, ABILITY OF LARGE METROPOLITAN AREAS TO HANDLE ACCIDENT SITUATIONS, CHARACTERISTICS OF THE HIGH-LEVEL WASTES, FATE OF RADIOACTIVE MATERIALS IN THE ENVIRONMENT, REMOVAL OF RADIOACTIVE NUCLIDES BY WATER TREATMENT FACILITIES, AND DECONTAMINATION PROCEDURES ARE RE-REVIEWED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.25 CY

ACCIDENT, TRANSPORTATION + CONTAMINATION + ECONOMIC STUDY + HAZARDS ANALYSIS + SAFETY STUDY

3-12643 LEIMKUHLER FF + KARSON MJ + THOMPSON JT
STATISTICAL ANALYSIS OF THE FREQUENCY AND SEVERITY OF ACCIDENTS TO POTENTIAL HIGHWAY CARRIERS OF HIGHLY RADIOACTIVE MATERIALS
JOHNS HOPKINS UNIVERSITY, BALTIMORE

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12643 *CONTINUED*
NYO-9771 +. 182 PAGES, JULY 1961

THE PROBABILITY OF ACCIDENTS TO TRACTOR SEMITRAILERS IS DEVELOPED THROUGH ANALYSIS OF ACCIDENT FREQUENCY DATA IN RELATION TO SEASON, GEOGRAPHICAL FACTORS, ROAD TYPE, TRAFFIC AND POPULATION DENSITY, AND TYPE OF CARRIER BUSINESS. MAXIMUM LIKELIHOOD RATES ARE DEVELOPED FOR THE POTENTIAL CARRIERS OF RADIOACTIVITY. IMPACT CHARACTERISTICS OF ACCIDENTS ARE STUDIED THROUGH THE ANALYSIS OF MASS, SPEED, AND ENERGY RELATIONS AND THE EFFECT OF THESE ON VEHICLE AND CARGO DAMAGES IS EXPLORED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$13.00 FS, \$5.66 MF

ACCIDENT, TRANSPORTATION + IMPACT SHOCK + STATISTICAL ANALYSIS

3-12644 THOMPSON JT
THE TRANSPORTATION OF HIGHLY RADIOACTIVE MATERIALS. A REVIEW OF CURRENT RESEARCH
JOHNS HOPKINS UNIVERSITY, BALTIMORE
NYO-9774 +. 26 PAGES, OCTOBER 1963

RECOGNIZING THE NEED FOR A SUMMARY OF THE EFFORT AIMED AT PRODUCING SAFE AND ECONOMICAL SHIPPING CASKS FOR HIGH LEVEL RADIOACTIVE MATERIALS, THERE ARE BROUGHT TOGETHER BRIEF STATEMENTS OF THE STATUS OF RESEARCH AT SEVERAL FACILITIES WHICH HAVE MADE SIGNIFICANT CONTRIBUTIONS. THE PURPOSES, ACCOMPLISHMENTS, AND PLANS FOR FUTURE EFFORTS ARE RECOUNTED TOGETHER WITH SOME FINDINGS AND CONCLUSIONS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$0.50 CY

SAFETY REVIEW (OPERATIONS, EXPERIMENTS) + TRANSPORTATION AND HANDLING

3-12645 LEIMKUHLER FF
TRUCKING OF RADIOACTIVE MATERIALS - SAFETY VS. ECONOMY IN HIGHWAY TRANSPORT
JOHNS HOPKINS UNIVERSITY, BALTIMORE
NYO-9773 +. 164 PAGES, JUNE 1963

THE ACCIDENT EXPERIENCES OF LARGE MOTOR CARRIERS IN THE UNITED STATES ARE STUDIED IN CONSIDERABLE DETAIL TO DEVISE AND ESTIMATE SUITABLE MEASURES OF THE ACCIDENT RISK TO TRUCK SHIPMENTS OF HIGHLY RADIOACTIVE MATERIALS. VARIATIONS IN BOTH ACCIDENT FREQUENCY AND ACCIDENT SEVERITY ARE RELATED TO THE OPERATING CHARACTERISTICS OF TRACTOR-SEMITRAILERS ON HIGHWAYS, SO THAT A QUANTITATIVE MEASURE OF THE RELATIVE RISK FOR VARIOUS SHIPPING STRATEGIES CAN BE EVALUATED AND COMPARED WITH THE COST OF REGULATION. THE EFFECTIVENESS OF CONTROLS FOR THE ROUTING AND TIMING OF SHIPMENTS WAS FOUND TO BE HIGHLY DEPENDENT ON THE INITIAL SHIPPING CONDITION. THERE APPEARS TO BE RELATIVELY LITTLE ADVANTAGE, FOR EXAMPLE, IN REDUCING SPEEDS ON SUPERHIGHWAYS, BUT CONSIDERABLE ADVANTAGE IN REROUTING OR DELAYING SHIPMENTS OVER CROWDED TWO-LANE ROADS IN THE WINTER. MODELS ARE DEVELOPED FOR BALANCING THE COST OF SUCH CONTROL MEASURES AGAINST ESTIMATES OF THE VALUE OF THE RISK-REDUCTION OBTAINED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75 CY

ACCIDENT, TRANSPORTATION + STATISTICAL ANALYSIS

3-12646 RUPP AF
RADIOISOTOPE PRODUCTION AND PROCESS DEVELOPMENT. ANNUAL REPORT FOR 1955
OAK RIDGE NATIONAL LABORATORY
ORNL-2064 +. 22 PAGES, MAY 3, 1956

PRODUCTION AND PROCESS DEVELOPMENT ACTIVITIES DURING 1955 ARE SUMMARIZED. TWELVE THOUSAND SEVEN HUNDRED AND FORTY-NINE SHIPMENTS WERE MADE. THE QUANTITY OF ACTIVITY SHIPPED INCREASED FROM 28,879 C IN 1954 TO 49,383 IN 1955. THE INCREASE RESULTED FROM A TREND TO LARGER QUANTITIES PER PACKAGE AND INCREASES IN SHIPMENTS OF CO-60 AND CS-137 FOR LARGE IRRADIATION UNITS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.30 CY, \$2.40 MF

CESIUM + COBALT + FABRICATION + OPERATING EXPERIENCE + WASTE TRANSPORTATION

3-12647 CLARKE HG + REDDI MM
STRUCTURAL INTEGRITY OF SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS. PART I. STUDY OF TRANSPORT OPERATIONS AND CONTAINER CONSTRUCTION
FRANKLIN INST. LABS. FOR RESEARCH AND DEVELOPMENT, PHILADELPHIA
NYO-9859 +. 145 PAGES, JULY 1962

A PROGRAM WAS UNDERTAKEN TO DEVELOP QUANTITATIVE METHODS FOR ASSESSING THE STRUCTURAL INTEGRITY OF SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS DURING BOTH TRANSPORT OPERATIONS AND ACCIDENTS. THE FORCES ENCOUNTERED DURING NORMAL TRAVEL AND ACCIDENTS ARE ANALYZED, AND THE PROBLEM OF PROPER RIGGING (TIE-DOWN) IS DISCUSSED. THE CONSTRUCTION OF EXISTING SHIPPING CONTAINERS IS CONSIDERED, AND THE USE OF FINS FOR INCREASING THE IMPACT RESISTANCE IS SUGGESTED. AN EXPERIMENTAL PROGRAM USING SMALL-SCALE MODELS TO STUDY THE RESPONSE OF CONTAINERS TO IMPACT IS OUTLINED.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12647 *CONTINUED*

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75 CY

ACCIDENT, TRANSPORTATION + CONTAINER TIEDOWN + FABRICATION + MODEL TESTING + STRUCTURAL INTEGRITY

3-12648 WATSON JS

HEAT TRANSFER FROM SPENT REACTOR FUELS DURING SHIPPING. A PROPOSED METHOD FOR PREDICTING TEMPERATURE DISTRIBUTION IN FUEL BUNDLES AND COMPARISON WITH EXPERIMENTAL DATA

OAK RIDGE NATIONAL LABORATORY

ORNL-3439 +. 69 PAGES, JUNE 11, 1963

A SIMPLE METHOD IS DEVELOPED FOR CALCULATING OR PREDICTING TEMPERATURE DISTRIBUTIONS IN SPENT REACTOR FUELS IN SHIPPING CASKS. THE METHOD ACCOUNTS FOR RADIANT HEAT TRANSFER BETWEEN ALL THE PINS IN A SQUARE ARRAY. WITH THE DIMENSIONS OF THE FUEL BUNDLE, THE CONFIGURATION FACTORS FOR RADIATION BETWEEN VARIOUS TUBES IN THE BUNDLE CAN BE OBTAINED FROM THE TABULATED NUMERICAL CALCULATIONS PRESENTED. THE CONFIGURATION FACTORS, ALONG WITH THE HEAT GENERATION RATES, SURFACE EMISSIVITY, AND THE TEMPERATURE OF THE WALL OF THE CASK CAN BE USED TO ESTIMATE THE TEMPERATURE DISTRIBUTION AUTOMATICALLY WITH THE COMPUTER CODE PRESENTED OR POSSIBLY BY HAND CALCULATIONS BY THE METHOD OUTLINED. EXPERIMENTAL MEASUREMENTS OF TEMPERATURE DISTRIBUTION IN ELECTRICALLY HEATED TUBE ARRAYS IN STEEL SHELLS THAT SIMULATED SHIPPING CASKS WERE MADE TO TEST THE PROPOSED CALCULATIONAL PROCEDURE.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.75 CY.

FUEL ELEMENT + HEAT TRANSFER + HIGH TEMPERATURE

3-12649 WETT JF

SURFACE TEMPERATURES OF IRRADIATED ORR FUEL ELEMENTS COOLED IN STAGNANT AIR

OAK RIDGE NATIONAL LABORATORY

ORNL-2892 +. 15 PAGES, APRIL 6, 1960

A PROBLEM WHICH ARISES DURING SHIPMENT OF IRRADIATED FUEL ELEMENTS IS THAT OF THE MAXIMUM SURFACE TEMPERATURE WHICH MIGHT BE REACHED WHEN THE ELEMENT IS AIR-COOLED BY NATURAL CONVECTION ONLY. IN AN INVESTIGATION OF THIS PROBLEM, SEVERAL IRRADIATED OAK RIDGE RESEARCH REACTOR (ORR) FUEL ELEMENTS WERE RAISED INTO A HOT CELL, AND THEIR TEMPERATURE TRAVERSES WERE MEASURED. CORRELATIONS BETWEEN MAXIMUM SURFACE TEMPERATURE AND THE IRRADIATION HISTORY OF THE ELEMENT WERE MADE BY USING THE WAY-WIGNER FORMULA AND THE DATA OF PERKINS AND KING. IT CAN BE CONCLUDED THAT A DECAY OF 19 HR IS SUFFICIENT TO KEEP THE MAXIMUM SURFACE TEMPERATURE OF AN ORR FUEL ELEMENT, IN AIR, BELOW A DANGEROUS LEVEL. IT IS FELT THAT THE RESULTS, WHILE NOT DIRECTLY APPLICABLE TO ELEMENTS OTHER THAN THOSE FROM THE ORR, CAN ASSIST IN ESTABLISHING ORDERS OF MAGNITUDE AND WILL PROVIDE A BASIS FOR MORE GENERALIZED EXTENSIONS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA.

FUEL ELEMENT + HEAT TRANSFER + HIGH TEMPERATURE + ORR (OAK RIDGE RESEARCH REACTOR)

3-12650 FUEL SHIPPING STUDIES

OAK RIDGE NATIONAL LABORATORY

ORNL-3452 (PP. 233-5) +. 3 PAGES, SEPTEMBER 1963

EXPERIMENTAL AND COST STUDIES WERE MADE ON THE SHIPPING OF IRRADIATED REACTOR FUELS TO A FUEL-PROCESSING PLANT. THE EXPERIMENTAL WORK INVOLVED THE DROPPING OF 1.4- AND 6-TON MODEL CASKS FROM HEIGHTS UP TO 28 FT TO EVALUATE A SECTION OF THE PROPOSED AEC REGULATIONS ON FUEL SHIPPING. FLAT DROPS FROM 15 FT RESULTED IN LITTLE OR NO DAMAGE, BUT CORNER AND PISTON DROPS FROM THIS HEIGHT DID RESULT IN MINOR DAMAGE. THUS IT APPEARS THAT, EXCEPT FOR THE PISTON-IMPACT PROVISIONS, THE REGULATIONS CAN BE SATISFACTORILY MET BY CAREFUL CASK DESIGN. SHIPPING-COST STUDIES INDICATED THAT, FOR A DOMESTIC-FUEL-DISCHARGE RATE OF 3 TONS OF NATURAL URANIUM PER DAY, THE TRUCK SHIPPING-COST FOR A 2350-MILE ROUND TRIP WITH A 25-TON CASK WOULD BE ABOUT \$1.30 PER KILOGRAM OF URANIUM FOR AN IRRADIATION LEVEL OF 8500 MWD/TON. RAIL COSTS ARE ALMOST DOUBLE THAT. THE SHIPPING OF THE SAME FUEL FROM ITALY TO SOUTHERN CALIFORNIA BY CHARTERED BOAT WAS ESTIMATED TO COST ONLY \$1.25 PER KILOGRAM OF URANIUM.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.50 CY

ECONOMIC STUDY + MODEL TESTING + TEST, DROP

3-12651 REACTOR EVALUATION STUDIES

OAK RIDGE NATIONAL LABORATORY

ORNL-3627 (PP. 249-55) +. 7 PAGES, 1964

A PROGRAM IN WHICH OPTIMIZATION STUDIES ARE PREPARED FOR VARIOUS REACTOR TYPES AND THEIR ASSOCIATED FUEL CYCLES RESPECTIVELY IS DESCRIBED. ACTIVITIES DURING THE YEAR INCLUDED COMPLETION OF THE FUEL-SHIPPING-CASK DROP TESTS AND CORRELATION OF THE DATA OBTAINED; PREPARATION OF COMPUTER COSTING CODES (MYRA AND NORA) FOR FUEL SHIPPING OPTIMIZATION; PREPARATION OF A CRITICALITY REPORT FOR USE IN FUEL-PROCESSING PLANT DESIGN, AND AN ECONOMIC STUDY COMPARING THE PWR REACTOR AND FUEL CYCLE COSTS WITH THOSE OF SIX ADVANCED CONVERTER REACTORS.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12651 *CONTINUED*

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$7.00 CY, \$5.00 MN

ECONOMIC STUDY + TEST, DROP

3-12653 ABEE HH + DAVIS DM

RADIATION DOSE RECEIVED BY PASSENGERS AND CREW ON PLANES CARRYING RADIOISOTOPE SHIPMENTS

OAK RIDGE NATIONAL LABORATORY

ORNL-P-745 + CONF-803-5 +. 11 PAGES, 1961, INTERNATIONAL SYMPOSIUM ON THE DOSIMETRY OF IRRADIATIONS FROM EXTERNAL SOURCES, PARIS, NOVEMBER 1964

THE TRANSPORT OF RADIOACTIVE MATERIALS BY COMMERCIAL AIR CARRIER IN THE U.S. IS GOVERNED BY THE OFFICIAL AIR TRANSPORT RESTRICTED ARTICLES TARIFF NO. 6C. REGULATIONS THAT DETERMINE THE RATE OF EXPOSURE FROM RADIOISOTOPE SHIPMENTS ARE REVIEWED. RESULTS ARE REPORTED FROM MEASUREMENTS OF THE EXPOSURE RATE USING 2 DIFFERENT ISOTOPE SOURCES AND 5 DIFFERENT AIRCRAFT OF THE TYPES THAT NORMALLY TRANSPORT ISOTOPES. RADIATION LEVELS WERE ALSO MEASURED FOR THE PASSENGER TO SOURCE DISTANCE IN OPEN AIR. RESULTS OF THESE MEASUREMENTS SHOWED THAT ATTENUATION BY THE STRUCTURAL MATERIALS OF THE PLANE DID NOT REDUCE THE RADIATION DOSE BY MORE THAN 15 PERCENT OF ANY MEASUREMENT. IT WAS CONCLUDED THAT REGULATIONS GOVERNING THE TRANSPORTATION OF RADIOACTIVE MATERIALS BY COMMERCIAL AIR CARRIERS NEED TO BE REVIEWED AND UPDATED, GIVING CONSIDERATION TO THE LONG CARGO SPACES AVAILABLE ON PRESENT COMMERCIAL AIRCRAFT AND THE REGULATIONS GOVERNING THE PRESENT MAXIMUM PERMISSIBLE RADIATION EXPOSURE RATES ESTABLISHED BY NATIONAL AND INTERNATIONAL COMMITTEES.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.00 CY

AIRCRAFT + DOSE MEASUREMENT, EXTERNAL + RADIATION PROTECTION, ORGANIZATION + RADIATION SAFETY AND CONTROL + REGULATION, GENERAL

3-12654 HAFF KW

RADIOISOTOPE SHIPPING CONTAINER DEVELOPMENT

OAK RIDGE NATIONAL LABORATORY

ORNL-P-920 + CONF-650103-3 + SC-RR-65-98 (P. 413-422) +. 16 PAGES, 1964, INTERNATIONAL SYMPOSIUM ON PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIAL, ALBUQUERQUE, N. MEX.

THE SAFETY RECORD OF RADIOISOTOPE SHIPPING IS EXCELLENT, THE TREND TO SHIPMENTS CONTAINING A GREATER NUMBER OF CURIES PER PACKAGE HAS NECESSITATED MORE RIGID PACKAGING AND SHIPPING REQUIREMENTS. TO MEET THESE REQUIREMENTS, THE ISOTOPES DEVELOPMENT CENTER, AT ORNL HAS INITIATED A PROGRAM TO EVALUATE EXISTING SHIPPING CARRIER DESIGNS AND TO DEVELOP METHODS TO UPDATE THESE DESIGNS AS ECONOMICALLY AS IS POSSIBLE. WOODEN, FIRE, AND IMPACT SHIELDS AND FIRE-PROTECTIVE PAINTS HAVE BEEN INVESTIGATED AND FOUND SUITABLE AS A MEANS OF MEETING THE HIGHER REQUIREMENTS. ALSO BEING STUDIED ARE GASKET MATERIALS AND DESIGN PARAMETERS OF SHIPPING CASKS WHICH ARE ADVERSELY AFFECTED BY FIRE AND IMPACT CONDITIONS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.00 CY

EQUIPMENT DESIGN + FIRE + IMPACT SHOCK + SHIPPING CONTAINER + SOURCE, RADIATION

3-12655 PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM FOR PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS, HELD AT ALBUQUERQUE, NEW MEXICO, JANUARY 12-15, 1965

SANDIA CORP., ALBUQUERQUE, N. MEX.

SC-PR-65-98 + CONF-650103 +. 743 PAGES, JUNE 1965

PARTICIPANTS IN THE SYMPOSIUM INCLUDED REPRESENTATIVES, FROM AEC, MAJOR CONTRACTORS, LABORATORIES AND UNIVERSITIES, IAEA, TRAFFIC AUTHORITIES, BUREAU OF EXPLOSIVES, LICENSEES, SHIPPING CASK MANUFACTURERS, AND FOREIGN COUNTRIES. THE TECHNICAL PAPERS COVERED RECENT DEVELOPMENTS IN REGULATIONS, STANDARDS, PROOF-TESTING AND RESEARCH AND DEVELOPMENT ON CONTAINERS. SAFETY FACTORS IN HANDLING AND TRANSPORT ARE CONSIDERED. SEPARATE ABSTRACTS WERE PREPARED FOR SOME OF THE PAPERS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

CRITICALITY SAFETY + HEAT TRANSFER + REGULATION, GENERAL + SAFETY PRINCIPLES AND PHILOSOPHY + SHIPPING CONTAINER + STRUCTURAL INTEGRITY + TEST, PROOF + TRANSPORTATION AND HANDLING

3-12656 APPLETON GJ + SERVANT JY

PACKAGING STANDARDS

SC-RR-65-98 (PP. 32-44) +. 13 PAGES, JUNE 1965

THE TWO STANDARDS OF PACKAGING, TYPE A AND B, ARE DISCUSSED. A REVIEW IS GIVEN OF THE RESEARCH CONDUCTED TO MAKE THE STANDARDS FOR TYPE A AND B PACKAGING MORE OBJECTIVE. AFTER A CONSIDERATION OF NORMAL AND ACCIDENT CONDITIONS IN THE TRANSPORT ENVIRONMENT, MECHANICAL AND PHYSICAL TESTS FOR PROTOTYPE PACKAGES OF TYPE A AND B ARE DISCUSSED. IT IS POINTED OUT THAT THE REVISED IAEA REGULATIONS NO LONGER CONTAIN REFERENCE TO NORMAL TRANSPORT OR MAXIMUM CREDIBLE ACCIDENTS, BUT INSTEAD DEFINE TYPE A AND B PACKAGES IN RELATION TO TESTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12656 *CONTINUED*
CODES AND STANDARDS + REGULATION, IAEA

3-12657 THOMPSON JT + MORGAN JM
A SURVEY OF RESEARCH IN THE TRANSPORTATION OF RADIOACTIVE MATERIALS
SC-RR-65-98 (PP. 17-31) +. 15 PAGES, JUNE 1965

AN EXTENSIVE SURVEY WAS CONDUCTED DURING THE FIRST QUARTER OF 1965. THE PURPOSE OF THE REVIEW WAS (1) TO ASCERTAIN WHAT WORK HAS BEEN COMPLETED, WHAT IS IN PROGRESS, WHAT LIES AHEAD, AND (2) TO JUDGE IF DUPLICATION IS PRESENT, IF GAPS EXIST, OR IF NEEDED AREAS OF RESEARCH ARE BEING NEGLECTED. FROM THE OBSERVATIONS AND OPINIONS OBTAINED, THE STRENGTHS AND WEAKNESSES OF THE PROGRAM WERE EVALUATED AND ARE PRESENTED WITH SOME FINAL COMMENTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

SAFETY PRINCIPLES AND PHILOSOPHY + SAFETY STUDY

3-12658 GEORGE TC
ASPECTS OF TRANSPORTATION OF RADIOACTIVE MATERIALS
SC-RR-65-98 (PP. 74-78) +. 4 PAGES, JUNE 1965

AN INFORMAL DISCUSSION IS PRESENTED OF VARIOUS ASPECTS SUCH AS AVOIDANCE OF ACCIDENTS, ACCIDENT EXPERIENCE, REGULATIONS, AND HYSTERIA FOLLOWING ACCIDENTS. THE BUREAU OF EXPLOSIVES AND ITS ACTIVITIES ARE DESCRIBED BRIEFLY.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

OPERATING EXPERIENCE + REGULATION, GENERAL + SAFETY PRINCIPLES AND PHILOSOPHY

3-12659 BARKER RF + HOPKINS DR
REGULATORY PACKAGING STANDARDS
SC-RR-65-98 (PP. 45-54) +. 10 PAGES, JUNE 1965

DISCUSSES THE TRANSPORT REGULATIONS RECOMMENDED BY IAEA AND OF THESE PROPOSED FOR USE WITHIN U.S. THE PRINCIPLES INVOLVED IN THE PROPOSED AEC REGULATIONS ARE DEFINED. THE TRANSPORT OF FISSIONABLE MATERIALS IS CONSIDERED IN SOME DETAIL.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

CODES AND STANDARDS + CRITICALITY SAFETY + REGULATION, AEC + REGULATION, IAEA

3-12660 SOUSSELIER Y
FIRE TESTS OF PACKAGINGS FOR RADIOACTIVE MATERIALS
SC-RR-65-98 (PP. 114-118) +. 4 PAGES, JUNE 1965

FIRE-TEST METHODS ARE CONSIDERED. TWO OPEN-AIR FIRE TESTS WERE CONDUCTED ON TWO SHIELDED PACKAGINGS, CENTRILON TYPE FOR RADIOACTIVE SOLUTIONS AND GT-200 TYPE FOR RADIOACTIVE SOURCES. THE TEMPERATURES, WINDS, AND LEAD MELTING ARE DISCUSSED FOR EACH TEST. AN OVEN TEST WAS ALSO CONDUCTED ON THE CENTRILON PACKAGING. IT IS CONCLUDED THAT OPEN-AIR AND OVEN TESTS PRODUCE COMPARABLE RESULTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

FIRE + FRANCE + HEAT TRANSFER + SHIPPING CONTAINER

3-12661 AUPETIT A
RESISTANCE TO FIRE OF LEAD LINED CASKS
SC-RR-65-98 (PP. 107-113) +. 7 PAGES, JUNE 1965

THE PROBLEM OF THE FIRE RESISTANCE OF LEAD-LINED CONTAINERS AND THE TIME REQUIRED TO REACH THE MELTING POINT OF THE LEAD WAS STUDIED USING THEORETICAL METHODS. THE CALCULATED HEATING FLUX OF APPROXIMATELY 4 W/CM SQUARED IS HIGHER THAN THE REAL FLUXES REACHED IN FIRE TESTS (APPROXIMATELY 3 W/CM SQUARED). A SMALL SCALE MODEL TESTING METHOD IS PROPOSED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

FIRE + FRANCE + HEAT TRANSFER + SHIPPING CONTAINER

3-12662 SISLER JA
NEW DEVELOPMENTS IN ACCIDENT RESISTANT SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS
SC-RR-65-98 (PP. 141-186) +. 45 PAGES, JUNE 1965

A SHIPPING CONTAINER WAS DEVELOPED WHICH CAN WITHSTAND THE FIRE AND DROP TESTS GIVEN IN THE

ACCESSION NUMBER 3-12656 TO 3-12662

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12662 *CONTINUED*
PROPOSED REGULATIONS. THE CONTAINER COMPRISES A LAMINATED PLYWOOD SHELL WITH A 4-INCH MINIMUM WALL THICKNESS. RESULTS OF DROP AND FIRE TESTS ARE REPORTED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

EQUIPMENT DESIGN + FIRE + REGULATION, GENERAL + SHIPPING CONTAINER + TEST, DROP + THERMAL INSULATION

3-12663 WACHTELL GP
CAN WE MODEL A FIRE TEST
SC-RR-65-98 (PP. 133-40) +. 7 PAGES, JUNE 1965

THE INTERNAL TEMPERATURE DISTRIBUTION AT TIME T-SUB-P IN A PROTOTYPE SHIPPING CONTAINER WILL BE MODELED AT TIME T-SUB-M IN A SCALE MODEL. IF THE SAME CONSTRUCTION MATERIALS ARE USED, T-SUB-M EQUALS S-SQUARED SUB-P AND THE NET FLUX PER UNIT AREA IS F-SUB-M EQUALS (1/S) F-SUB-P. HERE IS THE SCALE FACTOR. STRESS AND STRAIN DISTRIBUTIONS WILL THEN ALSO BE MODELED. THESE CONCLUSIONS ARE ONLY APPROXIMATE IF NATURAL CONVECTION OF MOLTEN LEAD OCCURS, BUT THE APPROXIMATION IS VERY GOOD IF THE CONVECTION IS RAPID. BY REPEATING A MODEL TEST SEVERAL TIMES, ONE SHOULD BE ABLE TO OBSERVE THE VARIABILITY OF THERMAL STRESS DAMAGE. SINCE NET FLUX PER UNIT AREA IS PRACTICALLY INDEPENDENT OF OBJECT SIZE IN A FIRE, IT IS NOT SUFFICIENT TO PLACE THE MODEL IN A FIRE. INSTEAD, ANOTHER SOURCE OF FLUX MUST BE USED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

FIRE + MODEL TESTING

3-12664 CLARKE HG
EXPERIMENTAL STUDIES OF CASK IMPACT RESISTANCE
SC-RR-65-98 (PP. 261-282) +. 21 PAGES, JUNE 1965

METHODS ARE BEING DEVELOPED FOR ASSESSING THE RESPONSE OF CASKS TO IMPACTS THAT COULD OCCUR IN VEHICULAR OR HANDLING ACCIDENTS. PENETRATING AND CRUSHING IMPACT TESTS WERE MADE ON SMALL SCALE MODELS OF CASKS FOR IRRADIATED FUELS, AND THE RESULTS ARE DESCRIBED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

IMPACT SHOCK + MODEL TESTING + SHIPPING CONTAINER + STRUCTURAL INTEGRITY

3-12665 DOSHI KD
AN ANALYTICAL APPROACH TO STUDY VEHICLE COLLISIONS
SC-RR-65-98 (PP. 243-60) +. 17 PAGES, JUNE 1965

AN ANALYTICAL PROCEDURE IS PRESENTED FOR STUDYING THE STRUCTURAL RESPONSE OF VEHICLE-CONTAINER-TIEDOWN SYSTEMS DURING LONGITUDINAL COLLISIONS. AFTER A DEFINITION OF THE PROBLEM, THE APPROACH TO ITS ANALYTICAL STUDY IS DESCRIBED. A MATHEMATICAL MODEL IS GIVEN FOR A TRACTOR-SEMITRAILER-TYPE VEHICLE. EQUATIONS OF MOTION ARE PRESENTED, AND RECOMMENDATIONS ARE GIVEN FOR OBTAINING NUMERICAL RESULTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

ANALYTICAL MODEL + IMPACT SHOCK

3-12666 DUNAWAY DL
TESTING SHIPPING CONTAINERS FOR SLIGHTLY ENRICHED URANIUM BILLETS, INGOTS, AND FUEL CORES
SC-RR-65-98 (PP. 357-76) +. 20 PAGES, JUNE 1965

A SERIES OF TESTS WAS CONDUCTED TO EVALUATE THE ABILITY OF WIDE STEEL-BANDED WOODEN BOXES TO RETAIN THEIR LOADINGS UNDER SIMULATED VEHICULAR ACCIDENT CONDITIONS. THE BOXES ARE SHIPPING CONTAINERS FOR SLIGHTLY ENRICHED URANIUM FUEL CORES AND OTHER METALLIC PIECES. THE TESTS INCLUDED A BOX DROP TEST, A TUMBLE TEST, AND A FIRE TEST. THE TESTS DEMONSTRATED THAT A WOODEN BOX WITH SUFFICIENTLY WIDE STEEL BANDING PROVIDES A PACKAGE CAPABLE OF WITHSTANDING CONSIDERABLE IMPACT. THIS CAPABILITY IS OF PARTICULAR SIGNIFICANCE WHEN THE INTEGRITY OF THE PACKAGE IS A FACTOR IN CRITICALITY CONTROL.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

CRITICALITY SAFETY + FIRE + IMPACT SHOCK + SHIPPING CONTAINER + TEST, PROOF

3-12667 GUTMAN T
PROGRESS REPORT ON A CLASS II CONTAINER FOR LOW ASSAY URANIUM COMPOUNDS
SC-RR-65-98 (PP. 330-56) +. 26 PAGES, JUNE 1965

A SIMPLE AND INEXPENSIVE CONTAINER WAS DESIGNED TO PROVIDE A PRACTICAL MEANS OF SHIPPING URANIUM HAVING A U-235 ASSAY OF 5 PERCENT OR LESS. THE CONTAINER HAS A TARE WEIGHT OF APPROXIMATELY 150 POUNDS, AND PROVIDES A PAYLOAD OF 37.8 LITERS. THE DETERMINATION OF A SAFE

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12667 *CONTINUED*

ARRAY IS BASED ON THE ABSENCE OF AN INTERNAL MODERATOR SUBSEQUENT TO IMMERSING THE CONTAINER UNDER 3 FEET OF WATER AFTER HAVING BEEN (1) DROPPED 30 FEET ONTO AN UNYIELDING SURFACE, (2) DROPPED 40 INCHES ONTO A 6-INCH DIAMETER TARGET, AND (3) EXPOSED TO A TEMPERATURE OF 1475 F FOR 1/2 HOUR. SINCE UNMODERATED LOW ASSAY (LESS THAN 5 PERCENT U-235) URANIUM CANNOT ACHIEVE CRITICALITY, THE CONSIDERATION OF OPTIMUM INTERSPERSED MODERATION LIMITS THE SIZE OF THE ARRAY TO APPROXIMATELY 900 CONTAINERS, AS DETERMINED USING A PROPOSED CALCULATIONAL TECHNIQUE. WHEN SUBJECTED TO THE ABOVE CONDITIONS, DRYNESS OF THE PAYLOAD WAS ESSENTIALLY BUT NOT COMPLETELY MAINTAINED. THE PRESENCE OF MINUTE AMOUNTS OF WATER INDICATES THAT THE INCORPORATION OF MINOR MODIFICATIONS WILL PROVIDE A SATISFACTORY MEANS OF SHIPPING DRY LOW ASSAY URANIUM COMPOUNDS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

CRITICALITY SAFETY + EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12668 PATTERSON DE
THE PROBLEM OF CONTAINER INTERCHANGEABILITY
SC-RR-65-98 (PP. 442-9) +. 7 PAGES, JUNE 1965

THE SPECIAL APPROVAL SYSTEM USED BY THE ICC AND AEC IN SHIPPING RADIOACTIVE MATERIALS IS DISCUSSED. IT IS STATED THAT AN UPDATED ICC REGULATION WITH STANDARDIZED RULES IS NEEDED. THE ADVANTAGES OF SPECIFICATION CONTAINERS AND THEIR DEVELOPMENT IN THE FUTURE ARE CONSIDERED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

CODES AND STANDARDS + EQUIPMENT DESIGN + REGULATION, AEC + SHIPPING CONTAINER

3-12669 DELNAY RL
DESCRIPTION AND EVALUATION OF FOUR PU(N03)4 SHIPPING CONTAINERS
SC-RR-65-98 (PP. 423-41) +. 19 PAGES, JUNE 1965

STRUCTURAL INTEGRITY TESTS WERE CONDUCTED ON 3-LITER AND 10-LITER PACKAGES FOR CLASS I AND II SHIPMENTS OF PLUTONIUM NITRATE SOLUTIONS. RESULTS ARE DESCRIBED FOR THESE TESTS AND FOR SHIPMENT TESTS. COSTS OF THESE PACKAGES ARE LISTED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

ECONOMIC STUDY + LIQUID FUEL + PLUTONIUM + SHIPPING CONTAINER + STRUCTURAL INTEGRITY + TEST, DESTRUCTIVE

3-12670 MYERS JL + PEDIGO WR + HAMER WJ + SMITH VA + BERNSTEIN S
TESTING OF 10-TON CAPACITY URANIUM HEXAFLUORIDE SHIPPING CONTAINERS
SC-RR-65-98 (PP. 580-608) +. 28 PAGES, JUNE 1965

DROP TESTS WERE PERFORMED ON TWO TYPES OF 10-TON CONTAINERS - A THIN-WALL (5/16 IN. THICK) CYLINDER USED ONLY FOR STORAGE OF UF₆, AND A HEAVY-WALL (5/8 IN. THICK) CYLINDER USED FOR BOTH STORAGE AND INTERPLANT TRANSPORT OF UF₆. HORIZONTAL AND VERTICAL IMPACT TESTS WERE MADE AT HEIGHTS UP TO 20 FEET. NONE OF THE FOUR THIN-WALL CYLINDERS SHOWED ANY INDICATION OF FAILURE. THE ONLY FAILURE WAS WITH THE HEAVY-WALL CYLINDER. THE THIN-WALL CYLINDERS WILL BE USED FOR INTERPLANT SHIPMENTS OF UF₆. A 15-MIN FILM ILLUSTRATING THE TEST RESULTS WAS SHOWN.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

SHIPPING CONTAINER + TEST, DESTRUCTIVE + TEST, DROP + URANIUM HEXAFLUORIDE

3-12671 PETERSON RW
DESIGN OF CONTAINERS FOR SHIPMENT OF RADIOACTIVE MATERIALS
SC-RR-65-98 (PP. 450-72) +. 22 PAGES, JUNE 1965

A REVIEW IS PRESENTED OF DESIGN REQUIREMENTS AND SPECIAL FEATURES REQUIRED IN CONTAINERS FOR SHIPPING RADIOACTIVE MATERIAL. THE ENGINEERS APPROACH TO CONTAINER DESIGN IS DISCUSSED, AND THE CHARACTERISTICS OF DIFFERENT TYPES OF CASKS IN SERVICE ARE EXAMINED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

DESIGN CRITERIA + EQUIPMENT DESIGN + REVIEW + SHIPPING CONTAINER

3-12672 EDLOW S
SPECIAL PROBLEMS IN PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS
SC-RR-65-98 (PP. 625-91) +. 4 PAGES, JUNE 1965

THE SUBJECT OF PACKAGING AND TRANSPORTATION PROBLEMS IS DISCUSSED FROM THE VIEWPOINT OF TRAFFIC MANAGEMENT. IT IS STATED THAT THERE ARE NO, OR ONLY A FEW, SPECIAL PROBLEMS NOW. THE REGULATORY FUNCTIONS OF THE VARIOUS AGENCIES ARE DISCUSSED. THE EXPERIENCE GATHERED ON THE FIRST MOVEMENT OF IRRADIATED REACTOR FUEL FROM SWEDEN TO U.S. IS DESCRIBED BRIEFLY. THE

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12672 *CONTINUED*

TURNOVER IN PERSONNEL WORKING ON PACKAGING AND TRANSPORTATION IS CRITICIZED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

OPERATING EXPERIENCE + REGULATION, GENERAL + SHIPPING CONTAINER + SWEDEN + TRANSPORTATION AND HANDLING

3-12673 ADCOCK FE

DESIGN OF PLUTONIUM OXIDE AND PLUTONIUM NITRATE SHIPPING CONTAINERS
SC-RR-65-98 (PP. 609-10) +. 2 PAGES, JUNE 1965

THE DESIGN, CONSTRUCTION, AND TESTING OF PUO₂ PACKAGES FOR CLASS I AND II SHIPMENTS ARE DISCUSSED. A REVIEW IS MADE OF EXISTING PU(NO₃)₄ CONTAINER DESIGNS TO REDUCE SIZE, WEIGHT, AND COST.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

EQUIPMENT DESIGN + PLUTONIUM + SHIPPING CONTAINER

3-12674 SMITH DR

CRITICALITY SAFETY EVALUATION OF PACKAGES FOR THE TRANSPORT OF FISSILE MATERIAL
SC-RR-65-98 (PP. 679-90) +. 11 PAGES, JUNE 1965

THE CRITICALITY BEHAVIOR OF INDIVIDUAL UNITS OF FISSILE MATERIAL AND THE INTERRELATIONSHIP BETWEEN DENSITY AND DIMENSION ARE DISCUSSED. THE BEHAVIOR OF ARRAYS OF FISSILE UNITS IS NEXT CONSIDERED, AND THE REFLECTOR EFFECT IS SHOWN TO BE EQUIVALENT TO A NUMBER OF UNITS IN A CRITICAL ARRAY. THE RATIO BARE/REFLECTED CRITICAL MASS IS TABULATED FOR SEVERAL MATERIALS. THE USE OF A DENSITY ANALOG TECHNIQUE IN THE EVALUATION OF REFLECTED ARRAYS IN TRANSPORTATION PROBLEMS IS DESCRIBED WITH EXAMPLES. THE DEGREE OF CONSERVATISM IN THE CALCULATIONS IS CONSIDERED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

ANALYTICAL MODEL + CRITICALITY SAFETY + SHIPPING CONTAINER

3-12675 WACHTELL GP.

FIRE TEST OF 15-TON SHIPPING CONTAINER
SC-RR-65-98 (PP. 631-50) +. 20 PAGES, JUNE 1965

INSTRUMENTATION AND PRELIMINARY TEST RESULTS ARE DESCRIBED FOR THE FIRE TEST OF THE 15-TON SHIPPING CONTAINER, PERFORMED DURING THE SYMPOSIUM. A PREVIOUS TEST OF VARIOUS TEST OBJECTS, INCLUDING A FINNED BOX HAVING A SIMILAR EXTERNAL CONFIGURATION BUT ONE-THIRD THE SIZE, IS ALSO DESCRIBED. IN THE PRESENT TEST, LEAD LEAKAGE OCCURRED, MOSTLY FROM THE LID, STARTING ABOUT HALF AN HOUR AFTER THE START OF THE TEST. LEAKAGE APPEARS TO HAVE OCCURRED WHERE MODIFICATIONS WERE MADE FOR INSTRUMENTATION PURPOSES. CHROME-PLATED AND UNPLATED SURFACES OF AUXILIARY TEST OBJECTS ABSORBED HEAT AT THE SAME RATE, INDICATING THAT SOOT FORMED ON COOL SURFACES. THIS CONCLUSION IS UNCERTAIN, HOWEVER, BECAUSE IT IS NOT KNOWN HOW LONG THE CHROME-PLATED SURFACES SURVIVED. LEAKING LEAD DESTROYED THE STAINLESS-STEEL SHEATHED THERMOCOUPLES WHEREVER IT MADE CONTACT.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

FIRE + HEAT TRANSFER + SHIPPING CONTAINER + TEST, DESTRUCTIVE

3-12676 MORIYA T + JIN T

DISPERSION OF RADIOISOTOPES CAUSED BY TRANSPORT FIRES
SC-RR-65-98 (PP. 719-22) +. 4 PAGES, JUNE 1965

MEASUREMENTS WERE CARRIED OUT ON THE DISPERSION RATIO OF RADIOISOTOPES CAUSED BY A FIRE, I.E., THE RATIO OF AIRBORNE ACTIVITY TO THE ACTIVITY REMAINING IN THE BURNED MATERIALS. THE MEASUREMENTS WERE MADE BURNING NA²⁴Cl AND NH⁴BR⁸² SOLUTIONS WITH VARIOUS COMBUSTIBLE MATERIALS AT TEMPERATURES UP TO 800 C IN A PROPANE FIRE. THE MEASURED DISPERSION RATES ARE TABULATED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

ACCIDENT, TRANSPORTATION + DOSE MEASUREMENT, EXTERNAL + FIRE + RADIOACTIVITY, RELEASE + SHIPPING CONTAINER

3-12677 JOHNSTON KW

THE TRANSPORT CONTAINER FOR IRRADIATED FUEL FROM CIVIL POWER STATIONS IN THE UK
SC-RR-65-98 (PP. 711-18) +. 7 PAGES, JUNE 1965

THE CONTAINER IS A FABRICATED STEEL FLASK DESIGNED WITH A LIMIT OF 50 TONS/LOAD, FUEL ELEMENTS ARE RANDOMLY PACKED IN A SKIP AND COOLED BY WATER AND FINS ON THE FLASK. THE GAS RELIEF FILTER WHICH PREVENTS WATER LOSS IS DESCRIBED. THERMAL TESTS WITH EXTERNAL SOLAR RADIATION

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12677 *CONTINUED*
AND INTERNAL HEAT SOURCES UP TO 15 KW SHOW THAT TRANSPORT REGULATIONS WILL NOT BE VIOLATED.
DIFFICULTIES ENCOUNTERED IN OPERATION ARE DESCRIBED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

HEAT TRANSFER + REGULATION, GENERAL + SHIPPING CONTAINER + SHIPPING CONTAINER + UNITED KINGDOM

3-12678 TEAGUE HJ + BROOK AJ
APPROXIMATE CALCULATIVE ASSESSMENT MADE RELATING TO WALL TEMPERATURES AND BEHAVIOUR OF CASK IN FIRE TESTS
SC-RR-65-98 (PP. 732-5) +. 3 PAGES, JUNE 1965

A ROUGH ESTIMATE WAS MADE OF THE LIKELY OUTCOME OF THE FIRE TEST, USING THE ASSUMPTIONS USED
IN THE IAEA THERMAL TEST (FLAME TEMPERATURE, 800 C, FLASK WALL EMISSIVITY, 0.8, AND
CONVECTION NEGLECTED). LEAD BEGINS TO MELT AT 21 MIN, AND IS COMPLETELY MOLTEN AT 52 MIN.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

ANALYTICAL MODEL + FIRE + HEAT TRANSFER + SHIPPING CONTAINER

3-12679 MORIYA T + JIN T
STUDIES ON FIRE RESISTIVITIES OF RADIOISOTOPE CONTAINERS
SC-RR-65-98 (PP. 723-31) +. 9 PAGES, JUNE 1965

EXPERIMENTAL STUDIES AND THEORETICAL CALCULATIONS WERE MADE OF THE FIRE RESISTANCE OF
LEAD-SHIELDED CONTAINERS OF VARIOUS SIZES. FIRE TESTS WERE ALSO PERFORMED ON PACKAGES USED
FOR MAILING RADIOISOTOPES, AND THE LEAKAGE OF NA24Cl AND NH4BR82 SOLUTIONS FROM THE PACKAGES
WAS MEASURED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$10.58 CY, \$3.00 MN

ANALYTICAL MODEL + FIRE + RADIOACTIVITY, RELEASE + SHIPPING CONTAINER + TEST, DESTRUCTIVE

3-12680 SHAPPERT LB
RESULTS OF A TESTING PROGRAM FOR UNIRRADIATED FISSILE MATERIAL CONTAINERS
OAK RIDGE NATIONAL LABORATORY
ORNL-P-889 + CONF-650103-2 + SC-RR-65-98 (PP. 321-329) +. 16 PAGES, 1963, INTERNATIONAL SYMPOSIUM ON
PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIAL, ALBUQUERQUE, N. MEX.

CONTAINERS FOR THE SHIPMENT OF FISSILE MATERIALS ARE ORDINARILY DESIGNED SUCH THAT THE
CONTAINER WILL BE SUBCRITICAL UNDER ANY CONDITIONS OF NEUTRON MODERATION, REFLECTION, OR
INTERACTION THAT MAY CREDIBLY OCCUR DURING THE SHIPMENT. ONE SUCH DESIGN EMPLOYS THE USE OF
A 55-GAL DRUM AS A BUFFER OR BIRDCAGE. THE FISSILE CONTAINER (OR BIRD) IS A SECTION OF
2-IN.-DIA STEEL PIPE CENTERED COAXIALLY IN THE DRUM. IMPACT TESTS WERE MADE TO EVALUATE THE
EXTENT OF THE DISTORTION UNDER SIMULATED ACCIDENT CONDITIONS AND TO PROVIDE GUIDELINES FOR
IMPROVEMENTS IN BIRDCAGE DESIGN. IT WAS FOUND THAT BY WELDING STEEL BRACES BETWEEN THE BIRD
AND STEEL BEARING BANDS WHICH ARE IN TURN WELDED TO THE INNER SURFACE OF THE SURROUNDING
DRUM, THE BIRDCAGES CAN WITHSTAND AT LEAST A 30-FT FREE FALL ONTO A RIGID SURFACE WITHOUT ANY
SIGNIFICANT DISTORTION OF THE DRUM OR MOVEMENT OF THE BIRD WITHIN THE DRUM.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.00 CY

CRITICALITY SAFETY + STRUCTURAL INTEGRITY + TEST, DESTRUCTIVE + TEST, DROP

3-12682 NIEMEYER RG
RADIOISOTOPE SOURCES AND SOURCE TESTING
OAK RIDGE NATIONAL LABORATORY
ORNL-P-1910 + CONF-660207-1 +. 17 PAGES, 1965, RADIOISOTOPE APPLICATIONS IN AEROSPACE SYMPOSIUM, DAYTON,
OHIO

THE EXCELLENT SAFETY RECORD OF DOMESTICALLY MANUFACTURED SEALED SOURCES TOGETHER WITH
INFORMATION ACQUIRED IN THE ORNL SOURCE TESTING PROGRAM SERVED AS A BASIS FOR THE ORNL SOURCE
CAPSULE CLASSIFICATION SYSTEM WHICH IS PROPOSED. THIS SYSTEM PERMITS CLASSIFICATION OF
SOURCE CAPSULES ACCORDING TO STRUCTURAL AND TEMPERATURE CHARACTERISTICS AS THESE RELATE TO
THE OVERALL OBJECTIVE OF ENSURING CONTAINMENT OF THE RADIOISOTOPE.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.00 CY, \$0.50 MN

RADIATION SAFETY AND CONTROL + SOURCE, RADIATION + TEST, PROOF

3-12683 SHAPPERT LB + ROM AM
EVALUATION OF LHW CARRIER DESIGN FOR CONFORMANCE WITH CODE OF FEDERAL REGULATIONS, TITLE 10, PART 72
OAK RIDGE NATIONAL LABORATORY
ORNL-TM-154 +. 28 PAGES, FEBRUARY 1962

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12683 *CONTINUED*

A HAZARD ANALYSIS OF THE 1WW WASTE SOLUTION CASK WAS MADE AND EVALUATED FOR CONFORMANCE WITH THE APPLICABLE PARTS OF THE CODE OF FEDERAL REGULATIONS, TITLE 10, PART 72. THE CASK WILL BE SHIPPED BY RAIL. THE CASK WAS FOUND TO BE STRUCTURALLY ADEQUATE. THE NORMAL OPERATING PRESSURE IS ABOUT 7-10 PSI. THE MOST PROBABLE LIQUID TEMPERATURE IS 165 DEGREES F ASSUMING AN AMBIENT AIR TEMPERATURE OF 100 DEGREES F. THE DOSE RATE AT THE SIDE OF THE CASK SHOULD BE 75 MR/HR AT THE SURFACE. UNDER SEVERE ACCIDENT CONDITIONS, WHERE THE CASK IS EXPOSED TO DECELERATION FORCES OF 60 GS OR LESS, THE CASK WILL REMAIN ATTACHED TO THE CAR AND WILL BE PROTECTED BY A STEEL GRIDWORK FASTENED TO THE GONDOLA. IN THE EVENT THE ACCIDENT INCLUDES A FIRE, A FIRE SHIELD HAS BEEN DESIGNED TO FIT AROUND THE CASK AND PREVENT DIRECT IMPINGEMENT OF FLAME ON THE CASK.

ACCIDENT ANALYSIS + EQUIPMENT DESIGN + REGULATION, AEC + SHIPPING CONTAINER + STRUCTURAL INTEGRITY + URANIUM + WASTE TRANSPORTATION

3-12686 ROBINSON RA
ISOTOPE DEVELOPMENT CENTER SAFETY TESTING PROGRAM. PROGRESS REPORT, MARCH-APRIL 1963
OAK RIDGE NATIONAL LABORATORY
ORNL-TM-630 +. 28 PAGES, SEPTEMBER 24, 1963

TESTING ON RADIATION SOURCES AND CASKS WAS CONTINUED TO PROVIDE INFORMATION THAT WILL ASSIST IN MAINTAINING SAFETY IN PACKAGING AND SHIPPING RADIOACTIVE MATERIALS. RESULTS OF TESTS ON CASK FIRE AND IMPACT SHIELDS CONSTRUCTED OF WOOD SHOW THAT APPROXIMATELY 3 1/2-IN.-THICK MAPLE SHIELDS WILL ADEQUATELY PROTECT A CASK WEIGHING UP TO 234 LB FROM DAMAGE WHEN SUBJECTED TO A 30-FT FREE FALL ONTO A 6-IN.-DIAM PISTON OR ONTO ONE OF ITS CORNERS AND THE STANDARD 1-HR FIRE TEST.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.60 FS, \$1.04 MF

FIRE + IMPACT SHOCK + SOURCE, RADIATION + STRUCTURAL INTEGRITY + TEST, DESTRUCTIVE

3-12687 SHAPPERT LB
DROP TESTS PERFORMED ON THE FRANKLIN INSTITUTES 1/4-SCALE MODEL OF A 40-TON CASK
OAK RIDGE NATIONAL LABORATORY
OPNL-TM-629 +. 33 PAGES, AUGUST 19, 1963

RESULTS ARE PRESENTED OF FIVE IMPACT TESTS ON A 1/4-SCALE MODEL OF A 40-TON CASK. THE TESTS INCLUDED DROPS ONTO A BEAM AND A PISTON. IMPORTANT DIMENSIONAL MEASUREMENTS WERE MADE BEFORE AND AFTER EACH DROP. ACCELEROMETER READINGS WERE MADE BY KEY POSITIONS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.60 CY, \$1.19 MF

MODEL TESTING + STRUCTURAL INTEGRITY + TEST, DROP

3-12688 WHATLEY ME + HAAS PA + HORTON RW + RYON AD + SUDDATH JC
UNIT OPERATIONS SECTION MONTHLY PROGRESS REPORT, SEPTEMBER 1963
OAK RIDGE NATIONAL LABORATORY
ORNL-TM-785 +. 34 PAGES, AUGUST 1964

A STUDY WAS INITIATED ON HEAT TRANSFER IN VERTICAL CYLINDRICAL CHANNELS BY NATURAL CONVECTION IN CONNECTION WITH THE SHIPMENT OF SPENT REACTOR FUEL ELEMENTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.60 CY, \$1.22 MF

HEAT TRANSFER

3-12689 GOODPASTURE DW + SHAPPERT LB
ENERGY ADSORPTION CAPABILITY OF STEEL DETERMINED FROM CASK IMPACT TESTS
OAK RIDGE NATIONAL LABORATORY
ORNL-TM-680 +. 74 PAGES, JANUARY 6, 1964

THE OBJECT OF THE STUDIES DISCUSSED IS TO DETERMINE THE AMOUNT OF ENERGY ABSORBED BY THE STEEL SHELLS OF A 2600-POUND CASK FALLING HORIZONTALLY FROM A HEIGHT OF 23 FT. IN ADDITION, INFORMATION IS PRESENTED WHICH WILL HELP PREDICT THE FAILURE OF SIMILAR CASKS DROPPED FROM DIFFERENT HEIGHTS. THE RESULTS OF 22 DROP TESTS ARE SUMMARIZED. INCLUDED IN THE 22 TESTS WERE FIVE TESTS OF LARGER CASKS, WEIGHING ABOUT 11,350 LBS. THE LARGER CASK TEST RESULTS COMPARED FAVORABLY WITH THE SMALLER CASK TEST RESULTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$7.60 CY, \$2.42 MF

IMPACT SHOCK + STRUCTURAL INTEGRITY + TEST, DESTRUCTIVE + TEST, DROP

3-12690 SHAPPERT LB
PRELIMINARY EXPERIMENTAL GAS-COOLED REACTOR SPENT FUEL SHIPPING CASK DESIGN
OAK RIDGE NATIONAL LABORATORY
ORNL-TM-1001 +. 18 PAGES, JANUARY 1965

ACCESSION NUMBER 3-12683 TO 3-12690

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12690 *CONTINUED*

A PRELIMINARY DESIGN AND APPROPRIATE DESIGN INFORMATION WERE DEVELOPED FOR AN EXPERIMENTAL GAS-COOLED REACTOR IRRADIATED FUEL SHIPPING CASK. CRITERIA EXAMINED INCLUDED CRITICALITY, SHIELDING, FISSION PRODUCT HEAT DISSIPATION, STRUCTURAL INTEGRITY AND FIRE PROTECTION. A PRELIMINARY CASK OPERATING PROCEDURE WAS ALSO DEVELOPED. IT WAS CONCLUDED THAT SUCH A CASK COULD BE DESIGNED TO CONFORM WITH ALL THE REQUIREMENTS OF THE PROPOSED CODE OF FEDERAL REGULATIONS, TITLE 10, PART 72, DATED SEPTEMBER 23, 1961.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.00 CY

CRITICALITY SAFETY + EGCR (EXPERIMENTAL GAS COOLED REACTOR) + EQUIPMENT DESIGN + HEAT TRANSFER + REACTOR, GAS COOLED + REACTOR, GRAPHITE MODERATED + SHIELDING + SHIPPING ANALYSIS

3-12691 EVANS JH + LLEWELLYN GH + PICKEL TW + SPALLER AE + WIELAND BW
ANALYSIS OF HFIR IRRADIATED FUEL ELEMENT SHIPPING CASK
OAK RIDGE NATIONAL LABORATORY
ORNL-TM-959 +. 161 PAGES, JANUARY 1965

AN ANALYSIS IS PRESENTED OF THE HFIR ELEMENT SHIELDED TRANSFER CASK LOADED WITH A HFIR CORE WHICH HAS BEEN OPERATED FOR 15 DAYS AT 100 MW(T) AND SUBSEQUENTLY STORED FOR NINE MONTHS. THE CALCULATED RESULTS PERTAINING TO STRUCTURAL INTEGRITY, HEAT REMOVAL, FIRE RESISTANCE, AND SHIELDING ESTABLISH COMPLIANCE WITH REQUIREMENTS FOR BUREAU OF EXPLOSIVES APPROVAL AND WITH CRITERIA STATED IN THE PROPOSED AEC REGULATION 10 CFR 72, PROTECTION AGAINST RADIATION IN THE SHIPMENT OF IRRADIATED FUEL ELEMENTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

CRITICALITY SAFETY + EQUIPMENT DESIGN + HEAT TRANSFER + HFIR (HIGH FLUX ISOTOPE REACTOR) + REACTOR, RESEARCH + REACTOR, TEST + SHIELDING + STRUCTURAL INTEGRITY

3-12693 SCHUSKE CL
DESCRIPTION OF A PLUTONIUM AND ENRICHED URANIUM SHIPPING CONTAINER AND INTEGRITY TESTS ON THIS CONTAINER
DOW CHEMICAL COMPANY, ROCKY FLATS DIVISION, DENVER
RFP-290 +. 10 PAGES, NOVEMBER 16, 1962

THE M-101, AN ALL-STEEL SHIPPING CONTAINER AND SAFETY CAGE, WAS IN USE FOR ABOUT 15 YEARS FOR TRANSPORTING AND STORAGE OF ENRICHED U. WITH SLIGHT MODIFICATIONS AND THE ADDITION OF AN INNER CONTAINER, THE M-101 CAN BE USED TO SHIP PU METAL. VARIOUS PHYSICAL TESTS PERFORMED ON THE M-101 AND INNER CONTAINER ARE DESCRIBED, AND CRITICAL ARRAY SIZES UNDER VARIOUS CONDITIONS OF SPACING AND FLOODING ARE DISCUSSED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.10 CY, \$0.80 MF

CRITICALITY SAFETY + EQUIPMENT DESIGN + PLUTONIUM + SHIPPING CONTAINER + STRUCTURAL INTEGRITY

3-12694 POINDEXTER A
AIR TRANSPORTATION OF RADIOACTIVE MATERIALS INITIAL INVESTIGATION. A FINAL ENGINEERING REPORT FOR MARCH 3, 1959 TO OCTOBER 3, 1959
AMF ATOMICS INC., GREENWICH, CONN.
RADC-TR-59-198 + AD-229854 + ER-7558 + PB-157724 +. 205 PAGES, OCTOBER 1959, PROJECT 6185

A STUDY IS GIVEN OF THE LOGISTICS, ECONOMICS, AND SAFETY ASPECTS OF AIR TRANSPORTATION OF RADIOACTIVE MATERIALS ARISING FROM THE USE OF SMALL NUCLEAR POWER REACTORS AND RADIOISOTOPE ENERGY SOURCES. THE PRINCIPAL RADIOACTIVE MATERIALS WHICH MAY BE SHIPPED IN CONNECTION WITH THE OPERATION OF SMALL NUCLEAR POWER PLANTS ARE - SPENT REACTOR FUEL, RADIOACTIVE WASTES, SMALL RADIOACTIVE COMPONENTS OF THE PLANT, AND FRESH REACTOR FUEL. ALL OF THESE MATERIALS CAN BE SHIPPED ON A C-130 AIRPLANE WITH LITTLE SPECIAL EQUIPMENT OTHER THAN SHIELDED SHIPPING CASKS. SHIPMENTS OF THESE MATERIALS CAN BE MADE WITHOUT CREATING A SERIOUS RADIOACTIVE HAZARD TO THE HEALTH OF THE PUBLIC EVEN IN THE EVENT OF A SERIOUS ACCIDENT. OPTIMIZED SHIPPING PLANS ARE GIVEN FOR THE SM-1 AND SL-1 REACTORS IN REMOTE ARCTIC LOCATIONS. PRELIMINARY DESIGNS OF SHIPPING CASKS AND OTHER EQUIPMENT ARE SHOWN.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$14.00 CY

AIRCRAFT + ECONOMIC STUDY + REACTOR, ARMY + REACTOR, BOILING WATER + REACTOR, PRESSURIZED WATER + SAFETY STUDY + SHIELDING + SHIPPING CONTAINER + SL 1 (STATIONARY LOW POWER PLANT) + SM 1 (STATIONARY MEDIUM POWER PLANT) + WASTE TRANSPORTATION

3-12697 FAIRBAIRN A
THE APPROVAL OF AUTHORITY TRANSPORT CONTAINERS FOR RADIOACTIVE AND SPECIALLY HAZARDOUS NON-RADIOACTIVE ATOMIC ENERGY MATERIALS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, RISLEY
RPS(59)P2 +. 3 PAGES, FEBRUARY 1959

ABSTRACT IS NOT AVAILABLE FOR THIS DOCUMENT.

ADMINISTRATIVE CONTROLS AND PRACTICES + SHIPPING CONTAINER + UNITED KINGDOM

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12698 MALONEY FJ
JOINT DESIGN AND WELDING OF BORAL
SANDIA CORPORATION, NEW MEXICO
SC-DC-706 +. 16 PAGES, MAY 8, 1957

ABSTRACT IS NOT AVAILABLE FOR THIS DOCUMENT.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.30 COPY, \$2.40 MICROFILM

BORON + CRITICALITY SAFETY + FABRICATION + STRUCTURAL INTEGRITY

3-12699 BADER SE
HEAT TRANSFER IN LIQUID HYDROCARBON FUEL FIRES
SANDIA CORPORATION, ALBUQUERQUE, N. MEX.
SC-R-64-1366 + CONF-641201-14 +. 45 PAGES, DECEMBER 1964, AMERICAN INSTITUTE OF CHEMICAL ENGINEERS ANNUAL MEETING, BOSTON

IN RECENT YEARS THERE HAS BEEN AN INCREASED INTEREST IN THE BEHAVIOR OF ITEMS OR SYSTEMS EXPOSED TO FIRES RESULTING FROM ACCIDENTS. INCLUDED AMONG THESE ARE SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS. THE RESPONSE OF AN ITEM TO A FIRE ENVIRONMENT IS A FUNCTION OF THE DESIGN OF THE ITEM, THE PHYSICAL CONDITION OF THE ITEM AFTER THE ACCIDENT, ITS POSITION RELATIVE TO THE FIRE, AND THE FIRE ENVIRONMENT ITSELF. PRESENTED ARE A DESCRIPTION OF THE FIRE ENVIRONMENT, THE DEVELOPMENT OF AN ANALYTICAL FIRE MODEL, AND A METHOD USED SUCCESSFULLY TO SIMULATE FIRE ENVIRONMENTS. IN ADDITION, COMPARISONS BETWEEN COMPUTED AND EXPERIMENTALLY DETERMINED DATA ARE MADE.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.00 CY

FIRE + HEAT TRANSFER

3-12700 THE EFFICIENT IMPORTATION AND DISTRIBUTION OF RADIOISOTOPES. SUGGESTIONS FOR THE MOST ECONOMIC IMPORTATION OF RADIOISOTOPES. TECHNICAL REPORT SERIES NO. 19
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA
STI/DOC/10/19 +. 26 PAGES, AUGUST 1963

IMPORT PROCEDURES GOVERNING RADIOISOTOPES ARE REVIEWED. IT IS POINTED OUT THAT IN MOST COUNTRIES THE IMPORTATION OF RADIOISOTOPES IS SUBJECT TO THE GENERAL LAWS AND REGULATIONS REGARDING CONTROL OF FOREIGN EXCHANGE, IMPORT LICENSE, AND CUSTOMS CLEARANCE, PLUS SPECIAL LAWS AND REGULATIONS COVERING SPECIAL HAZARDS INVOLVED. AUTHORIZATIONS THAT MAY BE NECESSARY FOR EACH SHIPMENT ARE OUTLINED. OTHER TOPICS DISCUSSED INCLUDE THE CHOICE OF SUPPLIERS, MEANS OF TRANSPORTATION, SIZE OF SHIPMENTS, THE IMPORTATION OF LABELED COMPOUNDS, THE PRODUCTION OF SHORT-LIVED RADIOISOTOPES, THE DISTRIBUTION OF ISOTOPES, AND THE DOMESTIC PRODUCTION OF LABELED COMPOUNDS.

AVAILABILITY - INTERNATIONAL ATOMIC ENERGY AGENCY (NEW YORK OR GENEVA), \$1.00 CY

REGULATION, IAEA + TRANSPORTATION AND HANDLING

3-12701 LEMMON GV
CONTROLLED VENTING OF STORAGE AND SHIPPING CONTAINERS
SANDIA CORPORATION
SCTM-9-55(12) +. 14 PAGES, JANUARY 31, 1955

A RECOMMENDATION IS MADE THAT FUTURE CONTAINERS DESIGNED BY SANDIA CORPORATION FOR THE PROTECTION OF LARGE ORDNANCE ITEMS BE PROVIDED WITH OPEN VENTS FOR CONTROLLING THE MOIST AIR BREATHED, TO AN AMOUNT WHICH CAN BE ECONOMICALLY CONTROLLED BY THE INCLUSION OF A DESICCATING AGENT. A GROUP OF TESTS ARE CITED, WITH THEIR RESULTS, AS EVIDENCE UPON WHICH THIS RECOMMENDATION IS MADE. A FORMULA IS PRESENTED FOR CALCULATING THE AMOUNT OF DESICCANT NECESSARY TO MAINTAIN THE RELATIVE HUMIDITY BELOW 30 PERCENT (CONSIDERED TO BE A SAFE VALUE FROM THE STANDPOINT OF CORROSION) FOR ONE AND ONE-HALF YEARS STORAGE UNDER SEVERE STORAGE CONDITIONS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.30 CY, \$2.40 MF

CORROSION + SHIPPING CONTAINER + VENTILATION SYSTEM

3-12702 FARMER FR
THE PACKAGING, TRANSPORT AND RELATED HANDLING OF RADIOACTIVE MATERIALS
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA
STI/PUB/15/12 +. 64 PAGES, 1961, REVIEW SERIES NO. 12. DEVELOPMENTS IN THE PEACEFUL APPLICATIONS OF NUCLEAR ENERGY. IN ENGLISH, FRENCH, AND RUSSIAN

REQUIREMENTS FOR THE SAFE HANDLING AND TRANSPORT OF RADIOACTIVE AND FISSILE MATERIALS ARE EXPLORED. THE REVIEW SUGGESTS A FRAMEWORK WITHIN WHICH THE DEVELOPMENT OF NATIONAL AND INTERNATIONAL TRAFFIC MAY PROCEED SAFELY. IN PARTICULAR, ASPECTS OF SURFACE AND CONTOUR RADIATION LEVELS, QUANTITY OF RADIOACTIVE MATERIALS, SPECIFICATIONS OF AND ACCEPTANCE TESTS FOR CONTAINERS, AS WELL AS PROBLEMS ASSOCIATED WITH TRANSPORT OF FISSILE MATERIAL ARE CONSIDERED.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12702 *CONTINUED*
AVAILABILITY - INTERNATIONAL ATOMIC ENERGY AGENCY (NEW YORK OR GENEVA), \$1.00
CRITICALITY SAFETY + REGULATION, IAEA + TRANSPORTATION AND HANDLING

3-12703 REGULATIONS FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIALS. SAFETY SERIES NO. 6
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA
STI/PUB/40 +. 76 PAGES, 1961

SAFETY REGULATIONS ARE PROPOSED THAT CAN BE APPLIED TO THE NATIONAL AND INTERNATIONAL
TRANSPORT OF RADIOACTIVE MATERIALS BY ALL MEANS.

AVAILABILITY - INTERNATIONAL ATOMIC ENERGY AGENCY (NEW YORK OR GENEVA)
REGULATION, IAEA

3-12704 BIGGS BB
A SHIPPED CONTAINER FOR TRANSPORTING RADIOACTIVE SPENT FUEL
KNOLLS ATOMIC POWER LABORATORY
IID-6395 +. 6 PAGES, JULY 15, 1960

A CONTAINER FOR TRANSPORTING SPENT NUCLEAR FUEL TO REPROCESSING PLANTS IS DESCRIBED. THE
CONTAINER IS SAFE, READILY HANDLED, AND REUSABLE.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.80 CY
EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12705 NUCLEAR SAFETY GUIDE, 1961
GOODYEAR ATOMIC CORPORATION, PORTSMOUTH, OHIO
TID-7016 (REV. 1) +. 42 PAGES, 1961, REVISED BY SUBCOMMITTEE 8 OF THE AMERICAN STANDARDS ASSOCIATION
SECTIONAL COMMITTEE N6 AND PROJECT 8 OF THE AMERICAN NUCLEAR SOCIETY STANDARDS COMMITTEE

THE GUIDE CONTAINS RECOMMENDATIONS FOR ARRAYS OF INDIVIDUALLY SUBCRITICAL UNITS THAT MAY BE
APPLIED TO PROCESSING PLANT LAYOUT, TO STORAGE, AND TO THE ARRANGEMENT OF FISSIONABLE
MATERIALS SHIPMENT. PARTICULAR ATTENTION WAS DIRECTED TO ENSURING THE VALIDITY OF THE
INCLUDED SAFETY FACTORS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$0.50 CY
CRITICALITY SAFETY

3-12706 HENRY HF
GUIDE TO SHIPMENT OF U-235 ENRICHED URANIUM MATERIALS
OAK RIDGE GASEOUS DIFFUSION PLANT
TID-7019 +. 82 PAGES, JUNE 1959

BASIC CRITERIA APPLICABLE TO THE SHIPMENT OF U MATERIALS ENRICHED IN U-235 ISOTOPE ARE
PRESENTED. THE MANUAL IS PRESENTED AS A GUIDE RATHER THAN A SOURCE OF ANSWERS TO SPECIFIC
PROBLEMS AND IS CONCERNED ONLY WITH NUCLEAR SAFETY ASPECTS. GENERAL PROVISIONS ARE GIVEN
INCLUDING DEFINITIONS, FOLLOWED BY BASIC NUCLEAR SAFETY REQUIREMENTS, AND A DISCUSSION OF
SHIPPING CONTAINERS. ALSO, INCLUDED ARE VARIOUS CONTAINER SYSTEM DRAWINGS AS WELL AS NUCLEAR
SAFETY DATA.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.00 CY
CRITICALITY SAFETY + EQUIPMENT DESIGN

3-12707 BATIE RV
SHIPPING OF RADIOACTIVE MATERIALS AT THE NATIONAL REACTOR TESTING STATION
U. S. ATOMIC ENERGY COMMISSION, IDAHO OPERATIONS OFFICE
TID-7569 (PP. 68-73) +. 6 PAGES, PROCEEDINGS OF THE 1958 ATOMIC ENERGY COMMISSION AND CONTRACTOR SAFETY
AND FIRE PROTECTION CONFERENCE, HELD AT ATOMIC ENERGY COMMISSION HEADQUARTERS BUILDING, GERMANTOWN,
MARYLAND, JUNE 24-25, 1958

A REVIEW OF THE SHIPMENT PROCEDURES FOR RADIOACTIVE MATERIALS AT THE NATIONAL REACTOR TESTING
STATION AND AN OUTLINE OF THE PROBLEMS INVOLVED IN THESE SHIPMENTS IS PRESENTED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.50 CY
NRTS (NATIONAL REACTOR TEST STATION) + REVIEW + TRANSPORTATION AND HANDLING

3-12708 KNAPP HA
COST AND SAFETY CONSIDERATIONS IN THE TRANSPORT OF RADIOACTIVE MATERIALS

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12708 *CONTINUED*
U. S. ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.
TID-7569 (PP. 54-67) +. 14 PAGES, PROCEEDINGS OF THE 1958 ATOMIC ENERGY COMMISSION AND CONTRACTOR SAFETY AND FIRE PROTECTION CONFERENCE, HELD AT ATOMIC ENERGY COMMISSION HEADQUARTERS BUILDING, GERMANTOWN, MARYLAND, JUNE 24-25, 1958

THE OBJECT OF THIS PRESENTATION IS TO SUMMARIZE, ON THE BASIS OF AVAILABLE INFORMATION, THE FREQUENCY AND SEVERITY OF ACCIDENTS THAT CAN BE EXPECTED IN RAIL, AIR, AND TRUCK SHIPMENTS OF RADIOACTIVE MATERIALS AND TO DESCRIBE THE METHOD FOR DECIDING WHEN GREATER SAFETY DURING SHIPMENT IS WORTH ADDITIONAL COST.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.50

ACCIDENT, TRANSPORTATION + STATISTICAL ANALYSIS + STRUCTURAL INTEGRITY

3-12709 LICHLITER JS
EVALUATION OF URANIUM SHIELDING IN THE TRANSPORTATION OF RADIOISOTOPES
UNIVERSITY OF CALIFORNIA, BERKELEY, LAWRENCE RADIATION LABORATORY
TID-7599 (P. 450-7) +. 7 PAGES, 1965

URANIUM HAS SEVERAL ADVANTAGES AS A GENERAL SHIELDING MATERIAL FOR RADIOISOTOPE SHIPPING CONTAINERS. IT HAS A DENSITY OF 18.7, WHILE THAT OF LEAD IS ONLY 11.34. URANIUM IS MORE READILY MACHINABLE THAN TUNGSTEN, AND LESS EXPENSIVE FOR LARGE CONTAINERS THAN THE TUNGSTEN-NICKEL-COPPER ALLOYS. EACH INCH OF URANIUM GIVES ABOUT 65 PERCENT MORE SHIELDING THAN 1 INCH OF LEAD FOR 1-MEV GAMMA RAYS. THE URANIUM METAL IS EASILY CONTAINED TO PREVENT CONTAMINATION. IN WEEKLY AIR SHIPMENTS OF NA-24 FROM OAK RIDGE TO LAWRENCE RADIATION LABORATORY, URANIUM SHIELDING MATERIAL SAVED AN ESTIMATED \$5,000 PER YEAR IN SHIPPING COSTS. VARIOUS COMBINATIONS OF NESTING URANIUM CONTAINERS WERE DESIGNED AND FABRICATED FOR SAFE SHIPMENT OF IRRADIATED SLUGS FROM REACTORS. SPECIAL PROBLEMS OF DESIGN TO MEET COMPLEX REQUIREMENTS OF AIR TRANSPORTATION ARE CONSIDERED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$26.00 CY, \$16.94 MF

AIRCRAFT + ECONOMIC STUDY + EQUIPMENT DESIGN + SHIPPING CONTAINER + URANIUM

3-12710 HUGHES CW
METAL SPACE FRAME SHIPPING CONTAINERS
WESTINGHOUSE ELECTRIC CORP., BETTIS ATOMIC POWER DIVISION
TIO-7581 (PP. 215-23) +. 9 PAGES, 1965

THE DEVELOPMENT OF INSIDE AND OUTSIDE SHIPPING CONTAINERS ARE REPORTED. ONE CONTAINER WAS BUILT OUT OF WELDED STEEL ANGLE. THE COST AND LENGTH OF TIME FOR CONSTRUCTION OF THIS CONTAINER SHOWED THAT ANOTHER METHOD WAS NEEDED. A CONTAINER BUILT OF PRE-SLOTTED STEEL ANGLE PROVED TO BE INEXPENSIVE, QUICKLY ASSEMBLED, AND LIGHT IN WEIGHT. A SERIES OF DROP AND VIBRATION TESTS WAS PERFORMED ON THE PRE-SLOTTED STEEL ANGLE CONTAINERS. THEY WERE FOUND TO PERFORM SATISFACTORILY. THREE DIFFERENT TYPES OF INNER CONTAINERS ARE DISCUSSED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$15.00 CY, \$7.01 MN

ECONOMIC STUDY + EQUIPMENT DESIGN + FABRICATION + SHIPPING CONTAINER + TEST, DROP + VIBRATION

3-12711 LEIMKUHLER FF
AN OPERATIONS RESEARCH STUDY OF THE POTENTIAL ACCIDENT EXPERIENCE AND TOTAL COST OF TRUCK SHIPMENTS OF HIGHLY RADIOACTIVE MATERIALS
PURDUE UNIVERSITY, LAFAYETTE, INDIANA
TIO-7635 (P. 10-21) +. 11 PAGES, AUGUST 1962

THE RISKS AND ECONOMICS INVOLVED IN THE TRANSPORTATION OF HIGHLY RADIOACTIVE MATERIALS BY TRUCK WERE STUDIED IN AN ATTEMPT TO IDENTIFY THE SIGNIFICANT FACTORS AND RELATIONSHIPS THAT APPLY AND TO DEVELOP ACCEPTABLE METHODS OF OPTIMIZING TRANSPORTATION SAFETY AND TRANSPORTATION COSTS. A SCHEMATIC DIAGRAM IS PRESENTED OF A MODEL SYSTEM FOR THE TRANSPORTATION OF RADIOACTIVE MATERIALS. THE MODEL IS EVALUATED FOR ACCIDENT CHARACTERISTICS, VEHICLE AND CONTAINER DESIGN, OPERATING COSTS, OPERATIONAL CONTROLS, AND DECISION PROCESSES.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75 CY

ACCIDENT MODEL + ACCIDENT, TRANSPORTATION + ECONOMIC STUDY + HAZARDS ANALYSIS

3-12712 MORGAN JM + JOSEPH AB + STEVENSON JD + JAMISON DK
REPORT OF WORKING MEETING ON SHIPPING CONTAINER TESTING PROGRAMS AT THE JOHNS HOPKINS UNIVERSITY, MAY 2-3, 1962
JOHNS HOPKINS UNIVERSITY, BALTIMORE
TID-7635 +. 154 PAGES, AUGUST 1962

SEPARATE ABSTRACTS WERE PREPARED ON A NUMBER OF PAPERS PRESENTED AT THIS MEETING AND ARE GIVEN.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12712 *CONTINUED*
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75 CY

SAFETY REVIEW (OPERATIONS, EXPERIMENTS)

3-12713 HAFF KW
ORNL CASK TESTING PROGRAM
OAK RIDGE NATIONAL LABORATORY
TID-7635 (P. 28-32) +. 5 PAGES, AUGUST 1962

RESULTS ARE REPORTED FROM NON-DESTRUCTIVE TESTS AND FIRE TESTS ON ORNL CASKS DESIGNED FOR USE IN SHIPPING RADIOACTIVE MATERIALS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75

FIRE + HEAT TRANSFER + TEST, NONDESTRUCTIVE

3-12714 MORGAN JM
REVIEW OF CONSEQUENCES AND COST OF ACCIDENTS IN THE TRANSPORTATION OF HIGHLY RADIOACTIVE MATERIALS
VIRGINIA MILITARY INSTITUTE, LEXINGTON
TID-7635 (PP. 21-8) +. 7 PAGES, AUGUST 1962

EVALUATIONS WERE MADE OF THE POSSIBLE CONSEQUENCES OF ACCIDENTAL RELEASES OF HIGH LEVEL RADIOACTIVE MATERIALS DURING SHIPMENT. TRUCK ACCIDENT SITUATIONS ARE VISUALIZED, UNIT COSTS FOR REMEDIAL OPERATIONS CITED, AND LOSSES ESTABLISHED. THE FOLLOWING ITEMS, PERTINENT TO COST ANALYSIS, ARE REVIEWED - TRANSPORTATION PRACTICES, AND SHIPPING CONTAINERS, ABILITY OF LARGE METROPOLITAN AREAS TO HANDLE ACCIDENT SITUATIONS, CHARACTERISTICS OF THE HIGH LEVEL WASTES, FATE OF RADIOACTIVE MATERIALS IN THE ENVIRONMENT, REMOVAL OF RADIOACTIVE NUCLIDES BY WATER TREATMENT FACILITIES, AND DECONTAMINATION PROCEDURES.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75

ACCIDENT, TRANSPORTATION + CONTAMINATION + ECONOMIC STUDY + HAZARDS ANALYSIS + RADIOACTIVITY, RELEASE

3-12715 BECK C
UNIQUE LICENSING PROBLEMS
U. S. ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.
TID-7635 (PP. 81-2) +. 2 PAGES, AUGUST 1962

RESULTS ARE REPORTED FROM A REVIEW OF SHIPPING CASKS FOR COMPLIANCE WITH THE PROPOSED AEC PART 72 REGULATIONS GOVERNING THE SHIPMENT OF RADIOACTIVE MATERIALS. TOPICS DISCUSSED INCLUDE THE CONTRIBUTION OF THE LEAD SHIELD IN RESISTING IMPACT ON THE CASK, THE BUCKLING OF STRUCTURAL MEMBERS UNDER IMPACT, VIBRATION EFFECTS ON CASKS DURING TRANSPORT, PROTECTION FROM MECHANICAL DAMAGE OF EXTERNAL FUNCTIONAL PARTS OF THE CASK, AND THE EFFECTS OF ROUGH TREATMENT AND LONG USAGE ON STRUCTURAL INTEGRITY OF SHIPPING CONTAINERS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75 CY

IMPACT SHOCK + REGULATION, AEC + SHIPPING CONTAINER + STRUCTURAL INTEGRITY + VIBRATION

3-12716 DUGAN FA
BROOKHAVEN CONTAINER TESTING PROGRAM
BROOKHAVEN NATIONAL LAB.
TID-7635 (PP. 78-80) +. 3 PAGES, AUGUST 1962

RESULTS ARE REPORTED FROM LABORATORY DROP TESTS, MEASUREMENTS OF HEAT GENERATION FROM LOADED CASKS, AND EXAMINATION OF LOADED CASKS INVOLVED IN ACCIDENTS DURING THE TRANSPORTATION OF RADIOACTIVE MATERIALS FOR STRUCTURAL INTEGRITY. THE NEED FOR IMPROVEMENT IN TIE-DOWN ATTACHMENTS FOR CASKS IS DISCUSSED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75

CONTAINER TIEDOWN + HEAT TRANSFER + SHIPPING CONTAINER + STRUCTURAL INTEGRITY + TEST, DROP

3-12717 CLARKE HG
REVIEW OF RESEARCH ON STRUCTURAL INTEGRITY OF SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS
FRANKLIN INSTITUTE, PHILADELPHIA
TID-7635 (PP. 97-111) +. 14 PAGES, AUGUST 1962

RESULTS ARE REPORTED FROM STUDIES ON A VARIETY OF PROBLEMS RELATING TO THE STRENGTH OF SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS. THE OBJECT OF OUR WORK IS TO DEFINE A RATIONAL BASIS FOR ASSESSING THE STRUCTURAL INTEGRITY OF THESE CONTAINERS DURING BOTH NORMAL TRANSPORT OPERATIONS AND ACCIDENTS. THIS HAS REQUIRED THAT WE CONSIDER NOT ONLY THE CONTAINER STRUCTURE ITSELF BUT ALSO THE VEHICLE, THE RIGGING, AND THE GENERAL SHIPPING ENVIRONMENT. OUR INTEREST HAS BEEN PRIMARILY IN THE LARGER CONTAINERS USED TO SHIP HIGH LEVEL WASTES AND IRRADIATED FUEL ELEMENTS BY EITHER RAIL OR HIGHWAY TRANSPORT. THE FINAL

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12717 *CONTINUED*

RESULTS OF THE INVESTIGATION ARE EXPECTED TO BE CRITERIA AND PROCEDURES FOR DESIGNING CONTAINERS THAT HAVE A KNOWN DEGREE OF STRUCTURAL SAFETY IN SHIPMENT AND ARE ALSO NOT TOO COSTLY TO CONSTRUCT.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75

ACCIDENT ANALYSIS + DESIGN CRITERIA + SHIPPING CONTAINER + STRUCTURAL INTEGRITY

3-12718 SHAPPERT LB
CASK TEST PROGRAM AT ORNL
OAK RIDGE NATIONAL LABORATORY
TID-7635 (PP. 83-96) +. 13 PAGES, AUGUST 1962

DATA ARE TABULATED FROM STRAIN MEASUREMENTS AND CAVITY DEFLECTION FOR 8 MODEL SHIPPING CASKS FOR RADIOACTIVE MATERIALS SUBJECTED TO DROP TESTS AT HEIGHTS VARYING FROM 6 IN. TO 16 FT. INSTRUMENTATION USED IN THE TESTS IS DESCRIBED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75

MODEL TESTING + SHIPPING CONTAINER + TEST, DROP

3-12719 BARKER RF
REVIEW OF BRITISH TESTING PROGRAM
U. S. ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.
TID-7635 (PP. 116-21) +. 6 PAGES, AUGUST 1962

THE BRITISH PROGRAM OF TESTING SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS IS REVIEWED. DESIGN FEATURES OF THREE TYPES OF PACKAGING ARE SUMMARIZED. RESULTS ARE INCLUDED FROM A SURVEY OF THE ENVIRONMENT THAT MAY BE ANTICIPATED FOR VARIOUS MODES OF TRANSPORT. METHODS USED IN THE TESTING OF SHIELDED CONTAINERS ARE DISCUSSED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75

DESIGN STUDY + EQUIPMENT DESIGN + SHIPPING CONTAINER + TEST, NONDESTRUCTIVE + TEST, PROOF + UNITED KINGDOM

3-12720 CLAY RG
SHIPPING PROBLEMS AND TESTING AT SANDIA CORPORATION
SANDIA CORPORATION
TID-7635 (P. 112-15) + TID-16551 +. 3 PAGES, AUGUST 1962

THE DESIGN OF CONTAINERS AND HANDLING EQUIPMENT FOR USE DURING THE TRANSPORT OF MATERIALS CONTAINING BOTH HIGH EXPLOSIVES AND NUCLEAR MATERIALS IS DISCUSSED. SPECIAL FEATURES AND TESTING PROCEDURES ARE DESCRIBED FOR A RAILWAY CAR DESIGNED TO REDUCE THE EFFECTS OF ACCIDENTS. DATA ARE INCLUDED FROM ANALYSES OF RAILROAD, TRUCK, AND AIRCRAFT ACCIDENTS THAT MIGHT RESULT IN THE EXPLOSION OF A HIGH EXPLOSIVE DEVICE. ECONOMIC AND WEIGHT FACTORS AFFECTING THE DESIGN OF SHIPPING CONTAINERS ARE DISCUSSED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75 CY

ACCIDENT ANALYSIS + ECONOMIC STUDY + EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12721 PATTERSON DE
DISCUSSION OF AEC TECHNICAL TRANSPORT PROBLEMS
U. S. ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.
TID-7635 (PP. 125-8) +. 3 PAGES, AUGUST 1962

THE EFFECTS OF VARIABLES SUCH AS CONTAINER DESIGN, TIEDOWNS, TRAFFIC CONTROL, AND WEATHER ON SAFETY IN THE TRANSPORT OF RADIOACTIVE MATERIALS ARE CONSIDERED. TECHNICAL TRANSPORT PROBLEMS OF THE AEC ARE REVIEWED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75

CONTAINER TIEDOWN + EQUIPMENT DESIGN + SAFETY PRINCIPLES AND PHILOSOPHY + TRANSPORTATION AND HANDLING

3-12722 ROGERS LR
DISCUSSION OF AEC TECHNICAL TRANSPORT PROBLEMS
U. S. ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.
TID-7635 (PP. 122-4) +. 2 PAGES, AUGUST 1962

PRESENT AND PROPOSED REGULATORY STANDARDS FOR THE TRANSPORT OF RADIOACTIVE MATERIALS ARE DISCUSSED. EMPHASIS IS PLACED ON PROPOSED STANDARDS TO BE USED BY ALL FEDERAL AGENCIES TO AMEND AND REVISE EXISTING TRANSPORT REGULATIONS, THE PART 71 STANDARD DEALING WITH CRITICALITY SAFETY IN SHIPPING FISSIONABLE MATERIAL, AND THE PROPOSED PART 72 STANDARD FOR THE REGULATION OF SHIPPING OF IRRADIATED FUEL ELEMENTS.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12722 *CONTINUED*
AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75

CRITICALITY SAFETY + REGULATION, GENERAL + SAFETY PRINCIPLES AND PHILOSOPHY

3-12723 AEC SYMPOSIUM ON PACKAGING AND REGULATORY STANDARDS FOR SHIPPING RADIOACTIVE MATERIALS, HELD IN GERMANTOWN, MARYLAND, DECEMBER 3-5, 1962
DIVISION OF TECHNICAL INFORMATION, USAEC
TID-7651 +. 417 PAGES, DECEMBER 1962

A TOTAL OF TWENTY PAPERS AND ONE ROUNDTABLE DISCUSSION WERE PRESENTED. SEPARATE ABSTRACTS WERE PREPARED FOR EIGHTEEN OF THE PAPERS. THE PAPERS FOR WHICH NO ABSTRACTS WERE PREPARED ARE CONCERNED WITH IMPACT ENERGY SORPTION BY LARGE SHIPPING CASKS, DESIGN OF A PU AND ENRICHED U SHIPPING CONTAINER, AND THE ROUNDTABLE DISCUSSION ON REGULATORY STANDARDS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

EQUIPMENT DESIGN + IMPACT SHOCK + PLUTONIUM + REGULATION, GENERAL + SHIPPING CONTAINER + URANIUM

3-12724 HITCH JW
DISCUSSION OF AEC TECHNICAL TRANSPORT PROBLEMS
U. S. ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.
TID-7635 (PP. 128-33) +. 6 PAGES, AUGUST 1962

PROBLEMS INVOLVED IN THE SHIPMENT OF RADIOISOTOPES IN BOTH LARGE AND SMALL QUANTITIES, GAMMA SOURCES, AND OTHER RADIOACTIVE MATERIALS ARE REVIEWED. THE IMPORTANCE OF CONTAINER DESIGN IS STRESSED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.75

EQUIPMENT DESIGN + SAFETY PRINCIPLES AND PHILOSOPHY + SOURCE, RADIATION

3-12725 MORGAN JM + KNAPP JW + THOMPSON JT
THEORETICAL CONSEQUENCES OF ACCIDENTS
JOHNS HOPKINS UNIVERSITY, BALTIMORE
TID-7651 (PP. 18-30) +. 22 PAGES, DECEMBER 1962

AN ANALYSIS CONCERNING OCCURRENCES ASSOCIATED WITH THE RELEASE OR SUSPECTED RELEASE OF RADIOACTIVE MATERIALS DURING SHIPMENT IS PRESENTED. THE EMPHASIS IN THE DISCUSSION IS PLACED ON EVALUATION OF THE ECONOMIC FACTORS ASSOCIATED WITH ACCIDENTS INVOLVING RADIOACTIVE CARGOES. TOTAL COSTS OF ACCIDENTS ARE ESTIMATED BY CATEGORIES. THE PHYSICAL CONSEQUENCES OF ACCIDENTS ARE ALSO EXAMINED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

ACCIDENT ANALYSIS + ECONOMIC STUDY + RADIOACTIVITY, RELEASE

3-12726 PATTERSON DE
TYPES AND QUANTITIES OF MATERIALS BEING SHIPPED AND AEC ACCIDENT EXPERIENCE
DIVISION OF OPERATIONAL SAFETY, USAEC
TID-7651 (PP. 3-17) +. 15 PAGES, DECEMBER 1962

ANALYSES OF EXPERIENCE WITH SHIPMENT OF RADIOACTIVE MATERIALS AND INCIDENTS INVOLVING THESE SHIPMENTS ARE PRESENTED. IN A REPORT ON THE ANALYSIS OF SHIPPING EXPERIENCE, A TRANSFER RATE FOR BOTH AEC AND AEC LICENSEES WAS DEVELOPED, HOWEVER THE INCIDENT SUMMARY PERTAINS ONLY TO ACCIDENTS INVOLVING AEC MATERIALS. DETERMINATION OF ACCIDENT FREQUENCY IN THIS REPORT INVOLVES COMPARISON OF ON- AND OFF-SITE INCIDENTS. THE REPORT WHICH SUMMARIZES INCIDENTS INVOLVING AEC SHIPMENTS PROVIDES INFORMATION CONCERNING THE PERFORMANCE OF PACKAGES UNDER ACCIDENT CONDITIONS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

ACCIDENT ANALYSIS + ACCIDENT, TRANSPORTATION + OPERATING EXPERIENCE + STATISTICAL ANALYSIS

3-12727 GEORGE TC
DEVELOPMENT OF INTERSTATE COMMERCE COMMISSION REGULATIONS
ASSOCIATION OF AMERICAN RAILROADS, BUREAU OF EXPLOSIVES, NEW YORK
TID-7651 (PP. 45-54) +. 10 PAGES, DECEMBER 1962

IN THE REVIEW OF REGULATIONS DEVELOPMENT, IT IS NOTED THAT HISTORICAL INFORMATION CONCERNING THESE REGULATIONS IS PRESENTED IN NUCLEAR SCIENCE SERIES REPORT NO. 11. OTHER INFORMATION IS GIVEN CONCERNING THE CONTINUING CHANGES OF REGULATIONS AS NEW MATERIALS APPEAR, SAFETY AND PERSONNEL EXPOSURE CONSIDERATIONS, PREVENTION OF DAMAGE TO FILM IN THE SHIPMENT AREA, AND EXAMPLES OF SHIPPING PERMITS.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12727 *CONTINUED*
AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

REGULATION, GENERAL + REVIEW

3-12728 LEIMKUHLER FF
SAFETY CONSIDERATIONS IN THE TRANSPORTATION OF HIGHLY RADIOACTIVE MATERIALS - AN OPERATIONS RESEARCH APPROACH
PURDUE UNIVERSITY, LAFAYETTE, INDIANA
TID-7651 (PP. 31-44) +. 13 PAGES, DECEMBER 1962

ASPECTS OF DECISION MAKING IN THE AREA OF RADIOACTIVE MATERIALS SHIPMENT-SAFETY ARE DISCUSSED. INCLUDED ARE DISCUSSIONS OF DECISION-MAKING UNDER UNCERTAINTY, ACCIDENT DATA ON TRUCK SHIPMENTS, BALANCING SAFETY AND ECONOMY, AND CONTROL POLICIES. IT IS NOTED THAT AS MORE KNOWLEDGE IS GAINED ABOUT RADIOACTIVE SHIPMENT ACCIDENT RISKS, CONTROL POLICIES CAN BE EXPECTED TO MOVE FROM A CAUTIOUS MINIMAX TYPE OF DECISION TO A MORE ANALYTIC BASIS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, US DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

ACCIDENT ANALYSIS + SAFETY ANALYSIS

3-12729 BARKER RF
U. S. ATOMIC ENERGY COMMISSION REGULATIONS PERTAINING TO FISSIONABLE MATERIALS
DIVISION OF LICENSING AND REGULATION, USAEC
TID-7651 (PP. 88-98) +. 10 PAGES, DECEMBER 1962

A REVIEW OF PROPOSED REGULATIONS 10CFR71 AND 72 IS PRESENTED. THESE REGULATIONS ARE CONCERNED WITH PRECAUTIONS ASSOCIATED WITH SHIPMENT OF SPECIAL NUCLEAR OR FISSIONABLE MATERIALS, AND THE GENERAL CRITERIA FOR DESIGN OF SHIPPING CONTAINERS. IT IS NOTED THAT NUCLEAR SAFETY OF SHIPMENT METHODS MUST BE SUPPORTED BY EXPERIMENTAL DATA, CALCULATIONS, OR PLANS FOR SPECIAL CONTROLS. ASPECTS RELATED TO THE CHOICE OF CONDITIONS TO BE ASSUMED IN APPLYING THE SAFETY CRITERIA ARE DISCUSSED. SPECIFICATIONS FOR SHIPPING CONTAINERS ARE ALSO DISCUSSED FROM THE STANDPOINT OF RUGGEDNESS, CRITICALITY, AND SHIELDING.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

CRITICALITY SAFETY + REGULATION, AEC + REVIEW + SAFETY PRINCIPLES AND PHILOSOPHY + SHIPPING CONTAINER

3-12730 ROGERS LR
INTERAGENCY COMMITTEE WORK ON U. S. TRANSPORTATION REGULATIONS APPLICABLE TO RADIOACTIVE MATERIALS
DIVISION OF LICENSING AND REGULATION, USAEC
TID-7651 (PP. 55-87) +. 32 PAGES, DECEMBER 1962

A REVIEW OF WORK ON REVISIONS TO FEDERAL TRANSPORTATION REGULATIONS APPLICABLE TO RADIOACTIVE MATERIALS IS PRESENTED. BACKGROUND INFORMATION CONCERNING THE INTERAGENCY WORK COMMITTEE AND THE REGULATIONS NOW IN FORCE IS INCLUDED. OTHER INFORMATION IS GIVEN CONCERNING THE OBJECTIVES OF THE REVISION AND PROPOSED CHANGES. RADIOACTIVE SHIPMENT CATEGORIES AND REGULATION COMPARISONS ARE PRESENTED TABULARLY.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

REGULATION, GENERAL + REVIEW

3-12731 GIBSON R + MESSENGER WL
DEVELOPMENT OF TRANSPORT REGULATIONS IN THE UNITED KINGDOM
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, RISLEY
TID-7651 (PP. 103-25) +. 22 PAGES, DECEMBER 1962

A REVIEW AND DISCUSSION OF REGULATION DEVELOPMENT IS PRESENTED IN SECTIONS ON EARLY U.K. REGULATIONS, U.K. POLICY, INTERNATIONAL ATOMIC ENERGY AGENCY (I.A.E.A.) REGULATIONS, AND PRESENT U.K. REGULATIONS. OTHER INFORMATION IS INCLUDED ON PACKAGING, ACCIDENTS, APPROVED PACKAGING DESIGNS, AND FUTURE DEVELOPMENTS. A COMPARISON OF REGULATIONS IN THE U.K. BLUE BOOK AND THE I.A.E.A. TRANSPORT REGULATIONS IS INCLUDED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00

EQUIPMENT DESIGN + REGULATION, GENERAL + REGULATION, IAEA + REVIEW + UNITED KINGDOM

3-12732 MARTIN WA
DEVELOPMENT OF TRANSPORTATION REGULATIONS IN CANADA
BOARD OF TRANSPORT COMMISSIONERS, CANADA
TID-7651 (PP. 99-102) +. 4 PAGES, DECEMBER 1962

A REVIEW OF REGULATIONS NOW IN EFFECT IN CANADA CONCERNING TRANSPORT OF RADIOACTIVE MATERIALS IS PRESENTED ALONG WITH COMMENT CONCERNING DEVELOPMENT AND IMPLEMENTATION OF THESE

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12732 *CONTINUED*
REGULATIONS. A COMMITTEE FORMED IN 1961 BY GOVERNMENT REPRESENTATIVES INTERESTED IN SAFE TRANSPORTATION OF RADIOACTIVE MATERIALS ACCEPTED THE GENERAL CRITERIA IN PAMPHLET NO. 6 AND 7 OF THE INTERNATIONAL ATOMIC ENERGY AGENCY AS BASIS FOR DRAFTING UNIFORM REGULATIONS. RECOMMENDATIONS FOR REVISIONS IN THE PAMPHLETS ARE LISTED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

CANADA + REGULATION, GENERAL + REGULATION, IAEA + REVIEW

3-12733 LANGHAAR JW
PROBLEMS IN DESIGNING CASKS TO MEET REGULATORY STANDARDS
DU PONT DE NEMOURS (E.I.) AND COMPANY, WILMINGTON, DEL.
TID-7651 (PP. 132-44) +. 12 PAGES, DECEMBER 1962

IT IS NOTED THAT AN IMPORTANT FUNCTION OF THE CASK DESIGNER IS TO PRODUCE THE MOST ECONOMICAL DESIGN WHICH IS ACCEPTABLE. DATA-BASED METHODS OF PREDICTING FUEL AND CASK BEHAVIOR ARE REQUIRED FOR DESIGN PROCEDURES IN WHICH COST IS MINIMIZED AND REGULATIONS ARE COMPLIED WITH. FOR SEVERAL REQUIREMENTS OF THE REGULATIONS SET FORTH IN AEC CFR PART 72, ENGINEERING KNOWLEDGE IS INADEQUATE AT PRESENT. DISCUSSIONS ARE PRESENTED IN WHICH THE MOST TROUBLESOME PARAGRAPHS IN THIS REGULATION ARE CONSIDERED SINGLY.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

REGULATION, GENERAL + SAFETY PRINCIPLES AND PHILOSOPHY

3-12734 AIKENS AE
METHODS AND PROBLEMS IN EVALUATING APPROVING CASKS USING SAFETY STANDARDS
DIVISION OF LICENSING AND REGULATION, USAEC
TID-7651 (PP. 126-31) +. 6 PAGES, DECEMBER 1962

IT IS NOTED THAT RESULTS OF EVALUATIONS OF VARIOUS SHIPPING CASK DESIGNS INDICATE THAT IT IS DIFFICULT TO SHOW CONFORMANCE WITH SEVERAL CRITERIA CONTAINED IN A.E.C. CFR 72 (PROPOSED) BECAUSE OF A LACK OF SUFFICIENT DATA OR LACK OF ADEQUATE ANALYTICAL TECHNIQUES. SOME OF THE CRITERIA AGAINST WHICH IT HAS BEEN CONSISTENTLY DIFFICULT TO ASSESS CASK DESIGN ARE DISCUSSED. THE CRITERIA CONSIDERED INCLUDE THOSE WHICH REQUIRE DATA FROM MAJOR TESTING TO PERMIT BETTER ANALYSIS, THOSE WHICH COULD BE DETERMINED BY RELATIVELY SIMPLE EXPERIMENTS, AND THOSE REQUIRING PROOF CONFORMANCE BY PERFORMANCE TESTING.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00

CODES AND STANDARDS + DESIGN CRITERIA + REGULATION, AEC + SAFETY PRINCIPLES AND PHILOSOPHY

3-12735 MCLENDON JD
TESTS OF A PROPOSED URANIUM CONTAINER
Y-12 PLANT, OAK RIDGE, TENNESSEE
TID-7651 (PP. 161-86) +. 25 PAGES, DECEMBER 1962

A SIMPLE, RELATIVELY CHEAP SHIPPING CONTAINER, AVAILABLE FROM MANY POTENTIAL SUPPLIERS, WAS DESIGNED AND TESTED FOR IMPACT AND FIRE. POTENTIAL SUPPLIERS, WAS DESIGNED AND TESTED FOR IMPACT AND FIRE RESISTANCE. ALTHOUGH TESTS WERE LIMITED, RESULTS MEET, OR EXCEED, SPECIFICATIONS OF PROPOSED STANDARDS. IN VIEW OF FAVORABLE FIRE AND IMPACT RESISTANCE, AND CONSIDERING MECHANICAL AND GEOMETRIC DESIGN, IT IS CONCLUDED THAT NUCLEAR SAFETY OF ENRICHED U SHIPMENTS IN THESE CONTAINERS WOULD BE AT LEAST AS GOOD AS THAT EXPERIENCED WITH Y-12 BIRDCAGES. THE CONTAINER CURRENTLY MEETS CLASS II, IAEA REQUIREMENTS. WITH SOME MODIFICATIONS IT IS CONCEIVABLE THAT CLASS I SPECIFICATIONS CAN BE MET.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

FIRE + SHIPPING CONTAINER + STRUCTURAL INTEGRITY + TEST, PROOF

3-12736 HOFFMANN JM
TEST OF FISSION MATERIAL SHIPPING CONTAINERS
DU PONT DE NEMOURS (E.I.) AND COMPANY, WILMINGTON, DEL.
TID-7651 (PP. 145-60) +. 15 PAGES, DECEMBER 1962

AN INVESTIGATION WAS MADE OF THE SHIPPING CONTAINER BIRD CAGE USED FOR PU BU ON SHIPMENTS TO ASSESS WHAT MAY HAPPEN TO IT IN A RAILROAD ACCIDENT. IT WAS FOUND THAT IN / RAPID DECELERATION FROM 30 MPH THE CAGE WOULD SUFFER SEVERE PERMANENT DISTORTION, BUT WOULD REMAIN INTACT.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

PLUTONIUM + STRUCTURAL INTEGRITY + TEST, PROOF

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12737 SHAPPERT LB
THE CASK TESTING PROGRAM AT THE OAK RIDGE NATIONAL LABORATORY
OAK RIDGE NATIONAL LABORATORY
TID-7651 (PP. 211-37) +. 26 PAGES, DECEMBER 1962

A PROGRAM TO DETERMINE HOW SAFE UNBUFFERED, PB-FILLED SHIPPING CASKS ARE WITH RESPECT TO STRUCTURAL INTEGRITY IS DESCRIBED. ACCIDENT CONDITIONS CONSIDERED INCLUDE THOSE IN WHICH CASKS STRIKE UNYIELDING OBJECTS OR ARE IMPALED. RESULTS INDICATE THAT STEEL-SHELLED PB-FILLED CASKS MEET IMPACT REQUIREMENTS, HOWEVER IT APPEARS THAT THE PUNCTURE TEST COULD NOT BE MET. ANOTHER TEST, THOUGHT TO BE REALISTIC, TO REPLACE THE PUNCTURE TEST IS PROPOSED IN WHICH THE CASK IS DROPPED ON A 1-FT-WIDE UNYIELDING BEAM.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

SHIPPING CONTAINER + STRUCTURAL INTEGRITY + TEST, DROP + TEST, PROOF

3-12738 THISELL WI
STATIC AND IMPACT TESTS ON A FULL-SCALE, IRRADIATED FUEL SHIPPING CASK
DU PONT DE NEMOURS (E.I.) AND COMPANY, WILMINGTON, DEL.
TID-7651 (PP. 197-210) +. 14 PAGES, DECEMBER 1962

A 15-TON, LEAD-SHIELDED STEEL CASK USED FOR RAIL SHIPMENT OF IRRADIATED FUEL WAS SUBJECTED TO STATIC AND IMPACT TESTS. THE TESTS ARE DESCRIBED AND RESULTS ARE SUMMARIZED. REPORTED IN MORE DETAIL IN DP-843.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

SHIPPING CONTAINER + STRUCTURAL INTEGRITY + TEST, DESTRUCTIVE + TEST, NONDESTRUCTIVE

3-12739 HORN LH
FIRE TESTING OF RADIOISOTOPE SHIPPING CONTAINERS AND COBALT 60 TELETHERAPY HEAD
UNDERWRITERS LABS., INC., CHICAGO
TID-7651 (PP. 304-14) +. 10 PAGES, DECEMBER 1962

STANDARD 1-HR FIRE TESTS IN WHICH 1000 F IS REACHED AFTER 5 MIN FROM START, 1300 AFTER 10 MIN, 1550 AFTER 30 MIN, AND 1700 AFTER 1 HR WERE PERFORMED ON A TYPE 2 R RADIOACTIVE SHIPPING CONTAINER, A TYPE 55 RADIOACTIVE SHIPPING CONTAINER, AND A CO-60 TELETHERAPY HEAD. ONLY THE TYPE 2 R CONTAINER, CONSTRUCTED OF STAINLESS STEEL, WITHSTOOD THE TEST. THE OTHER TWO ITEMS LOST SHIELDING OR CRACKED. DATA AND DISCUSSION CONCERNING THE TESTS ARE INCLUDED. REPORTED IN DETAIL IN COO-274.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

COBALT + FIRE + TEST, DESTRUCTIVE

3-12740 DIXON FE
THE DESIGN OF SHIELDED CONTAINERS TO I.A.E.A. STANDARDS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL
TID-7651 (PP. 331-93) + TCAP/P.64 +. 62 PAGES, DECEMBER 1962

PROBLEMS ENCOUNTERED IN DESIGN OF LEAD SHIELDED CONTAINERS TO THE STANDARDS OF THE INTERNATIONAL ATOMIC ENERGY AGENCY ARE DISCUSSED. THE EFFECTS OF HEAT ON PB-FILLED CONTAINERS AND PROTECTION METHODS TO PREVENT HEAT AND MECHANICAL DAMAGE ARE ALSO DISCUSSED. TEST PROGRAMS ARE DESCRIBED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

DESIGN CRITERIA + FIRE + UNITED KINGDOM

3-12741 MELDRUM R
A PROPOSED STUDY OF RAIL AND HIGHWAY TRANSPORT SYSTEMS DURING A CREDIBLE ACCIDENT
OFFICE OF THE CHIEF OF TRANSPORTATION, WASHINGTON, D.C.
TID-7651 (P. 315-30) +. 15 PAGES, DECEMBER 1962

PROPOSALS FOR STUDY CONCERNED WITH THE MAGNITUDE, ORIENTATION, AND DISTRIBUTION OF SHOCK FORCES DURING RAIL AND HIGHWAY ACCIDENTS ARE DISCUSSED. THE STUDY WOULD BE CONDUCTED TO PROVIDE A BASIS FOR ESTABLISHING STANDARDS, DESIGNS AND PROCEDURES THAT WILL ASSURE MAXIMUM PRACTICAL SAFETY AT MINIMUM COST IN THE TRANSPORT OF RADIOACTIVE MATERIALS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00

ACCIDENT, TRANSPORTATION + IMPACT SHOCK + SAFETY STUDY

3-12742 NUCLEAR MATERIALS IN TRANSIT
ARGONNE NATIONAL LABORATORY

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12742 *CONTINUED*
TID-7660 (P. 155-65) +. 10 PAGES, 1965

THE PREVENTION OF CRITICALITY IN SHIPMENTS OF SPECIAL NUCLEAR MATERIALS IS DISCUSSED. REGULATIONS FOR CONTROLLING SHIPMENTS ARE REVIEWED. TESTING OF SHIPPING CONTAINERS TO ASSURE SAFETY IS CONSIDERED. THE STRATEGIC IMPORTANCE OF FISSIONABLE MATERIALS IS DISCUSSED AS ONE REASON FOR PROTECTION IN TRANSPORT. EDUCATION OF THE TRANSPORTATION INDUSTRY IN THE HAZARDS AND PRECAUTIONS IN SHIPPING NUCLEAR MATERIALS IS DESCRIBED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.00 CY

CRITICALITY SAFETY + HAZARDS ANALYSIS + REGULATION, GENERAL + TEST, PROOF

3-12743 ZAHN LL + BROWN CL + LANGHAAR JW
TRANSPORTATION OF RADIOACTIVE MATERIALS
HANFORD ATOMIC PRODUCTS OPERATION + BATTELLE-NORTHWEST + DU PONT DE NEMOURS (E.I.) AND COMPANY,
WILMINGTON, DEL.
TID-8541 (PP. 249-319) +. 69 PAGES, 1965

A DISCUSSION OF PAST EXPERIENCE IN SHIPPING OF RADIOACTIVE MATERIALS WITHIN THE UNITED STATES IS PRESENTED. THE OVERALL CONSIDERATIONS AND RELATIONS THAT GOVERN TRANSPORT-SYSTEM DESIGNS AS A FUNCTION OF THE MATERIAL TO BE SHIPPED, THE MODE OF TRANSPORT, AND OTHER FACTORS, ARE SUMMARIZED. THE CURRENT STATUS OF STANDARDS AND REGULATIONS, RESEARCH AND DEVELOPMENT PROGRAMS, AND CURRENT TRANSPORT PRACTICE THROUGH THE UNITED STATES, ARE SUMMARIZED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$4.00 CY, \$2.50 MF

OPERATING EXPERIENCE + REGULATION, AEC + SAFETY PRINCIPLES AND PHILOSOPHY + SHIPPING ANALYSIS

3-12744 BRODSKY A + BEARD GV
A COMPENDIUM OF INFORMATION FOR USE IN CONTROLLING RADIATION EMERGENCIES, INCLUDING LECTURE NOTES FROM A TRAINING SESSION AT IDAHO FALLS, IDAHO, FEBRUARY 12-14, 1958
OFFICE OF HEALTH AND SAFETY, USAEC
TID-8206 +. 102 PAGES, FEBRUARY 1960

INFORMATION IS SUMMARIZED WHICH MAY BE NEEDED BY TRAINED PERSONNEL IN EXERCISING RAPID AND PROFESSIONAL JUDGMENT DURING THE PERIOD IMMEDIATELY FOLLOWING AN UNEXPECTED RADIOLOGICAL INCIDENT. PAST EXPERIENCES IN RADIATION ACCIDENTS ARE REVIEWED. THE SHIPMENT OF RADIOACTIVE MATERIALS AND THE CONTROL OF FIRES DURING RADIATION EMERGENCIES ARE DISCUSSED. THE RESULTS OF FUEL ELEMENT BURN TESTS ARE REVIEWED AND MONITORING ACTIVITIES ARE DESCRIBED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.00 CY

ACCIDENT, TRANSPORTATION + EMERGENCY PROCEDURE + FIRE + RADIOACTIVITY, RELEASE

3-12745 PATTERSON DE + DEFATTA VP
A SUMMARY OF INCIDENTS INVOLVING USAEC SHIPMENTS OF RADIOACTIVE MATERIAL, 1957-1961
DIVISION OF OPERATIONAL SAFETY, USAEC
TID-16764 +. 80 PAGES, 1962

DATA ARE SUMMARIZED ON INCIDENTS THAT HAVE BEEN SUSTAINED BY THE AEC IN THE TRANSPORT OF RADIOACTIVE MATERIALS FROM 1957 THROUGH 1961. IN THE PERIOD COVERED BY THIS REPORT THERE WERE 47 INCIDENTS REPORTED. TWENTY-NINE DID NOT RESULT IN THE RELEASE OF RADIOACTIVE MATERIALS. OF THE REMAINING 18 CASES THERE WAS NONE THAT INVOLVED ANY SERIOUS RADIOLOGICAL CONSEQUENCES OR INVOLVED COSTLY CLEANUP. SIX OF THE INCIDENTS INVOLVED ONSITE MOVEMENTS OF MATERIALS. THE INCIDENTS ARE CLASSIFIED IN ACCORDANCE WITH THE TYPE OF INCIDENT. PHOTOGRAPHS ARE INCLUDED FOR A NUMBER OF THE INCIDENTS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$0.75

ACCIDENT ANALYSIS + ACCIDENT, TRANSPORTATION + CONTAMINATION + INCIDENT COMPILATION + OPERATING EXPERIENCE + RADIOACTIVITY, RELEASE

3-12746 OTHMER RT
SHOCK AND VIBRATION ENVIRONMENTS TO WHICH SPECIAL PACKAGING IS EXPOSED
SANDIA CORPORATION, ALBUQUERQUE, NEW MEXICO
TID-11367 +. 26 PAGES, 1957, SANDIA PACKAGING SYMPOSIUM, OCTOBER 21-23, 1957

INFORMATION CONCERNING THE ENVIRONMENTS TO WHICH PACKAGING IS SUBJECTED DURING TRANSPORTATION IS PRESENTED. DISCUSSIONS OF VIBRATION ON RAILROADS, RAILROAD SHOCKS, TRUCK TRANSPORTATION, AIRCRAFT TRANSPORTATION, SHIP TRANSPORTATION, AND HANDLING ARE INCLUDED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$4.80 CY, \$2.70 MF

CONTAINER TIFDOWN + TRANSPORTATION AND HANDLING + VIBRATION

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12749 PIQUA-ELK RIVER REACTORS SPENT FUEL SHIPPING CASK. FINAL DESIGN REPORT
KNAPP MILLS INC., WILMINGTON, DEL.
TID-18813 +. APRIL 1, 1963

FOR 16 DRAWINGS RELATING TO THIS REPORT, SEE CAPE-1011. THE PIQUA-ELK RIVER SPENT FUEL SHIPPING CASK, DESIGNED TO TRANSPORT 19 FUEL ASSEMBLIES FROM EITHER REACTOR STARTING 120 DAYS AFTER REACTOR SHUTDOWN FOR REFUELING, IS DESCRIBED. THE MAXIMUM WEIGHT OF THE LOADED CASK IS 30 TONS AND THE DIMENSIONS ARE 55 IN. DIA BY 108 IN. HIGH. THE SPACE ENVELOPE REQUIRED FOR THE CASK AND SHIPPING STRUCTURE IS 7 BY 10 BY 10 FT. THE CASK SYSTEM IS COMPOSED OF 6 MAJOR COMPONENTS - CASK BODY, CLOSURE HEAD, FUEL BASKET, SHIPPING STRUCTURE, LIFTING YOKE, AND ELK RIVER FUEL ASSEMBLY ADAPTERS. INTERNAL SURFACES ARE STAINLESS STEEL AND EXTERNAL SURFACES ARE PAINTED CARBON STEEL. THE ANNULUS BETWEEN THE INNER AND OUTER SHELLS IS FILLED WITH LEAD SHIELDING. THE FUEL BASKET IS AN ALUMINUM CYLINDER IN WHICH 19 CAVITIES WERE MACHINED TO RECEIVE THE FUEL ASSEMBLIES. THE CASK IS DESIGNED FOR DRY SHIPMENT AT ATMOSPHERIC PRESSURE.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$15.00 CY, \$7.04 MF

ELK RIVER + EQUIPMENT DESIGN + PIQUA + REACTOR, BOILING WATER + REACTOR, ORGANIC COOLED + SHIPPING CONTAINER

3-12750 WACHTER JW
PROPOSED IAEA REGULATIONS FOR THE INTERNATIONAL TRANSPORT OF FISSIONABLE MATERIALS
Y-12 PLANT, OAK RIDGE, TENNESSEE
TID-17084 +. 17 PAGES, AIChE SYMPOSIUM ON NUCLEAR SAFETY IN HANDLING RADIOACTIVE FUELS, CHICAGO, DECEMBER 3-6, 1962

THE INTERNATIONAL ATOMIC ENERGY AGENCY CONVENED TWO PANELS OF EXPERTS TO DRAFT PROPOSALS FOR REGULATIONS COVERING THE SAFE TRANSPORT OF ALL TYPES OF RADIOACTIVE MATERIALS. THE GENERAL PROVISIONS OF THESE PROPOSED REGULATIONS ARE REVIEWED. FACTORS AFFECTING THE CRITICALITY OF INTERACTING ARRAYS AND THE HAZARDS OF HANDLING FISSIONABLE MATERIAL CONTAINERS ARE DISCUSSED.

CRITICALITY SAFETY + REGULATION, IAEA

3-12751 WRIGHT N
BIBLIOGRAPHY ON TRANSPORTATION OF RADIOACTIVE MATERIALS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, RISLEY
TRG-INF-SER-239 +. 24 PAGES, SEPTEMBER 6, 1962

A SELECTION OF 192 REFERENCES IS PRESENTED COVERING ALL ASPECTS OF THE TRANSPORTATION OF RADIOACTIVE MATERIALS. REFERENCES ARE INCLUDED TO OFFICIAL REGULATIONS OF MANY COUNTRIES AND THE DESIGN OF TRANSPORT CONTAINERS.

AVAILABILITY - BRITISH INFORMATION SERVICE, 845 THIRD AVENUE, NEW YORK, N.Y., 10022, \$0.42

BIBLIOGRAPHY + EQUIPMENT DESIGN + REGULATION, GENERAL + TRANSPORTATION AND HANDLING + UNITED KINGDOM

3-12752 PIQUA-ELK RIVER REACTORS SPENT FUEL SHIPPING CASK DESIGN REPORT
KNAPP MILLS INC., WILMINGTON, DEL.
TID-21246 +. 179 PAGES, 1962

THE SHIPPING CASK SYSTEM IS DESIGNED TO SHIP 19 FUEL ASSEMBLIES FROM BOTH THE PIQUA AND ELK RIVER REACTOR PLANTS, BY RAIL OR TRUCK. THE DESIGN ANALYSIS INCLUDES SHIELDING ANALYSIS, THERMAL ANALYSIS, STRESS ANALYSIS, FIRE ANALYSIS, AND CRITICALITY ANALYSIS. THE LOADING-UNLOADING PROCEDURES AND TEST PROGRAM ARE DESCRIBED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$5.00 CY

CRITICALITY SAFETY + ELK RIVER + EQUIPMENT DESIGN + FIRE + HEAT TRANSFER + PIQUA + REACTOR, BOILING WATER + REACTOR, ORGANIC COOLED + SHIELDING + STRESS ANALYSIS + STRUCTURAL INTEGRITY

3-12755 BOCK E
TRANSPORT REGULATIONS FOR RADIOACTIVE MATERIALS IN THE USA, GERMANY, FRANCE, UK, RUSSIA ETC. WITH ENCLOSED BIBLIOGRAPHY OF RADIOACTIVE SHIPPING CONTAINERS. A LITERATURE AND OFFICIAL TEXT REVIEW
AKTIEBOLAGET ATOMENERGI, STOCKHOLM, SWEDEN
VDIT-43 +. 85 PAGES, OCTOBER 1961

REGULATIONS COVERING THE TRANSPORT OF RADIOACTIVE MATERIALS IN THE U.S. AND U.K. ARE PRESENTED IN DETAIL. PROPOSED CHANGES ARE DISCUSSED. A LIST IS INCLUDED OF 19 HANDBOOKS AND PUBLICATIONS DEALING WITH THE SHIPMENT OF RADIOACTIVE MATERIALS IN GERMANY, FRANCE, AND RUSSIA, AND REGULATIONS OF THE INTERNATIONAL ATOMIC ENERGY AGENCY.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPT. OF COMMERCE, SPRINGFIELD, VA.

BIBLIOGRAPHY + REGULATION, GENERAL + REGULATION, IAEA + SHIPPING CONTAINER

3-12757 SHIPMENT OF IRRADIATED YANKEE FUEL ELEMENTS
WESTINGHOUSE ELECTRIC CORP., PITTSBURGH, PA.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12757 *CONTINUED*
WCAP-1859 (REV.) +. 123 PAGES, OCTOBER 1961, REVISED JANUARY 1962

A SAFEGUARDS EVALUATION WAS MADE OF THE DESIGN AND PROPOSED USE OF A SHIELDED CASK FOR TRANSPORTING IRRADIATED FUEL ASSEMBLIES FROM THE YANKEE REACTOR SITE TO THE SAVANNAH RIVER REPROCESSING PLANT. THE SHIPMENT OF IRRADIATED FUEL IS TO BE MADE BY SPECIAL RAIL CAR. THE CASK WEIGHS 75 TONS WHEN FULLY LOADED. FUEL ASSEMBLIES ARE POSITIONED WITHIN THE CENTRAL CAVITY BY A COPPER-POISON BASKET WITH A CORROSION-RESISTANT CLADDING, WHICH SERVES AS A MECHANICAL SUPPORT AND A PERMANENT NEUTRON POISON. THE BOLTED CLOSURE-HEAD CONTAINS MECHANICAL COMPONENTS OF THE CASK INTERNAL COOLING SYSTEM. IN THE EVENT THAT THE CASK-COOLING SYSTEMS ARE DISABLED BY ACCIDENT, HEAT DISSIPATION FROM THE FINNED OUTER SURFACE OF THE CASK IS SUFFICIENT TO PREVENT THERMAL DAMAGE AND FISSION PRODUCT RELEASE FROM THE FUEL.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA.

CRITICALITY SAFETY + EQUIPMENT DESIGN + HEAT TRANSFER + REACTOR, PRESSURIZED WATER + SAFETY ANALYSIS + SHIPPING CONTAINER + YANKEE

3-12758 CREAGAN RJ + HENRY AF
URANIUM HANDLING FOR CVR EXPERIMENTS
WESTINGHOUSE ELECTRIC CORPORATION, PITTSBURGH
WAPD-RM-145 +. 18 PAGES, OCTOBER 21, 1952, DECLASSIFIED MARCH 12, 1957

CRITICALITY AND RADIOACTIVITY CONSIDERATIONS FOR PROCESSING AND SHIPPING A1-CLAD NATURAL-U PODS ABOUT 5 FT LONG ARE GIVEN. THE MATERIAL IS FOR CARRIER VESSEL REACTOR CRITICALITY EXPERIMENTS AT BNL AND WAPD.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.30 CY, \$2.40 MF

CRITICALITY SAFETY + TRANSPORTATION AND HANDLING

3-12759 SAXTON PLUTONIUM PROGRAM PROGRESS REPORT FOR THE PERIOD ENDING MARCH 31, 1965
WESTINGHOUSE ELECTRIC CORP., PITTSBURGH
WCAP-3345-3 + EURAEC-1368 +. 54 PAGES, APRIL 1965

REPORTS ACTIVITIES IN A PROGRAM TO DEVELOP INFORMATION CONCERNING THE UTILIZATION OF PU-ENRICHED FUEL IN PRESSURIZED WATER REACTOR SYSTEMS, THROUGH DESIGN, FABRICATION AND OPERATION OF A PARTIAL CORE OF PUO2--UO2 FUEL IN THE SAXTON REACTOR. IN ADDITION, A FUEL SHIPPING-CONTAINER DESIGN WAS FOUND TO BE SAFE NUCLEARLY FOR SHIPMENT OF FOUR SAXTON 9 BY 9 ASSEMBLIES. CRITICALS WERE RUN WITH 5.7 PERCENT ENRICHED PELLETIZED UO2 FUEL RODS. CRITICALS WITH PELLETIZED PUO2--UO2 FUEL RODS ARE SCHEDULED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$3.00 CY

CRITICALITY SAFETY + PLUTONIUM + SHIPPING CONTAINER + URANIUM

3-12761 MCLENDON JD
TESTS OF A PROPOSED URANIUM CONTAINER
Y-12 PLANT, OAK RIDGE, TENNESSEE
Y-KB-22 +. 27 PAGES, NOVEMBER 14, 1962

A SIMPLE, RELATIVELY CHEAP SHIPPING CONTAINER, AVAILABLE FROM MANY POTENTIAL SUPPLIERS, HAS BEEN DESIGNED AND TESTED FOR IMPACT AND FIRE RESISTANCE. ALTHOUGH TESTS HAVE BEEN LIMITED, RESULTS MEET, OR EXCEED, SPECIFICATIONS OF PROPOSED STANDARDS. IN VIEW OF FAVORABLE FIRE AND IMPACT RESISTANCE, AND CONSIDERING MECHANICAL AND GEOMETRIC DESIGN, IT IS CONCLUDED THAT NUCLEAR SAFETY OF ENRICHED URANIUM SHIPMENTS IN THESE CONTAINERS WOULD BE AT LEAST AS GOOD AS THAT EXPERIENCED WITH Y-12 BIRDCAGES. THE CONTAINER CURRENTLY MEETS CLASS II, IAEA REQUIREMENTS. WITH SOME MODIFICATIONS IT IS CONCEIVABLE THAT CLASS I SPECIFICATIONS CAN BE MET.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.60 CY, \$1.01 MF

CRITICALITY SAFETY + EQUIPMENT DESIGN + FIRE + IMPACT SHOCK + STRUCTURAL INTEGRITY

3-12762 MARCINOWSKI H
ACCIDENTS DURING THE TRANSPORTATION OF RADIOACTIVE MATERIALS
4 PAGES, VERSICHERUNGSWIRTSCHAFT, (16), PP. 3-7 (AUGUST 1963) IN GERMAN

INFORMATION IS GIVEN ON ACCIDENTS THAT HAVE TAKEN PLACE IN THE GERMAN FEDERAL REPUBLIC DURING THE TRANSPORTATION OF RADIOACTIVE MATERIALS BY RAIL, ROAD, AIR, AND WATER, AND IN WHICH PHASE OF THE TRANSPORTATION THE ACCIDENTS HAVE OCCURRED. THE LOADS ARE DIVIDED ACCORDING TO THEIR RADIATION CHARACTERISTICS AND ACTIVITIES, AND THE ACCIDENTS DURING TRANSPORTATION ACCORDING TO THE RADIOACTIVE MATERIALS THAT FALL INTO TWO MAIN GROUPS, FISSION PRODUCTS AND RADIONUCLIDES.

ACCIDENT, TRANSPORTATION + GERMANY + INCIDENT COMPILATION + OPERATING EXPERIENCE

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12763 BRITISH COFFINS MAY SELL ABROAD
1 PAGE, NUCLEAR POWER, 4(34), PP. 102 (FEBRUARY 1959)

DESCRIBES A SMALL 2-TON CASK DEVELOPED BY THE BRITISH. THE CONTAINER IS DESIGNED TO CONTAIN 25 CURIES OF ACTIVITY.

SHIPPING CONTAINER + UNITED KINGDOM

3-12764 KOWALSKI H
BASIC METHODS OF PROTECTION IN HANDLING CLOSED RADIOISOTOPE CONTAINERS
5 PAGES, NUCLEONIKA, 3, PP. 95-100 (1958), IN POLISH

ABSTRACT OF THIS POLISH DOCUMENT IS NOT AVAILABLE.

POLAND + SHIPPING CONTAINER + TRANSPORTATION AND HANDLING

3-12765 VERTUT J
CENDRILLON CONTAINERS FOR THE TRANSPORT AND DISPENSING OF RADIOACTIVE LIQUIDS
COMMISSARIAT A L ENERGIE ATOMIQUE, FRANCE
2 PAGES, TRANSACTIONS OF AMERICAN NUCLEAR SOCIETY, 6(2), PP. 461-462 (1963)

THIS NEW TYPE OF CONTAINER WAS DESIGNED FOR THE TRANSPORT AND TEMPORARY STORAGE OF RADIOACTIVE LIQUIDS WHOSE ACTIVITY CAN EXCEED 1000 CURIES PER LITER. THE DESIGN IS DESCRIBED.

EQUIPMENT DESIGN + FRANCE + LIQUID FUEL + SHIPPING CONTAINER

3-12766 COBALT-60 CARRIER IS CONTROLLED FROM A SAFE AREA
1 PAGE, STEEL, 144, P. 92 (JUNE 22, 1959)

ABSTRACT IS NOT AVAILABLE FOR THIS ARTICLE.

COBALT + SHIPPING CONTAINER + TRANSPORTATION AND HANDLING

3-12767 GARLAND RJ
CLEANING, PACKING AND TRANSPORTATION OF NUCLEAR PRODUCTS AND COMPONENTS
5 PAGES, NUCLEAR ENERGY, PAGES 232-7 (JUNE 1962)

METHODS USED TO SECURE FREEDOM OF NUCLEAR MATERIALS AND SURROUNDINGS FROM CONTAMINATION ARE CONSIDERED AND CORRELATED. TOPICS DISCUSSED INCLUDE TYPES OF CONTAMINATION, COMPOSITION OF CLEANERS, LIQUID CLEANING, GRIT BLASTING, CLEAN ROOM ASSEMBLY, CLEANING OF LARGE COMPONENTS, CELL TYPES, REMOTE HANDLING, ACTIVE MATERIALS HANDLING, DECONTAMINATION FACILITIES, ACTIVE MATERIALS PACKAGING, SHIELDING BY SPACE, AND ISOTOPE TRANSPORTATION.

CONTAMINATION + DECONTAMINATION + RADIOACTIVITY, RELEASE

3-12768 COMMERCIAL ASPECTS OF FUEL PROCESSING
5 PAGES, REACTOR FUEL PROCESSING, 6(1), PP. 1-5 (1963)

A COMPARISON OF THE ECONOMICS INVOLVED IN OPERATION OF LARGE FUEL-PROCESSING PLANTS IS COMPARED WITH SMALL-PLANT OPERATION. DATA FOR USE IN COMPARISON OF VARIOUS PLANT DESIGNS ARE INCLUDED. OTHER DISCUSSION IS PRESENTED CONCERNING THE TRANSPORTATION OF IRRADIATED FUEL IN WHICH CASK CONSTRUCTION AND USE ARE EMPHASIZED.

EQUIPMENT DESIGN + TRANSPORTATION AND HANDLING

3-12769 MECHAM WJ + JONKE AA
COMMERCIAL ASPECTS OF FUEL PROCESSING
15 PAGES, REACTOR FUEL PROCESSING, 9, PP. 1-15 (WINTER 1965-1966)

FUEL PROCESSING PLANS, VALUES IN SPENT FUEL FROM POWER REACTORS, SPENT-FUEL PROCESSING COSTS FOR ADVANCED CONVERTERS, ECONOMIC EVALUATION OF CLOSE-COUPLED FUEL PROCESSING, ECONOMICS OF IRRADIATED FUEL SHIPMENT, AND PATENTS CONCERNING PROCESSING ARE DISCUSSED.

ECONOMIC STUDY + TRANSPORTATION AND HANDLING

3-12770 COMMERCIAL ASPECTS OF FUEL PROCESSING
5 PAGES, REACTOR FUEL PROCESSING, 4(4), PP. 1-5 (OCTOBER 1961)

THE COST OF TRANSPORTING IRRADIATED FUEL ELEMENTS IN TWO DIFFERENT SIZE CASKS IS PRESENTED. COSTS APPEAR TO BE INVERSELY PROPORTIONAL TO THE CASK PAYLOAD AND TOTAL WEIGHT.

ECONOMIC STUDY + TRANSPORTATION AND HANDLING

3-12771 UEMURA T + FURUHASHI N

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12771 *CONTINUED*
A CONTAINER FOR A RADIUM-BERYLLIUM NEUTRON SOURCE
3 PAGES, RADIOISOTOPES (TOKYO), 11, PP. 328-30 (AUGUST 1962), IN JAPANESE

THE CONTAINER OF A 10 MILLICURIE RA-ALPHA-BE-NEUTRON SOURCE WHICH KEEPS THE RADIATION DOSE AT ABOUT 2 MREM/HOUR ON ITS SURFACE WAS CLOSELY EXAMINED. REMOVAL CROSS SECTIONS BY HORNYAK BUTTONS YIELDED THE FOLLOWING RESULTS - 0.0055 CM²/G FOR PB, 0.135 CM²/G FOR FE, AND 0.110 CM²/G FOR PARAFFIN. THE CALCULATIONS INDICATED THAT 10 CM OF PB AND 15 CM OF PARAFFIN ARE SUFFICIENT TO SHIELD THE CONTAINER, HOWEVER, IF A 10-CM THICK CONCRETE LAYER IS USED, 7 CM OF PB AND 10 CM OF PARAFFIN ARE SUFFICIENT.

BERYLLIUM + DOSE MEASUREMENT, EXTERNAL + JAPAN + RADIUM + SHIELDING + SHIPPING CONTAINER + SOURCE, NEUTRON

3-12772 BUYERS GUIDE - MANUFACTURERS OF CONTAINERS
2 PAGES, NUCLEAR ENGINEERING, 7, PP. 280-1 (JULY 1962)

A LIST OF MANUFACTURERS FROM THE U.K., THE U.S. AND EUROPE WHO HAVE HAD EXPERIENCE IN RADIOACTIVE MATERIAL CONTAINER FABRICATION IS PRESENTED ALONG WITH THE SIZE CONTAINERS THEY HAVE RECENTLY BUILT.

BIBLIOGRAPHY + REVIEW + SHIPPING CONTAINER

3-12773 JONKERS RA
THE CONSTRUCTION OF CONTAINERS FOR RADIOISOTOPES FOR GAMMA IRRADIATION
3 PAGES, ATOMENERGIE, 1(10), PP. 167-70 (OCTOBER 1959)

ABSTRACT OF THIS DUTCH DOCUMENT IS NOT AVAILABLE.

SHIPPING CONTAINER

3-12774 FRYNTA Z + LANGMAJER J
CONTAINERS FOR CO-60
5 PAGES, JADERNA ENRGY, 4, PP. 98 102 (APRIL 1958) IN CZECH.

ABSTRACT OF THIS CZECHOSLOVAKIAN DOCUMENT IS NOT AVAILABLE.

COBALT + CZECHOSLOVAKIA + SHIPPING CONTAINER

3-12775 LUSK EC + EPSTEIN HM + EIBER RJ + GATES JE
CONTAINERS FOR THE SHIPMENT OF SPENT REACTOR FUEL ELEMENTS
BATTTELLE MEMORIAL INSTITUTE
2 PAGES, TRANSACTIONS AMERICAN NUCLEAR SOCIETY, 5, PP. 361-2 (NOVEMBER 1962)

SEVERAL UNIQUE SPENT-FUEL-ELEMENT SHIPPING CASKS HAVE BEEN DESIGNED AND FABRICATED TO MEET THE AEC DIVISION OF LICENSING AND REGULATIONS REQUIREMENTS FOR SUCH CONTAINERS AS DETAILED IN 10 CFR-PART 72. THESE SHIPPING CASKS HAVE RANGED IN SIZE FROM A 30,000-LB UNIT DISSIPATING 8 KW OF DECAY HEAT FOR TRUCK SHIPMENT OF 19 WESTINGHOUSE TEST REACTOR-TYPE FUEL ELEMENTS TO A 150,000-LB UNIT DISSIPATING 80 KW OF HEAT FOR RAIL SHIPMENT OF 10 YANKEE FUEL ELEMENTS. PROBLEMS INVOLVING CRITICALITY, HEAT DISSIPATION, WEIGHT OPTIMIZATION, AND FABRICATION OF COMPONENT PARTS HAVE BEEN ENCOUNTERED AND SOLVED. A NOVEL METHOD OF OBTAINING A THERMAL BOND BETWEEN THE LEAD SHIELD AND OUTER CONTAINER SHELL HAS BEEN DEVISED AND PATENTED. NEUTRON POISONS HAVE BEEN INCORPORATED IN METAL ALLOYS TO REDUCE CRITICALITY HAZARDS. THIS PAPER DESCRIBES THE DESIGN, FABRICATION, AND OPERATION OF A CASK NOW BEING USED TO TRANSPORT WESTINGHOUSE TEST REACTOR FUEL ELEMENTS.

CRITICALITY SAFETY + EQUIPMENT DESIGN + HEAT TRANSFER + SHIPPING CONTAINER

3-12776 CONTAINERS FOR RADIOACTIVE MATERIALS
1 PAGE, ENGINEER, 219, P. 277 (FEBRUARY 5, 1965)

CONTAINERS WERE DEVELOPED FOR TRANSPORTING RADIOACTIVE OR FISSILE MATERIAL. THEY HAVE AN INNER VESSEL OF LEAD, A THERMALLY INSULATING CASING (HARDWOOD OR CELOTEX BOARD), AND AN ENCLOSING CANISTER OF FIRE-RESISTANT MATERIAL (MILD STEEL). IN ONE DESIGN THE INNER VESSEL IS SURROUNDED WITH A RESIN, WHICH CAN ACT AS A MATRIX FOR A UNIFORMLY DISTRIBUTED MODERATOR AND SHIELDING MATERIALS SUCH AS BORAX AND LEAD SHOT.

EQUIPMENT DESIGN + FIRE + SHIELDING + SHIPPING CONTAINER

3-12777 BRUCHER H + ESCHNAUER H
CONVEYANCE OF NUCLEAR FUELS AND FUEL ELEMENTS
5 PAGES, ATOMWIRTS. 6(9), PP. 431-5 (SEPTEMBER 1961), IN GERMAN

ABSTRACT OF THIS GERMAN DOCUMENT IS NOT AVAILABLE.

FUEL ELEMENT + GERMANY + TRANSPORTATION AND HANDLING

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12778 CONTAINERS UNDER FIRE. HARWELL RATIONALIZES RANGE OF CLASS B TRANSPORT CONTAINERS
2 PAGES, NUCLEAR ENGINEERING, 10, PP. 234-5 (JUNE 1965)

FIRE TESTS WERE CARRIED OUT ON CLASS B TRANSPORT CONTAINER. THE FIRE WAS PROVIDED BY 10,000 GALLONS OF JET FUEL AND BURNED FOR ONE HOUR AT 2000 C. A DISCUSSION OF THE REQUIREMENTS OF SHIELDING AND SHIELDING MATERIALS FOR IRRADIATED FUELS IS GIVEN WITH SPECIAL ATTENTION TO THERMAL SHIELDING.

FIRE + HEAT TRANSFER + SHIELDING + TEST, DESTRUCTIVE

3-12779 WOODCOCK ER + PAXTON HC
THE CRITICALITY ASPECTS OF TRANSPORTATION OF FISSILE MATERIALS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, RISLEY + LOS ALAMOS SCIENTIFIC LABORATORY
34 PAGES, PROGRESS IN NUCLEAR ENERGY SER. IV, 4, PP. 401-34 (1961)

IN THE TRANSPORT OF FISSILE MATERIALS IT IS NECESSARY TO TAKE PRECAUTIONS TO GUARD AGAINST THE POSSIBILITY OF A CRITICALITY EXCURSION WHICH COULD HAVE SERIOUS CONSEQUENCES. THUS, THE PROBLEMS INVOLVED IN REMOVING THE POSSIBILITY OF SUCH AN OCCURRENCE ARE REVIEWED, WITH PARTICULAR REFERENCE TO PRACTICES IN U.S. AND U.K. AND TO THE REGULATIONS PREPARED BY THE IAEA. METHODS OF ENSURING SAFETY ARE DESCRIBED. THE BIBLIOGRAPHY CONTAINS 21 REFERENCES.

CRITICALITY SAFETY + REGULATION, IAEA + UNITED KINGDOM

3-12780 GILLIESON AH
CRITICALITY AND ITS EFFECT ON THE STUDY AND THE USE OF CHEMICAL INSTALLATIONS TREATING FISSILE MATERIALS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL
3 PAGES, ENERGIE NUCLEAIRE, 1, PP. 17-19 (JANUARY-MARCH 1957), IN FRENCH

A SUMMARY IS GIVEN OF THE THEORETICAL AND PRACTICAL FACTORS FOR SAFE OPERATIONS IN THE TRANSPORT, STORAGE, AND TREATMENT OF FISSILE MATERIALS.

CRITICALITY SAFETY + UNITED KINGDOM

3-12781 WITTE H
DRUM TRANSPORT EQUIPMENT IN DEACTIVATION INSTALLATIONS
DONGES STAHLBAU GMBH, DARMSTADT, GERMANY
3 PAGES, KERntechnik, 4, PP. 288-90 (JULY 1962), IN GERMAN

EQUIPMENT IS DISCUSSED WHICH WAS DEVELOPED FOR THE BOTTLING AND THE TRANSPORT OF RADIOACTIVE WASTE PRODUCTS. IN THIS CONNECTION, SPECIAL EMPHASIS WAS PLACED ON A DESCRIPTION OF THE SINGLE ELEMENTS IN ORDER TO CREATE FOUNDATIONS FOR THE PLANNING OF NEW INSTALLATIONS.

EQUIPMENT DESIGN + GERMANY + SHIPPING CONTAINER + WASTE TRANSPORTATION

3-12782 NEWBERRY GP
THE DISTRIBUTION OF RADIOISOTOPES. PUBLIC SAFETY ASPECTS
RADIOCHEMICAL CENTRE, AMERSHAM, ENGLAND.
8 PAGES, ROYAL SOCIETY HEALTH JOURNAL, 80, PP. 220-8 (JULY-AUGUST 1960)

IN THE UNITED KINGDOM AND RADIOCHEMICAL CENTRE IS RESPONSIBLE FOR THE PRODUCTION AND DISTRIBUTION OF ALL RADIOISOTOPES MADE IN REACTORS. RADIATION HAZARDS ARE DISCUSSED AND METHODS ARE SUMMARIZED FOR THE SAFE HANDLING AND TRANSPORT OF PACKAGES CONTAINING RADIOISOTOPES.

HAZARDS ANALYSIS + RADIATION SAFETY AND CONTROL + TRANSPORTATION AND HANDLING + UNITED KINGDOM

3-12783 DIXON FE
THE EFFECT OF I.A.E.A. REGULATIONS ON THE DESIGN OF SHIELDED CONTAINERS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL
10 PAGES, ATOM, (84), PP. 315-24 (OCTOBER 1963)

DISCUSSES SOME PROBLEMS MET WITH IN DESIGNING SHIELDED CONTAINERS FOR RADIOACTIVE MATERIALS, CAPABLE OF MEETING THE I.A.E.A. REGULATIONS. VARIOUS TESTS OF DURABILITY UNDER FIRE, IMPACT, AND RUPTURE WERE CARRIED OUT, AND RESULTS ARE BRIEFLY SUMMARIZED.

FIRE + IMPACT SHOCK + REGULATION, IAEA + SHIPPING CONTAINER + UNITED KINGDOM

3-12784 DRYDEN CE
ECONOMICS OF SHIPPING SPENT NUCLEAR FUEL ELEMENTS
GENERAL ELECTRIC COMPANY, SCHENECTADY, N.Y.
4 PAGES, NUCLEONICS, 14(7), PP. 77-80 (JULY 1956)

DISCUSSES REGULATIONS FOR SHIPPING, SHIPPING COST ESTIMATES, DESIGN OF SHIPPING CONTAINERS, SHIELDING REQUIREMENTS AND TRANSPORTATION FOR THE SHIPPING OF SPENT NUCLEAR FUEL ELEMENTS.

ECONOMIC STUDY + REGULATION, GENERAL + SHIELDING + TRANSPORTATION AND HANDLING

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12785 BONILLA CF
AN ELECTRIC ANALOG COMPUTER FOR NUCLEAR FUEL SHIPPING CASK FIRE TESTS
COLUMBIA UNIVERSITY, N.Y.
7 PAGES, NUCLEAR STRUCTURAL ENGINEERING 2, PP. 40-7 (JULY 1965)

DESCRIBES AN ELECTRICAL ANALOG NETWORK FOR THE THERMAL ANALYSIS OF NUCLEAR FUEL SHIPPING CASKS UNDER FIRE ACCIDENT CONDITIONS. THE NETWORK ALLOWS THE THERMAL BEHAVIOR OF A WIDE RANGE OF CASK DIMENSIONS FOR ANY GIVEN FIRE TEMPERATURE CURVE TO BE SIMULATED. CHANGES IN THERMAL PROPERTIES OF THE MATERIALS INVOLVED, MELTING OF THE LEAD SHIELD, AND ANY CHANGES IN THE HEAT TRANSFER COEFFICIENTS DURING THE FIRE MAY ALL BE REPRESENTED.

FIRE + HEAT TRANSFER + THERMAL ANALYSIS

3-12786 ASHLEY RL
EFFECTIVE ENERGY METHOD FOR SPENT FUEL SHIELDING
2 PAGES, NUCLEONICS, 16(10), PP. 78-9 (OCTOBER 1958)

GRAPHS ARE PRESENTED WHICH PERMIT THE DETERMINATION OF A SINGLE PHOTON ENERGY FOR A FISSION PRODUCT SPECTRUM. SHIELDING OF SPENT FUEL ELEMENTS ARE REDUCED TO FINDING THE PENETRATION OF PHOTONS OF THIS ENERGY.

FUEL ELEMENT + SHIELDING

3-12787 HIRLING J
EXPERIENCE IN THE HANDLING OF SEALED GAMMA-ACTIVE ISOTOPES
CSEPEL IRON AND STEEL WORKS, HUNGARY
4 PAGES, ENERGIA ES ATOMTECHNIKA, 13, PP. 82-5 (JANUARY-FEBRUARY 1960), IN HUNGARIAN

DESCRIBES TRANSPORT CASKS FOR SEALED GAMMA-ACTIVE ISOTOPES AND LABORATORY EQUIPMENT (PORTABLE LEAD SHIELDS, TWO TYPES OF REMOTE HANDLING RODS) USED TO UNPACK THE ISOTOPES AND TO PLACE THEM INTO CAPSULES. FOR ITS OWN USE AND FOR OTHER INSTITUTES AS WELL, THE CSEPEL IRON AND STEEL WORKS IN 1959 PREPARED 180 CAPSULES OF SOVIET GAMMA-ACTIVE ISOTOPES, THE EQUIVALENT OF ABOUT 1.0 KG OF RA. THE PERSONNEL ASSIGNED TO THIS WORK WAS EXPOSED TO ONLY 23 TO 37 PERCENT OF THE MAXIMUM PERMISSIBLE EXPOSURE.

HUNGARY + OPERATING EXPERIENCE + PERSONNEL EXPOSURE, RADIATION + RADIUM

3-12788 HAFF KW
EVALUATION OF ORNL CARDBOARD-BOX-STEEL-CAN SHIPPING CONTAINER
OAK RIDGE NATIONAL LABORATORY
ISOTOPES AND RADIATION TECHNOLOGY, 1(3), (1964)

CARDBOARD-BOX-STEEL-CAN CONTAINERS FOR USE IN SHIPPING RADIOISOTOPES WERE TESTED TO DETERMINE WHETHER THE CONTAINERS MEET PRESENT IAEA SPECIFICATIONS AND TO EVALUATE THE SUGGESTED TESTS. RESULTS INDICATE THAT THE CONTAINERS ARE ADEQUATE TO MEET REQUIREMENTS.

REGULATION, IAEA + SHIPPING CONTAINER + TEST, PROOF

3-12789 MORIYA T + JIN T + HIRIUCHI S
EXPERIMENTAL STUDY ON FIRE RESISTIVITY OF RADIOISOTOPE CONTAINERS AND CAPSULES
FIRE RESEARCH INST. OF JAPAN
3 PAGES, PROC. JAPAN CONF. RADIOISOTOPES, 5TH, (3), PP. 28-30 (1963), IN JAPANESE

SEVERAL TESTS FOR THE EVALUATION OF FIRE-RESISTIVE PERFORMANCES OF RADIOISOTOPE CONTAINERS AND CAPSULES WERE PERFORMED IN CONNECTION WITH AN EXPERIMENTAL FIRE IN A FIRE-RESISTIVE BUILDING. OTHER TESTS FOR THE SAME PURPOSE WERE PERFORMED IN THE LABORATORY USING ELECTRIC FURNACES TO PRODUCE THE SAME HEATING CONDITIONS AS FIRES. CONTAINERS TESTED WERE OF THREE TYPES, ALL OF THEM CYLINDRICAL IN SHAPE. THE RISE OF TEMPERATURE PRODUCED IN ONE OF THE CONTAINERS DURING THE TEST WAS MEASURED. IT IS CONCLUDED THAT THE CONTAINER NO. 1, MADE OF LEAD FOR THE MOST PART AND COATED WITH 5-MM IRON PLATE ON ITS WHOLE SURFACE, MAY BE RESISTIVE TO FIRES GENERALLY. BUT IT CANNOT BE CONCLUDED THAT THE ABOVE-MENTIONED FACT WILL HOLD FOR ALL CASES OF FIRES. THE CONTAINER NO. 2, WHOLLY MADE OF LEAD, AND THE CONTAINER NO. 3, MADE OF LEAD WITH ONLY THE SIDE SURFACE COATED WITH IRON, ARE NOT RESISTIVE TO ANY FIRES. THE DOUBLE CAPSULE, WHICH CONSISTS OF AN INNER CAPSULE AND AN OUTER CAPSULE MADE OF STAINLESS-STEEL, MAY BE FIRE-PROOF FOR MOST OF FIRES.

FIRE + HEAT TRANSFER + JAPAN + TEST, DESTRUCTIVE

3-12790 STRATTON K
EXPERIENCE IN THE SHIPMENT AND CHEMICAL REPROCESSING OF GETR AND VBWR FUEL
GENERAL ELECTRIC COMPANY, PLEASANTON, CALIFORNIA
1 PAGE, TRANSACTIONS AMERICAN NUCLEAR SOCIETY, 5, PP. 361 (NOVEMBER 1962)

TWO SHIPPING CASKS OF CONVENTIONAL DESIGN WERE USED. EACH CASK TRANSPORTED TEN CUT ELEMENTS OF EITHER DESIGN IN A VERTICAL CAVITY 15 INCHES IN DIAMETER BY 40 INCHES DEEP, AND PROVIDED 10 INCHES OF LEAD SHIELDING. LOADED SHIPPING WEIGHT WAS ABOUT 23,000 POUNDS. A SPECIALLY DESIGNED BASKET WAS USED TO SUPPORT THE ELEMENTS IN TRANSIT AND WAS FABRICATED FROM ALUMINUM-CLAD CADMIUM STRIPS FOR CRITICALITY CONTROL. THE PLATE-SURFACE TEMPERATURE OF A CENTRALLY LOCATED FUEL ELEMENT IN A LOADED CASK GAVE A MAXIMUM EQUILIBRIUM VALUE OF 131 F WITHOUT LIQUID COOLANT AND THE CASK CLOSED. ALL ELEMENTS HAD COOLED FOR 120 DAYS (MINIMUM

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12790 *CONTINUED*

REQUIRED FOR PROCESSING FACILITY ACCEPTANCE) AND HAD OPERATED IN THE REACTOR (GETR) FOR ABOUT EIGHT WEEKS AT AN AVERAGE POWER OF ONE MW. NO INCREASE IN CASK-SURFACE TEMPERATURE ABOVE AMBIENT WAS EVER MEASURABLE. TESTS WERE ALSO CONDUCTED TO DETERMINE THE EXTENT OF RADIOLYTIC-GAS BUILD-UP IN THE SEALED CASK CAVITY. TWO ANALYSES TAKEN AFTER A FOUR-DAY PERIOD, WITH NO SIGNIFICANT VARIATION IN H₂ OR O₂ CONCENTRATION OBSERVED. ON TWO OCCASIONS IT WAS NECESSARY TO SHIP CASKS CONTAINING ELEMENTS WITH EXPOSED FUEL. THREE OF THESE ELEMENTS (120-DAY COOLING TIME) WERE ISOLATED IN WATER-FILLED SEALED CANS FOR PERIODS EXCEEDING TWO WEEKS TO OBSERVE THE BUILD-UP OF BETA-GAMMA ACTIVITY. THE MAXIMUM CONCENTRATION OF 5 BY 10 MINUS 9 MICROCURIES ML WAS LOW ENOUGH TO PERMIT SHIPMENT OF THESE ELEMENTS IN THE NORMAL MANNER.

CONTAMINATION + CRITICALITY SAFETY + GETR (GENERAL ELECTRIC TEST REACTOR) + HEAT TRANSFER + OPERATING EXPERIENCE + RADIOLYTIC GAS + REACTOR, TEST

3-12791 BARKER FB
FACTORS AFFECTING THE TRANSPORT OF RADIOACTIVITY BY WATER
9 PAGES, AMERICAN WATERWORKS ASSOCIATION JOURNAL, 50(5), PP. 603-12 (MAY 1956)

PROBLEMS OF RADIOACTIVE MATERIAL ACCIDENTALLY DISCHARGED TO THE ENVIRONMENT ARE DISCUSSED. EQUATIONS OF MATERIAL TRANSPORTED BY GROUND WATER ARE PRESENTED ALONG WITH RESULTS OF ION EXCHANGE STUDIES.

ANALYTICAL MODEL + CONTAMINATION + RADIOACTIVITY, RELEASE

3-12793 PELZER N
FUEL ELEMENT TRANSPORTATION IN COMPARATIVE LEGAL VIEWPOINT
UNIVERSITY OF GOETTINGEN, GERMANY
6 PAGES, ENERGIEWIRTSCH. TAGESFRAG., 14, PP. 418-23 (SEPTEMBER 1964), IN GERMAN

THE LEGAL REQUIREMENTS FOR THE TRANSPORTATION OF NUCLEAR FUELS IN VARIOUS COUNTRIES ARE COMPARED WITH RESPECT TO THE APPROVAL AND MONITORING OF TRANSPORTATION PROCESSES AND LIABILITIES FOR DAMAGES.

GERMANY + LAW + LIABILITY

3-12794 UPTON AE + EHREN CA
FEDERAL AND STATE REGULATION OF TRANSPORTATION OF ATOMIC MATERIALS
34 PAGES, ATOMIC ENERGY LAW JOURNAL, 3(2), PP. 123-57 (SPRING 1961)

AN EXTENSIVE DISCUSSION FROM A LAWYERS POINT OF VIEW OF THE EFFECT OF CONGRESSIONAL ACTIVITY ON FEDERAL AND STATE REGULATIONS CONCERNING THE TRANSPORTATION OF RADIOACTIVE MATERIALS.

LAW + REGULATION, AEC + REGULATION, GENERAL

3-12795 LYNCH DE
GUARDING AGAINST MAJOR RADIATION ACCIDENTS IN A LARGE CITY
NEW YORK CITY OFFICE OF RADIATION CONTROL, N.Y.
2 PAGES, AMERICAN INDUSTRIAL HYGIENE ASSOCIATION JOURNAL, 22, PP. 130-2 (APRIL 1961)

THE NEW YORK CITY PLAN FOR HANDLING RADIATION ACCIDENTS RELIES IN THE MAIN ON CONTROL AT THE ACCIDENT SCENE BY THE POLICE DEPARTMENT, HAZARD EVALUATION BY THE HEALTH DEPARTMENT AND ATOMIC ENERGY COMMISSION RADIATION SPECIALISTS, A COMMUNICATION PLAN USING TELEPHONE AND CIVIL DEFENSE TWO-WAY RADIO, AND ADVANCE INFORMATION ON STORAGE LOCATIONS OR SHIPMENTS OF HAZARDOUS QUANTITIES OF RADIOACTIVE MATERIAL. POSSIBILITIES OF ACCIDENTS TO THE WATER SUPPLY AND CERTAIN OTHER ACCIDENTS NOT COVERED IN THE PLAN ARE DISCUSSED.

EMERGENCY PROCEDURE + HAZARDS ANALYSIS

3-12796 NAUMANN HH
A GUIDE FOR THE PROPER SHIPMENT OF RADIOACTIVE MATERIALS IN THE INTERNATIONAL RAILROAD FREIGHT TRAFFIC
6 PAGES, MITTEILUNGSBL. STRAHLUNGSMESSGERAETE, 5(11), PP. 5-11 (FEBRUARY 1964), IN GERMAN

THE LEGAL REQUIREMENTS GOVERNING THE RAIL SHIPMENT OF RADIOACTIVE MATERIALS IN INTERNATIONAL COMMERCE ARE BRIEFLY SUMMARIZED. EXAMPLES OF SHIPPING LABELS ARE GIVEN. A CHART SHOWING THE LEAD THICKNESS FOR CO-60 SOURCES IS PRESENTED.

COBALT + GERMANY + LAW + SAFETY PRINCIPLES AND PHILOSOPHY + SHIELDING

3-12797 HANFORD LINE HAULS RADIOACTIVE FREIGHT - GENERAL ELECTRICS PLANT RAILROAD CARRIES URANIUM AND PLUTONIUM
GENERAL ELECTRIC COMPANY
3 PAGES, RAILWAY AGE, 141, PP. 26-8 (AUGUST 20, 1956)

ABSTRACT IS NOT AVAILABLE FOR THIS ARTICLE.

PLUTONIUM + TRANSPORTATION AND HANDLING + URANIUM

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12798 MUMBY K
HANDLING OF RADIOACTIVE MATERIALS AT A.E.R.E.
UNITED KINGDOM ATOMIC ENERGY AUTHORITY
8 PAGES, MECH. HANDLING, 42(5), PP. 252-9 (MAY 1955)

ABSTRACT IS NOT AVAILABLE FOR THIS ARTICLE.

TRANSPORTATION AND HANDLING + UNITED KINGDOM

3-12799 A HIGH INTENSITY COBALT CONTAINER FOR INDUSTRIAL RADIOGRAPHY
2 PAGES, METALLURGIA, 59, PP. 311-2 (JUNE 1959)

A BRITISH DESIGN OF A COBALT CONTAINER USED FOR INDUSTRIAL RADIOGRAPHY IS DESCRIBED. THE CONTAINER IS DESIGNED TO EMPLOY A SOURCE OF 1500 CURIES OF COBALT-60.

COBALT + SHIPPING CONTAINER + UNITED KINGDOM

3-12801 KALINOVA RS
HYGIENIC PROBLEMS IN TRANSPORTATION OF RADIOACTIVE ISOTOPES
4 PAGES, GIGIENA I SANITARIA, 23(10), PP. 41-5 (OCTOBER 1958), IN RUSSIAN

PRESENTS THE RESULTS OF INVESTIGATIONS OF VARIOUS TYPES OF TRANSPORT CONTAINERS WITH RESPECT TO THE SANITARY-HYGIENIC REQUIREMENTS AND THE DATA OF INDIVIDUAL DOSIMETRIC EXAMINATIONS OF A GROUP OF WORKMEN EMPLOYED IN THE TRANSPORTATION OF RADIOACTIVE ISOTOPES. VARIOUS DEFECTS WERE NOTED IN SOME TYPES OF CONTAINERS USED AT PRESENT. THE DATA OBTAINED SHOW THAT IT IS NECESSARY TO IMPROVE THE SYSTEM OF TRANSPORTATION OF RADIOACTIVE ISOTOPES AND TO CONSTRUCT CONTAINERS IN ACCORDANCE WITH THE SANITARY-HYGIENIC REQUIREMENTS.

PERSONNEL EXPOSURE, RADIATION + RADIATION SAFETY AND CONTROL + TRANSPORTATION AND HANDLING + UNION OF SOVIET SOCIALIST REPUBLICS

3-12802 IMPACT TEST FOR SHIPPING CASKS OF IRRADIATED FUEL ELEMENTS
7 PAGES, ISHIKAWAJIMA-HARIMA GIHO, 4, PP. 313-20 (JULY 1964), IN JAPANESE

SHIPPING CASKS MUST WITHSTAND AN IMPACT FORCE DUE TO ANY CREDIBLE ACCIDENT DURING TRANSPORTATION WITHOUT CREATING A RADIATION HAZARD IN THE ENVIRONMENT. FREE FALL TESTS AT 5 M WERE MADE USING SIMPLIFIED TEST MODELS TO INVESTIGATE THE CAPABILITY OF LEAD CASKS OF WITHSTANDING THE IMPACT FORCE. RING, DISK, AND HOLLOW CYLINDER TYPE TEST MODELS, WITH OR WITHOUT STEEL LININGS, WERE USED TO REPRESENT THE HORIZONTAL OR VERTICAL FALL OF HOLLOW CYLINDRICAL SHIPPING CASKS. NINETY-ONE MODELS WERE TESTED, THEIR WEIGHTS RANGED FROM 0.2 TO 500 KG. THE TEST RESULTS SHOWED THAT LEAD CASKS COULD WITHSTAND THE IMPACT FORCE WITH LITTLE DAMAGE. NO APPRECIABLE SCALE EFFECTS WERE OBSERVED BETWEEN MODEL SIZES, AND THE MAGNITUDES OF DEFORMATIONS OF HOLLOW CYLINDRICAL LEAD CASKS WITH VARIOUS THICKNESS OF STEEL LININGS DUE TO FREE FALL IMPACT AT 5 M CAN BE ESTIMATED FROM THE TEST RESULTS. THE STEEL LININGS ARE EFFECTIVE IN LIMITING DEFORMATIONS. APPRECIABLE SHRINKAGES IN LEAD HEIGHT OF CYLINDRICAL CASKS DUE TO VERTICAL IMPACT FORCE WERE OBSERVED, AND THIS MUST BE TAKEN INTO ACCOUNT IN DESIGNING THE SHIPPING CASKS. AN EFFECTIVE METHOD OF LIMITING THE VERTICAL SHRINKAGE OF LEAD IS TO ATTACH RIBS TO THE INSIDE OF STEEL LININGS.

IMPACT SHOCK + JAPAN + LEAD + MODEL TESTING + STRUCTURAL INTEGRITY

3-12803 BUCKLAND CW
INTERPRETATION OF REGULATIONS GOVERNING THE SHIPMENT OF RADIOACTIVE MATERIAL
LOS ALAMOS SCIENTIFIC LABORATORY
10 PAGES, A.M.A. ARCH. IND. HEALTH, 19, PP. 33-43 (JANUARY 1959)

REGULATIONS GOVERNING THE SHIPMENT OF RADIOACTIVE MATERIAL BY COMMON CARRIER WITHIN THE UNITED STATES ARE REVIEWED AND INTERPRETED.

REGULATION, AEC + REVIEW + TRANSPORTATION AND HANDLING

3-12804 SHAPPERT LB
IMPACT TESTING OF SHIPPING CONTAINERS
OAK RIDGE NATIONAL LABORATORY
1 PAGE, TRANSACTIONS AMERICAN NUCLEAR SOCIETY, 6, P. 172 (JUNE 1963)

PROPOSED REGULATIONS REQUIRE IN PART THAT A CASK MUST WITHSTAND BOTH A 15-FT FREE FALL ONTO AN UNYIELDING SURFACE AND THE PUNCTURING ACTION OF A PISTON. THIS PAPER DESCRIBES THE INVESTIGATION OF THE BEHAVIOR OF CASKS UNDER THE ABOVE CONDITIONS. SEVEN CYLINDRICAL LEAD-FILLED CASKS WERE BUILT. FIVE WERE 18 IN. OD, 10 IN. ID, 36 IN. LONG, HAD AN OUTER SHELL THICKNESS 0.312 IN. AND WEIGHED 1.4 TONS. TWO WERE 30 IN. OD, 18 IN. ID, 60 IN. LONG, HAD AN OUTER SHELL THICKNESS 0.500 IN. AND WEIGHED 6 TONS. THESE CASKS WERE INSTRUMENTED. IN ADDITION, SEVERAL WERE COATED WITH A BRITTLE LACQUER, WHICH GAVE QUALITATIVE EVIDENCE OF THE MAGNITUDE AND DIRECTION OF THE STRAINS AT THE TIME OF IMPACT.

IMPACT SHOCK + MODEL TESTING + STRUCTURAL INTEGRITY + TEST, DROP

3-12805 WHITTLE D + ANDERSON D

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12805 *CONTINUED*
INVESTIGATION OF FUEL ELEMENT TEMPERATURES IN CHAPELCROSS DISCHARGE VESSELS AND TRANSPORT FLASKS
DOMINION TAR AND CHEMICAL COMPANY, LTD., CANADA
9 PAGES, J. BRITISH NUCLEAR ENERGY SOCIETY, 5, PP. 156-64 (APRIL 1966)

STEADY-STATE TEMPERATURE MEASUREMENTS WERE MADE IN THE VESSELS USED AT THE UKAEA, CHAPELCROSS WORKS, FOR THE DISCHARGE AND TRANSPORT OF FUEL ELEMENTS. THESE MEASUREMENTS WERE USED TO CALCULATE THE MAXIMUM TEMPERATURE TO WHICH AN IRRADIATED FUEL ELEMENT IS HEATED WHEN PLACED IN A DISCHARGE VESSEL AND TO CALCULATE THE MAXIMUM TEMPERATURE TO WHICH THE INTERIOR OF A WATER FILLED TRANSPORT FLASK WOULD BE HEATED WHEN USED DURING HOT SUMMER WEATHER. EXPERIMENTAL AND DATA ANALYSIS TECHNIQUES WHICH CAN HAVE GENERAL APPLICATION TO SIMILAR PROBLEMS ARE ILLUSTRATED. MODELS FOR THE WET AND DRY TRANSPORT FLASKS ARE DESCRIBED, PERMITTING PREDICTIONS TO BE MADE OF SPECIFIC TEMPERATURE CONDITIONS WHICH WERE IN EXCELLENT AGREEMENT WITH MEASURED TEMPERATURES.

ACCIDENT, LOSS OF COOLANT + HEAT TRANSFER + SHIPPING CONTAINER + UNITED KINGDOM

3-12806 FISHER C
LEAD VESSELS IN RADIOACTIVE WORK
4 PAGES, INDUSTRIAL CHEMIST, 28(326), PP. 120-4 (MARCH 1952)

EQUIPMENT USED IN PROTECTING PERSONNEL FROM GAMMA RAYS IS DESCRIBED. THE EQUIPMENT DISCUSSED ARE SHIPPING AND STORAGE CONTAINERS, PROTECTIVE WALLS, STORAGE SAFES AND SCREENING EQUIPMENT FOR USE IN RADIOTHERAPY WORK.

PERSONNEL PROTECTIVE DEVICE + SHIPPING CONTAINER

3-12807 PATTERSON DE + BATIE RV
LAND SHIPPING RADIOACTIVE MATERIAL
1 PAGE, NATIONAL FIRE PROTECTION ASSOCIATION QUARTERLY, 53(3), P. 202 (JANUARY 1959)

ABSTRACT IS NOT AVAILABLE FOR THIS DOCUMENT.

RADIOISOTOPE + TRANSPORTATION AND HANDLING

3-12808 JENKINSON HA
THE MANUFACTURE OF SPECIAL LEAD SHIELDS FOR NUCLEAR SHIELDING
W. G. JENKINSON LTD., SHEFFIELD, ENGLAND
10 PAGES, LEAD, 62, PP. 151-61 (1962), LEAD DEVELOPMENT ASSOCIATION, LONDON

THE USE OF LEAD AND ANTIMONY-LEAD ALLOYS FOR SHIELDING IS DISCUSSED. METHODS FOR CASTING SHIELDED CONTAINERS ARE OUTLINED. THE BONDING OF LEAD TO STEEL AND COPPER AND THE FABRICATION OF LEAD SHEETS ARE CONSIDERED. SEVERAL WORKSHOP PRACTICES USED FOR WORKING WITH LEAD ARE DESCRIBED.

ANTIMONY + COPPER + FABRICATION + LEAD + UNITED KINGDOM

3-12809 WARRIKOFF A
LEGAL QUESTIONS IN THE TRANSPORT OF UNIRRADIATED AND IRRADIATED FUEL ELEMENTS
2 PAGES, ENERGIEWIRTSCH. TAGESFRAG., 14, PP. 415-17 (SEPTEMBER 1964), IN GERMAN

THE LEGAL QUESTIONS INVOLVED IN THE TRANSPORTATION OF IRRADIATED AND NONIRRADIATED FUEL ELEMENTS ARE DISCUSSED WITH RESPECT TO THE LIABILITY STANDARDS, THE UNIFORMITY OF INSURANCE CONDITIONS IN INTERNATIONAL TRANSPORTATION, PUBLIC INTEREST IN DAMAGE CASES, AND SPECIAL PROBLEMS IN THE TRANSPORT OF FUEL ELEMENTS.

GERMANY + LAW + LIABILITY

3-12810 LUSK EC + GATES JE
NEW DEVELOPMENTS IN THE DESIGN OF SHIPPING CASKS FOR IRRADIATED FUEL ELEMENTS
BATTELLE MEMORIAL INSTITUTE, COLUMBUS, OHIO
4 PAGES, NUCLEAR NEWS, 6(6), 11-14 (JUNE 1963)

SOME ASPECTS OF DESIGNING CASKS FOR TRANSPORTING IRRADIATED FUEL ELEMENTS ARE REVIEWED. THE MAJOR PROBLEMS OF SHIELDING, HEAT REMOVAL, CRITICALITY, AND ECONOMIC CONSIDERATIONS ARE TREATED ALONG WITH SOME SOLUTIONS TO THESE PROBLEMS.

CRITICALITY SAFETY + ECONOMIC STUDY + EQUIPMENT DESIGN + HEAT TRANSFER + SHIELDING

3-12811 SINITSYN V + LESHCHINSKII NI + GUSEV A
NEW CONTAINER FOR HIGHLY RADIOACTIVE MATERIALS
2 PAGES, ATOMNAYA ENERGIE, 7, PP. 399-400 (OCTOBER 1959), IN RUSSIAN

DESCRIBES A NEW CONTAINER DESIGNED FOR TRANSPORTING AND HANDLING HIGHLY RADIOACTIVE SOURCES. THE CONTAINER HOLDS UP TO FOUR STANDARD COBALT SOURCES OF 700 G EQV. RA, WHICH CAN BE TRANSFERRED DIRECTLY FROM THE CONTAINER INTO THE LOADING CHANNELS OF AN INSTALLATION. THE RADIOACTIVITY FROM THE CONTAINER AT 0.5 M DOES NOT EXCEED 2.5 MICRORONTGENS/SEC. THE WEIGHT OF THE CONTAINER IS 1 TON.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12811 *CONTINUED*
COBALT + DOSE MEASUREMENT, EXTERNAL + EQUIPMENT DESIGN + RADIUM + UNION OF SOVIET SOCIALIST REPUBLICS

3-12812 MOISEITSEV PI
NEW SANITARY REGULATIONS OF WORK WITH RADIOACTIVE SUBSTANCES AND SOURCES OF IONIZING RADIATIONS NO. 333-60
AND REGULATIONS OF TRANSPORTATION OF RADIOACTIVE SUBSTANCES NO. 349-60
JPRS-12823 + TT-62-19804 +. 12 PAGES, TRANSLATED FROM GIGIENA I SANIT., 26(10), PP. 50-57 (OCTOBER 1961)

THE CONTENTS OF THE SANITARY REGULATIONS OF WORK WITH RADIOACTIVE SUBSTANCES AND SOURCES OF IONIZING RADIATIONS NO. 333-60 ARE DESCRIBED. THE MAXIMUM PERMISSIBLE LEVEL AND CONCENTRATION DIFFERENCES BETWEEN THESE REGULATIONS AND INTERNATIONAL RECOMMENDATIONS ARE GIVEN. RADIOACTIVE SUBSTANCES AND LABORATORIES FOR HANDLING THEM ARE CLASSIFIED ACCORDING TO THE ACTIVITY. THE CONTENTS OF REGULATIONS ON THE TRANSPORTATION OF RADIOACTIVE SUBSTANCES NO. 349-60 ARE ALSO DESCRIBED. TEMPORARY STORAGE OF THE SHIPPED MATERIAL AND RETURN OF EMPTY CONTAINERS ARE CONSIDERED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$1.60 CY

REGULATION, GENERAL + UNION OF SOVIET SOCIALIST REPUBLICS

3-12813 SHTAN A + LESHCHINSKII NI
THE NEW RULES FOR TRANSPORTING RADIOACTIVE MATERIALS
1 PAGE, ATOMNAYA ENERGIA, 7, P. 399 (OCTOBER 1959), IN RUSSIAN

THE NEW REGULATIONS AND INSTRUCTIONS OF THE USSR ATOMIC ENERGY ADMINISTRATION FOR HANDLING AND TRANSPORTING RADIOACTIVE MATERIALS ARE DESCRIBED.

REGULATION, GENERAL + UNION OF SOVIET SOCIALIST REPUBLICS

3-12814 NEWTON VICTOR RADIOACTIVE ISOTOPE CONTAINERS
1 PAGE, METALLURGIA, 49, P. 147 (MARCH 1954)

A CONTAINER FOR USE IN INDUSTRIAL RADIOGRAPHY IS DESCRIBED. SOURCE STRENGTH IS IN THE RANGE OF 10 CURIES.

SHIPPING CONTAINER

3-12815 KLEINFELD M
NEW YORKS EXPERIENCE IN ADMINISTERING CODE ON RADIATION PROTECTION
9 PAGES, ARCH. IND. HEALTH, 17, PP. 87-95 (FEBRUARY 1958)

ON DECEMBER 15, 1955, INDUSTRIAL CODE RULE NO. 38, RADIATION PROTECTION, BECAME EFFECTIVE IN NEW YORK STATE. THE PURPOSE OF THE CODE WAS TO SUPPLY INDUSTRY WITH A FLEXIBLE GUIDE TO ENHANCE THE DEVELOPMENT OF A SAFE ATOMIC INDUSTRY. THE CODE HAS BEEN ADMINISTERED BY THE DIVISION OF INDUSTRIAL HYGIENE. THIS ARTICLE REVIEWS THE EXPERIENCE OF THE DIVISION TO DATE AND PRESENTS AN EVALUATION OF THE CODES EFFECTIVENESS.

COMPARISON, THEORY AND EXPERIENCE + RADIATION PROTECTION, ORGANIZATION + RADIATION SAFETY AND CONTROL + SAFETY REVIEW (OPERATIONS, EXPERIMENTS)

3-12816 GIBSON R
THE 1963 REVISION OF THE IAEA TRANSPORT REGULATIONS
3 PAGES, NUCLEAR ENGINEERING, PP. 195-197 (JUNE 1963)

A DISCUSSION OF THE 1963 REVISION OF THE IAEA TRANSPORT REGULATIONS IS PRESENTED.

REGULATION, IAEA + REVIEW

3-12817 NUCLEAR SAFETY OF FISSIONABLE MATERIALS DURING TRANSPORT VIA COMMON CARRIER
HEALTH AND SAFETY INFORMATION BULLETINS NO. 122 AND 122A +. NO. 122, FEBRUARY 14, 1961, PAGE 2, NO. 122A, JUNE 19, 1961, PAGE 2

ABSTRACT IS NOT AVAILABLE FOR THIS DOCUMENT.

CRITICALITY SAFETY + TRANSPORTATION AND HANDLING

3-12818 BRANNICAN FL + MILES GS
NUCLEAR TRANSPORTATION ACCIDENTS
5 PAGES, NATIONAL SAFETY NEWS, 85(5), PP. 38-9, 62, 64-5 (MAY 1962)

METHODS OF FIGHTING FIRES INVOLVING SHIPMENTS OF RADIOACTIVE MATERIALS ARE DESCRIBED. REGULATIONS IN SHIPPING ARE OUTLINED. EXAMPLES ARE DISCUSSED.

ACCIDENT, TRANSPORTATION + EMERGENCY PROCEDURE + FIRE + RADIATION SAFETY AND CONTROL + REGULATION, AEC

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12819 LEIMKUHLER FF
AN OPERATIONS RESEARCH STUDY OF THE POTENTIAL ACCIDENT EXPERIENCE AND TOTAL COST OF TRUCK SHIPMENTS OF
HIGHLY RADIOACTIVE MATERIALS
JOHNS HOPKINS UNIVERSITY, BALTIMORE
2 PAGES, DISSERTATION ABSTRACTS, 23, PP. 561-2 (AUGUST 1962)

PROVIDES QUANTITATIVE EVALUATION OF THE NATURE AND MAGNITUDE OF THE HAZARD TO SHIPMENTS BY
TRACTOR-SEMITRAILERS, AND IDENTIFIES OPPORTUNITIES FOR CONTROLLING THE HAZARD. DECISION
MODELS FOR THE TIMING AND ROUTING OF SHIPMENTS WERE CONSTRUCTED AND SOLVED FROM THE
STANDPOINT OF MINIMIZING THE TOTAL COST OF SHIPMENTS SUBJECT TO THE RISK OF ACCIDENTS WITH
UNCERTAIN AND POTENTIALLY LARGE COST CONSEQUENCES. PROVISION IS MADE FOR THE ADOPTION OF
VARIOUS ATTITUDES IN SELECTING APPROPRIATE MEASURES OF THE ACCIDENT RISK.

ACCIDENT ANALYSIS + ACCIDENT MODEL + ECONOMIC STUDY + SAFETY STUDY + STATISTICAL ANALYSIS

3-12820 BRESLIN AJ + HARRIS WR + WEINTRAUB AA
ORGANIZATION OF A RADIATION HAZARD EMERGENCY RESPONSE CAPABILITY
U. S. ATOMIC ENERGY COMMISSION, HEALTH AND SAFETY LAB., NEW YORK
5 PAGES, AMERICAN INDUSTRIAL HYGIENE ASSOCIATION JOURNAL, 22, PP. 59-63 (FEBRUARY 1961)

THE U. S. ATOMIC ENERGY COMMISSION IN COOPERATION WITH THE DEPARTMENT OF DEFENSE MAINTAINS A
NATIONWIDE ORGANIZATION OF RADIATION SAFETY TEAMS TO PROVIDE EMERGENCY TECHNICAL ASSISTANCE
TO STATE AND LOCAL OFFICIALS IN THE EVENT THAT AN ACCIDENT WITH PUBLIC HEALTH SIGNIFICANCE
OCCURS DURING THE UTILIZATION, HANDLING, OR TRANSPORTATION OF RADIOACTIVE MATERIALS. THE
CAPABILITY TO HANDLE SUCH ACCIDENTS IS NOT YET ADEQUATELY DEVELOPED AT THE STATE AND
MUNICIPAL LEVELS. THE BASIC MISSION OF THE TEAMS IS TO PROVIDE RAPID HAZARD EVALUATION AND
RECOMMENDATIONS FOR CONTROL. IMPORTANT REQUIREMENTS FOR THE SATISFACTORY PERFORMANCE OF THIS
MISSION ARE EFFECTIVE LIAISON WITH CIVIL AUTHORITIES, EXPEDITIOUS TEAM MOBILIZATION AND
TRANSPORTATION, USE OF PROFESSIONAL RADIATION SAFETY PERSONNEL, AND FIELD EQUIPMENT SUITABLE
FOR RAPID AND APPROXIMATE MEASUREMENTS.

ACCIDENT, TRANSPORTATION + EMERGENCY PROCEDURE + RADIATION SAFETY AND CONTROL

3-12821 MOISEITSEV PI
PRINCIPAL PROVISIONS, REQUIREMENTS AND STANDARDS OF THE NEW REGULATIONS FOR TRANSPORTATION OF RADIOACTIVE
SUBSTANCES
3 PAGES, MED. RADIOL., 6(5), PP. 3-5 (SEPTEMBER 1961), IN RUSSIAN

TO PROVIDE FOR THE REQUIREMENTS OF RADIATION SAFETY IN THE TRANSPORTATION OF RADIOACTIVE
SUBSTANCES, THE MINISTRY OF HEALTH, USSR, AND THE STATE COMMITTEE OF THE COUNCIL OF
MINISTERS, USSR, ON THE UTILIZATION OF ATOMIC ENERGY, APPROVED NEW REGULATIONS FOR THE
TRANSPORTATION OF RADIOACTIVE SUBSTANCES NO. 349-60. MATERIALS FOR TRANSPORT ARE DIVIDED
INTO FOUR CATEGORIES. THESE ARE BRIEFLY DISCUSSED.

REGULATION, GENERAL + UNION OF SOVIET SOCIALIST REPUBLICS

3-12822 WERNER K
PROBLEMS AND PRACTICE OF THE TRANSPORT OF RADIOACTIVE MATERIALS BY RAIL
4 PAGES, ATOMWIRTSCHAFT, 8, PP. 402-5 (JULY-AUGUST 1963), IN GERMAN

DISCUSSES INTERNATIONAL REGULATIONS CONCERNING THE TRANSPORT OF RADIOACTIVE MATERIALS BY RAIL.
THE MOST IMPORTANT CHANGES ARE THE REGULATIONS DEALING WITH THE PREVENTION OF CRITICALITY OF
NUCLEAR FUELS, NEW DIVISIONS OF THE RADIO-TOXICITY GROUPS AND OF PACKING TYPES AND CHANGES IN
RESPECT OF THE WHITE AND YELLOW DANGER CATEGORIES. THE PROVISIONS OF THE RAIL REGULATIONS
GOVERNING INTERNAL GERMAN TRAFFIC WERE ALTERED ACCORDINGLY BUT ONLY TO RAISE VARIOUS
IMPEDIMENTS WHICH HAVE PRACTICALLY PRECLUDED THE TRANSPORT OF RADIOACTIVE MATERIALS AS
EXPRESS GOODS. BECAUSE OF THIS A PROVISIONAL REGULATION WAS MADE BY SPECIAL LICENSING OF THE
TRANSPORT MINISTRY FOR SHORT LIVED RADIOISOTOPES.

CRITICALITY SAFETY + GERMANY + REGULATION, IAEA + TRANSPORTATION AND HANDLING

3-12823 PENSKO J
THE PROBLEM OF RADIOLOGICAL PROTECTION ABROAD AND IN POLAND
11 PAGES, NUKLEONIKA, 3, PP. 417-27 (1958), IN POLISH

METHODS OF RADIATION PROTECTION IN POLAND AND ABROAD ARE ANALYZED. SAFETY MEASURES IN
HANDLING RADIOISOTOPES, REMOTE CONTROL DEVICES, PERMISSIBLE DOSES OF EXPOSURE,
DECONTAMINATION OF INSTRUMENTS AND LABORATORIES, PERSONNEL PROTECTION, AND STORAGE AND
TRANSPORTATION OF RADIOACTIVE MATERIALS ARE DISCUSSED.

POLAND + RADIATION SAFETY AND CONTROL

3-12824 OTSUBO T
PROBLEMS ON THE TRANSPORTATION OF THE USED FUELS
MITSUBISHI SHOJI KAISHA, LTD., JAPAN
8 PAGES, GENSHIRYOKU HATSUDEN, 8, PP. 24-31 (MARCH 1964), IN JAPANESE

THE TRANSPORTATION OF SPENT FUELS FROM JAPAN TO AMERICA IS DISCUSSED. NUCLEAR FUELS ARE
SHIPPED AFTER COOLING FOR CERTAIN PERIODS FOR DECAY OF RADIOACTIVITIES. THE TRANSPORT CASKS
USED MUST BE STRONG AND AIRTIGHT, AND MUST BE SO DESIGNED AS TO FACILITATE DISSIPATION OF

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12824 *CONTINUED*
HEAT GENERATED IN THE FUEL. COMPENSATION MUST BE MADE FOR DAMAGES TO TRANSPORTING DEVICES, CREWS, LOADERS AND UNLOADERS, AS WELL AS TO THE PUBLIC, DURING TRANSPORTATION. IN THE TRANSPORTATION OF USED FUELS, SOME AGREEMENT WITH THE LABORERS ENGAGED IN THE TRANSPORT IS NECESSARY. THE TREND IN THE SIZE OF TRANSPORT CASKS IS TO MAKE THEM LARGER FROM THE STANDPOINT OF TRANSPORT ECONOMY. BUT, THIS TREND IS IN CONFLICT WITH PRESENT REGULATIONS ON SHIP TRANSPORT.

ECONOMIC STUDY + JAPAN + REGULATION, GENERAL + TRANSPORTATION AND HANDLING

3-12825 WERNER K + BURGHARDT J
PROBLEMS OF THE TRANSPORT OF IRRADIATED NUCLEAR FUELS
AEG, FRANKFURT AM MAIN, GERMANY
4 PAGES, ATOMWIRTSCHAFT 8, PP. 405-8 (JULY-AUGUST 1963), IN GERMAN

TWO QUESTIONS WHICH ARE IMPORTANT FOR THE OPERATION OF NUCLEAR REACTORS AND FOR THE ECONOMICS OF NUCLEAR POWER STATIONS ARE DISCUSSED - HOW CAN IRRADIATED FUELS BE TRANSPORTED TO A REPROCESSING INSTALLATION AND WHAT COSTS ARE INVOLVED IN SUCH TRANSPORT. IN THE GERMAN FEDERAL REPUBLIC NUMEROUS LICENSES HAVE TO BE OBTAINED - FOR EXPORT, TRANSPORT, STORAGE, INTERMEDIATE STORAGE, TRANSPORT CONTAINERS, ETC., WHOSE BASIS LIES IN VARIOUS LEGAL PROVISIONS. IN PARTICULAR THE LIABILITY AND INSURANCE STIPULATIONS MUST BE OBSERVED BOTH AT HOME AND ABROAD. THESE PLACE SPECIAL DEMANDS ON THE TRANSPORT TECHNICALITIES (PACKING, HANDLING, PROVISION OF MEANS OF TRANSPORT, ETC.).

ECONOMIC STUDY + GERMANY + INSURANCE + LIABILITY

3-12826 NEWBERY GR
PUBLIC SAFETY ASPECTS OF RADIOISOTOPE DISTRIBUTION
14 PAGES, ATOM (UKAEA), (43), PP. 19-32 (MAY 1960)

PRESENTS A BRIEF DISCUSSION OF THE METHODS OF PROTECTION AND TRANSPORT REGULATIONS FOR VARIOUS MODES. IN ADDITION TO DISCUSSING VARIOUS TYPES OF SHIPPING CONTAINERS, AN ANALYSIS OF INCIDENTS INVOLVING RADIOISOTOPES DURING TRANSPORT IN THE U.K. IS DISCUSSED.

HAZARDS ANALYSIS + RADIATION SAFETY AND CONTROL + SHIPPING ANALYSIS

3-12827 CURTISS LF
PROTECTIVE REQUIREMENTS FOR SHIPPING RADIOACTIVE SUBSTANCES
1 PAGE, JOURNAL OF APPLIED PHYSICS, 12(4), P. 346 (APRIL 1941)

DISCUSSES THE PROBLEM OF SHIPPING RADIOACTIVE MATERIALS IN CLOSE PROXIMITY TO FILM. A TABLE OF MG. OF RADIUM SHIPPED AS A FUNCTION OF ALLOWABLE HOURS IN TRANSIT WITH LEAD SHIELDING AS A PARAMETER IS PRESENTED.

FILM, GENERAL + RADIATION SAFETY AND CONTROL

3-12828 APNOTT DG
RADIOACTIVE HAZARDS AND THE PUBLIC HEALTH SERVICE
LONDON HOSPITAL
9 PAGES, PUBLIC HEALTH, (LONDON), 75, PP. 195-203 (MAY 1961)

THE HAZARDS OF THE TRANSPORTATION OF RADIOACTIVE MATERIALS ARE DISCUSSED IN DETAIL. THE DANGER HERE IS IN ACCIDENTS, THE NATURE OF WHICH IT IS DIFFICULT TO FORECAST AND AGAINST WHICH IT IS IMPOSSIBLE TO PROVIDE 100 PERCENT ADEQUATE PROTECTION IN ADVANCE. IT IS PREDICTED THAT THIS HAZARD WILL GROW. REGULATIONS FOR RAILROAD, SEA, AND AIR TRANSPORT ARE DESCRIBED. DISPOSAL OF RADIOACTIVE WASTE, A PROBLEM CONCERNED MOST IN THE PROCESSING OF IRRADIATED FUEL ELEMENTS, IS ALSO CONSIDERED, AS ARE THE HAZARDS OF NUCLEAR TEST EXPLOSIONS.

ACCIDENT, TRANSPORTATION + HAZARDS ANALYSIS + UNITED KINGDOM + WASTE TRANSPORTATION

3-12829 RADIOACTIVE FUEL--A PACKAGING PROBLEM
2 PAGES, LEAD, 27(3), PP. 2-3 (1963)

DESCRIPTION OF THE SIZE, STRENGTH, THERMAL PROPERTIES, DESIGN, AND FABRICATION FACTORS OF LEAD-STAINLESS STEEL-CARBON STEEL SHIPPING CONTAINERS FOR RADIOACTIVE FUEL ELEMENTS IS DISCUSSED.

EQUIPMENT DESIGN + LEAD + PROPERTY, PHYSICAL + SHIELDING

3-12830 RADIOACTIVE WASTE CONTAINER
1 PAGE, NUCLEONICS, 16(10), P. 122 (OCTOBER 1958)

A WASTE CONTAINER SUITABLE FOR SEA DISPOSAL IS DESCRIBED. THE CONTAINER IS DESIGNED FOR THE EQUIVALENT OF 5 CURIES OF COBALT-60.

COBALT + OCEAN AND SEA + SHIPPING CONTAINER + WASTE TRANSPORTATION

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12831 KEHOE EJ
RADIOISOTOPES IN TRANSIT - REQUIREMENTS AND HAZARDS INVOLVED IN SHIPPING
2 PAGES, RAILWAY AGE, 140, PP. 20-1 (JANUARY 2, 1960)

ABSTRACT IS NOT AVAILABLE FOR THIS DOCUMENT.

HAZARDS ANALYSIS + RADIOISOTOPE + TRANSPORTATION AND HANDLING

3-12832 RADIOISOTOPE CONSIGNMENTS
3 PAGES, NUCLEAR ENGINEERING, 7, PP. 277-9 (JULY 1962)

OUTLINES REGULATIONS, OPERATION EXPERIENCES, COMMERCIAL CONSIDERATIONS, PACKAGING
REQUIREMENTS, AND SAFETY RECORD OF THE RADIOCHEMICAL CENTRE, WHICH IS THE RADIOISOTOPE
DISTRIBUTION AGENCY OF THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY.

OPERATING EXPERIENCE + RADIATION SAFETY AND CONTROL + UNITED KINGDOM

3-12833 REGULATIONS TO PROTECT AGAINST ACCIDENTAL CONDITIONS OF CRITICALITY IN THE SHIPMENT OF SPECIAL
NUCLEAR MATERIAL
2 PAGES, ATOMIC ENERGY LAW JOURNAL, 1(1), PP. 101-2 (1959)

GIVES BRIEF DISCUSSION CONCERNING THE LIMITS OF SPECIAL NUCLEAR MATERIAL THAT LICENSEES MAY
TRANSPORT IN THEIR OWN VEHICLES.

LAW + REGULATION, GENERAL

3-12834 REGULATIONS FOR THE TRANSPORTATION OF RADIOACTIVE MATERIALS
JPRS-10599 + TT-61-28933 +. 71 PAGES, TRANSLATED FROM PRAVILA PEREVOZKI RADIAKTYVNYKH VESHCHESTV (A
PUBLICATION OF THE STATE ATOMIC ENERGY PUBLISHING HOUSE, 1961)

THE REGULATIONS WERE DEVELOPED IN CONSONANCE WITH THE REQUIREMENTS OF THE SANITARY REGULATIONS
COVERING WORK WITH RADIOACTIVE MATERIALS AND SOURCES OF IONIZING RADIATION, TAKING INTO
ACCOUNT THE INTERNATIONAL RECOMMENDATIONS OF 1960. THE REGULATIONS ARE MANDATORY FOR ALL
CONCERNED WITH THE TRANSPORTATION, STORAGE, AND USE OF RADIOACTIVE MATERIALS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$7.60 CY

REGULATION, GENERAL + TRANSPORTATION AND HANDLING + UNION OF SOVIET SOCIALIST REPUBLICS

3-12835 REPROCESSING TECHNIQUES AND PROGRESS. PART II
2 PAGES, EURONUCLEAR, 2, PP. 604-5 (DECEMBER 1965)

REPROCESSING TECHNIQUES AND PROGRESS ARE REVIEWED FOR BELGIUM, ITALY, THE UNITED KINGDOM, AND
THE NETHERLANDS. ALSO THE TRANSPORTATION OF IRRADIATED FUEL IS CONSIDERED. THE EUROCHEMIC
PLANT AT MOL IN BELGIUM IS EXPECTED TO PROVIDE A LARGE PERCENTAGE OF THE REPROCESSING
CAPACITY REQUIRED DURING THE NEXT FEW YEARS, BUT SEVERAL OTHER NUCLEAR-DEVELOPED COUNTRIES
HAVE THEIR OWN SMALLER PLANTS WHICH MAY ALSO CONTRIBUTE TO THE TOTAL EUROPEAN REQUIREMENT.

TRANSPORTATION AND HANDLING

3-12836 REGULATORY CONTROL. A REVIEW OF NATIONAL AND INTERNATIONAL REGULATIONS FOR THE TRANSPORT OF
ACTIVE MATERIALS
5 PAGES, NUCLEAR ENGINEERING, 7, PP. 268-72 (JULY 1962)

IN THE TRANSPORT OF ACTIVE MATERIALS, SPECIAL PRECAUTIONS MUST BE TAKEN, PARTICULARLY IN THE
DESIGN AND CONSTRUCTION OF CONTAINERS FOR HIGHLY ACTIVE MATERIALS. A REVIEW IS GIVEN OF
THESE PRECAUTIONS, AS INTERPRETED THROUGH THE VARIOUS REGULATIONS THAT ARE ENFORCED BOTH
INTERNATIONALLY AND NATIONALLY.

REGULATION, AEC + REGULATION, IAEA + SAFETY PRINCIPLES AND PHILOSOPHY

3-12837 LEWIS WB + GOIN RW
SAFER PACKAGES FOR SHIPPING FUEL
PHILLIPS PETROLEUM COMPANY, IDAHO FALLS
2 PAGES, NUCLEONICS, 18(7), PP. 91, 93 (JULY 1960)

SHIPPING AND STORAGE OF FISSIONABLE MATERIAL CAN BE MADE SAFE BY SEPARATING PACKAGES WITH A
POISON-MODERATOR-POISON SANDWICH COMPOSED OF CADMIUM FOIL AND SOLID HYDROGENOUS MATERIAL
(WOOD OR POLYETHYLENE). SUCH SANDWICHES CAN BE USED TO WRAP FLAT OR CYLINDRICAL SAMPLES AND
TO CONTAIN FUEL BOTTLES AND FUEL ELEMENTS (LAMINATED POLYETHYLENE). ILLUSTRATIVE DRAWINGS
ARE GIVEN. SAFETY FACTORS FOR THICKNESS, ETC., COMPUTED FOR CRITICALITY WITH A 750-BARN
FISSION CROSS SECTION, ARE GIVEN.

CADMIUM + CRITICALITY SAFETY

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12838 KHVOSTOV NN
RULES FOR WORKING WITH RADIOACTIVE SUBSTANCES
ERISMAN MOSCOW SCIENTIFIC-RESEARCH INSTITUTE OF SANITARY AND HYGIENE, MINISTRY OF HEALTH, R.S.F.S.R.
3 PAGES, GIGIENA I SANIT., 23(10), PP. 59-61 (OCTOBER 1958), IN RUSSIAN

RULES AND REGULATIONS ARE SUGGESTED FOR HANDLING, STORING, AND TRANSPORTING RADIOACTIVE SUBSTANCES. THE RULES ARE SPECIFIED FOR VARIOUS ISOTOPES IN RELATION TO THEIR COMPARATIVE RADIOTOXICITY AND PRACTICAL USES.

REGULATION, GENERAL + UNION OF SOVIET SOCIALIST REPUBLICS

3-12839 CALLIHAN D + JOHNSON EB
SAFETY IN HANDLING FISSIONABLE MATERIALS
OAK RIDGE NATIONAL LABORATORY
4 PAGES, MAG. STD., 36, PP. 81-4 (MARCH 1965)

PREVENTION OF NUCLEAR CHAIN REACTIONS IN HANDLING, STORING, PROCESSING, TRANSPORTING, AND TREATING FISSIONABLE NUCLIDES OUTSIDE REACTORS IS THE PURPOSE OF A NEW SAFETY STANDARD. THE STANDARD PRESENTS GENERALIZED CRITERIA ON WHICH THE BASE DESIGN OF EQUIPMENT AND PROCESSES FOR HANDLING FISSIONABLE MATERIALS. IT ALSO REFERENCES LITERATURE THAT PROVIDES SOLUTIONS TO SPECIFIC PROBLEMS. PREVENTION OF UNINTENTIONAL CHAIN REACTIONS IS IMPORTANT BECAUSE THE ENERGY RELEASED IN THE REACTION, PRINCIPALLY AS HEAT AND RADIATION, MIGHT BE LETHAL TO NEARBY PERSONNEL, CAUSE PROPERTY DAMAGE, OR INTERRUPT PROCESS SCHEDULES.

CRITICALITY SAFETY + TRANSPORTATION AND HANDLING

3-12840 HAFF KW
THE SAFETY TESTING PROGRAM AT ORNL
OAK RIDGE NATIONAL LABORATORY
2 PAGES, TRANSACTIONS OF AMERICAN NUCLEAR SOCIETY, 7, PP. 208-9 (JUNE 1964)

INCLUDED IN THE ORNL SAFETY TESTING PROGRAM IS A PROGRAM TO IMPROVE THE SAFETY OF SHIPPING CONTAINERS FOR RADIOISOTOPES. DEVELOPMENTS TO DATE INCLUDE A WOODEN FIRE AND IMPACT SHIELD FOR RADIOISOTOPE SHIPPING CASKS AND SEVERAL SAFETY MEASURES TAKEN TO PROTECT ORNL CONTAINERS FROM INLEAKAGE OF WATER. INTUMESCENT PAINTS HAVE BEEN INVESTIGATED AND ONE BRAND, ALBICLAD, LOOKS PROMISING FOR USE ON SOME CASKS. TESTS ON THESE PAINTS ARE NOT YET COMPLETE. OTHER TESTS HAVE BEEN MADE TO EVALUATE GASKET MATERIALS FOR SHIPPING CASKS. A HASTELLOY/ASBESTOS SPIRAL WOUND GASKET WAS FOUND TO WITHSTAND FIRE, AND BOLTS WITH A COEFFICIENT OF THERMAL EXPANSION SOMEWHAT LESS THAN THAT OF THE GASKET MATERIAL ARE BEING INVESTIGATED SINCE IN TESTS THE FLANGES FAILED BECAUSE OF EXPANSION OF THE BOLTS AND SUBSEQUENTLY RELEASED THE BUILD-UP PRESSURE.

FIRE + IMPACT SHOCK + STRUCTURAL INTEGRITY + TEST, PROOF

3-12841 THE SAFETY OF NUCLEAR TRANSPORT
5 PAGES, CIVILTA DELLA MACCHINE, (2), PP. 35-40 (MARCH/APRIL 1960), IN ITALIAN

ABSTRACT OF THIS ITALIAN DOCUMENT IS NOT AVAILABLE.

ITALY + RADIATION SAFETY AND CONTROL + TRANSPORTATION AND HANDLING

3-12842 HAGUET R
SEMITRACK FOR TRANSPORTING IRRADIATED URANIUM
2 PAGES, INDUSTRIES ATOMIQUES, 3(7-8), PP. 95-6 (1959), IN FRENCH

AN ARRANGEMENT FOR HAULING IRRADIATED URANIUM TO THE PROCESSING PLANT AT MARCOULE. LOAD POSITIONING, SHIELDING AND OTHER FACTORS ARE DISCUSSED.

FRANCE + SHIELDING + TRANSPORTATION AND HANDLING

3-12843 SANI L
SHIPMENT OF IRRADIATED FUEL FROM THE LATINA PLANT
10 PAGES, COMIT. NAZ. ENERG. NUCL., NOTIZ., 12(4), PP. 48-57 (APRIL 1966), IN ITALIAN

THE VARIOUS STAGES IN THE SHIPMENT OF IRRADIATED FUEL FROM THE LATINA PLANT ARE REVIEWED. THIS OPERATION INVOLVES THE SOLUTION OF SEVERAL TECHNICAL AND ORGANIZATIONAL PROBLEMS, WHICH HAVE TO BE DEALT WITH ON AN INTERNATIONAL SCALE, NOT ON A ONE-LOT BASIS BUT IN VIEW OF A SERIES OF SHIPMENTS REPEATED OVER A CONSIDERABLE NUMBER OF YEARS.

ITALY + TRANSPORTATION AND HANDLING

3-12844 SANTOS AA + BENITO AS
SHIPPING CASE FOR IRRADIATED FUEL ELEMENTS
8 PAGES, ENERGIA NUCLEAR (MADRID), 3(10), 73-80 (APRIL-JUNE 1959), IN SPANISH

IN THE SHIPPING OF IRRADIATED FUEL ELEMENTS, SPECIAL ATTENTION MUST BE GIVEN TO PROTECTION AGAINST RADIATION AND TO THE MINIMIZATION OF THE HEAT PRODUCED. THE SHIPPING CASE DESIGNED FOR THE JUNTA DE ENERGIA NUCLEAR IS DESCRIBED. IT CONSISTS OF AN INNER ALUMINUM CONTAINER IN

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12844 *CONTINUED*

WHICH ARE PLACED THE FUEL ELEMENTS. THE OUTER CASE IS MADE OF TWO STEEL CYLINDERS WITH A LEAD SHIELD BETWEEN THEM. THE TANK HAS WATER PIPES THROUGH IT TO REMOVE THE HEAT PRODUCED. THE CALCULATIONS TO DETERMINE THE THICKNESS OF THE LEAD SHIELD ARE GIVEN.

EQUIPMENT DESIGN + SHIELDING + SHIPPING CONTAINER + SPAIN

3-12845 GEIPEL W

SHIPPING CASK FOR IRRADIATED FUEL ELEMENTS
8 PAGES, KERntechnik, 4, PP. 402-10 (SEPTEMBER 1962), IN GERMAN

ASPECTS TO BE CONSIDERED FOR THE CONSTRUCTION OF SHIPPING CASKS ARE GIVEN. OWING TO THE LACK OF GERMAN CONSTRUCTION REGULATIONS, EXPERIENCES GAINED IN THE CONSTRUCTION OF THE SHIPPING CASK FOR THE FIRST GERMAN NUCLEAR POWER PLANT AT KAHL (MAIN) ACCORDING TO REGULATIONS PUBLISHED BY THE USAEC ARE REPORTED.

EQUIPMENT DESIGN + GERMANY + OPERATING EXPERIENCE + SHIPPING CONTAINER

3-12846 SPENT FUEL CASKS

1 PAGE, NUCLEONICS, 17, P. 116 (AUGUST 1959)

A 10-TON SHIPPING CASK CAPABLE OF TRANSPORTING 200,000 CURIES OF ACTIVITY IS BRIEFLY DESCRIBED.

SHIPPING CONTAINER

3-12847 MORGAN KZ

SHIPPING OF RADIOISOTOPES
OAK RIDGE NATIONAL LABORATORY
5 PAGES, JOURNAL OF APPLIED PHYSICS, 19(7), PP. 593-8 (JULY 1948)

A GENERAL DISCUSSION OF THE PROBLEM ASSOCIATED WITH THE TRANSPORT OF RADIOACTIVE MATERIAL IS PRESENTED, ALONG WITH AN OUTLINE OF REGULATIONS CURRENT AT THAT TIME.

REGULATION, GENERAL + TRANSPORTATION AND HANDLING

3-12848 KOERNER HJ

TESTING OF THE SEAL OF CONTAINERS FOR RADIOACTIVE SUBSTANCES AND ITS RESULTS
GEWERBEAUFsICHTSVERWALT. DES LANDES HESSEN, KASSEL, GERMANY
2 PAGES, ZENTR. ARBEITSMED. ARBEITSCHUTZ, 14, PP. 210-12 (1964)

RESULTS OF MEASUREMENTS OF LEAKS IN SEALED RADIOACTIVE SOURCES ARE DISCUSSED. THE RELATIVE NUMBER OF THE LEAKING SOURCES VARIED FROM 1.8 TO 3.1 PERCENT OF THE NUMBER OF SOURCES INVESTIGATED, OF WHICH 70 PERCENT WERE RADIUM SOURCES FOR THERAPEUTIC USE. SOME PRECAUTIONS ARE POINTED OUT WHICH WOULD DECREASE THE RISK OF SPREADING CONTAMINATION FROM LEAKING SOURCES.

CONTAINMENT DESIGN + CONTAINMENT PENETRATION, CLOSURE OF + GERMANY + RADIUM + TEST, LEAK LOCATION

3-12849 TRANSPORT OF FISSIONABLE MATERIAL AND CIVIL RESPONSIBILITY IN NUCLEAR MATTERS
3 PAGES, ATOMO. PETROLIO ELET, PP. 63-5 (APRIL 1959), IN ITALIAN

ABSTRACT OF THIS ITALIAN DOCUMENT IS NOT AVAILABLE.

ITALY + RADIATION SAFETY AND CONTROL + TRANSPORTATION AND HANDLING

3-12850 KUHN F

TESTING FOR LEAKAGE IN CONTAINERS FOR RADIOACTIVE MATERIAL
2 PAGES, ATOMPRAXIS, 7(1), PP. 16-17 (1961), IN GERMAN

ABSTRACT OF THIS GERMAN DOCUMENT IS NOT AVAILABLE.

GERMANY + SHIPPING CONTAINER + TEST, LEAK LOCATION

3-12851 TRANSPORT OF IRRADIATED FUEL

3 PAGES, REACTOR FUEL PROCESSING, 7(1), PP. 1-3 (WINTER 1963)

GIVES GENERAL REVIEW OF THE PROBLEMS ASSOCIATED WITH THE TRANSPORT OF RADIOACTIVE MATERIALS. ALSO, THE RESULTS OF AN ECONOMIC STUDY CONCERNING THE SHIPMENT OF SPENT FUEL ELEMENTS FROM ITALY TO SOUTHERN CALIFORNIA IS DISCUSSED.

ECONOMIC STUDY + REVIEW + TRANSPORTATION AND HANDLING

3-12852 ASYEE J

TRANSPORT OF IRRADIATED FISSIONABLE MATERIAL
7 PAGES, ATOOMENERGIE HAAR TOEPASSINGEN, 6(11), PP. 255-61 (NOVEMBER 1964), IN DUTCH

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12852 *CONTINUED*

THE TRANSPORT AND STORAGE OF RADIOACTIVE AND FISSIONABLE MATERIALS IS NECESSARY IN THE PROCESSING OF IRRADIATED FUELS. THE PROBLEMS WITH RESPECT TO TRANSPORT IN EUROPE ARE DISCUSSED. IT IS EXPECTED THAT BY 1968 OR 1969 ABOUT 200 MC OF ACTIVITY PER YEAR MUST BE TRANSPORTED. IN ADDITION TO A PRESENTATION OF THE REGULATIONS ON THE TRANSPORT OF FISSIONABLE MATERIALS, THE DEVELOPMENT OF CONTAINERS AND TRANSPORT COSTS ARE ALSO CONSIDERED.

EQUIPMENT DESIGN + NETHERLANDS + REGULATION, IAEA + TRANSPORTATION AND HANDLING

3-12853 MARRIOTT AJ + HOWDEN JL
TRANSPORT OF NON-IRRADIATED FISSIONABLE MATERIAL UNDER THE INTERNATIONAL ATOMIC ENERGY AGENCY REVISED TRANSPORT REGULATIONS
ATOMIC WEAPONS RESEARCH ESTABLISHMENT, ALDERMASTON, ENGLAND
9 PAGES, JOURNAL OF BRITISH NUCLEAR ENERGY SOCIETY, 5, PP. 137-45 (APRIL 1966)

THE PURPOSE OF THIS PAPER IS CHIEFLY TO RECOUNT THOSE PARTS OF THE IAEA REGULATIONS WHICH DEAL WITH THE TRANSPORT OF NON-IRRADIATED FISSIONABLE MATERIALS AND TO REVIEW UKAEA ATOMIC WEAPONS RESEARCH ESTABLISHMENTS (AWRE) EXPERIENCE, WITH RELATED RECOMMENDATIONS ON DESIGN, MANUFACTURE, AND MAINTENANCE OF PACKINGS. THE PAPER DOES NOT DEAL WITH THE DETAILS OF CALCULATIONS APPERTAINING TO CRITICALITY CLEARANCE CERTIFICATION.

EQUIPMENT DESIGN + OPERATING EXPERIENCE + REGULATION, IAEA + TRANSPORTATION AND HANDLING + UNITED KINGDOM

3-12854 AINSWORTH SI
TRANSPORT OF IRRADIATED FUEL FROM MAGNOX POWER STATIONS IN THE UNITED KINGDOM
7 PAGES, JOURNAL OF BRITISH NUCLEAR ENERGY SOCIETY, 4, PP. 299-306 (OCTOBER 1965)

THE PROBLEM OF TRANSPORTING FUEL FROM MAGNOX POWER STATIONS WITHIN THE UNITED KINGDOM IS DISCUSSED. THE CONTROLLING FEATURES OF THE METHODS OF TRANSPORT ARE SUMMARIZED, AND THE EQUIPMENT DEVELOPED TO ACHIEVE THE NECESSARY PERFORMANCE IS DESCRIBED.

EQUIPMENT DESIGN + TRANSPORTATION AND HANDLING + UNITED KINGDOM

3-12855 NESSELMANN J
THE TRANSPORT OF RADIOACTIVE MATERIALS
2 PAGES, ATOMWIRTSCHAFT, 8, PP. 400-1 (JULY-AUGUST 1963), IN GERMAN

THE CONVEYANCE OF RADIOACTIVE MATERIALS BY PUBLIC TRANSPORT SERVICES IS SUBJECT TO LICENSE IN THE GERMAN FEDERAL REPUBLIC. THE LICENSING IS ISSUED BY THE APPROPRIATE AUTHORITY IN THE FORM OF A GENERAL TRANSPORT LICENSE EXTENDING, AT THE MOST, FOR THREE YEARS. THE LICENSING IS COMBINED WITH CONDITIONS IN RESPECT OF THE TRANSPORT PROCESSES AND IN RESPECT OF COVER PROTECTION TO FULFILL THE LEGAL OBLIGATIONS CONCERNING DAMAGE COMPENSATION. THE LAWS AND REGULATIONS HAVE, IN PRACTICE, RAISED SOME PROBLEMS. IN PARTICULAR THE TRANSPORT OF ITEMS WITH RADIOACTIVE CONTENT BY THE DEUTSCHE BUNDESBahn BECAME UNCERTAIN ACCORDING TO THE REGULATIONS. THIS DIFFICULTY WAS RESOLVED BY A SPECIAL LICENSING OF THE FEDERAL TRANSPORT MINISTRY BY WHICH SUBSTANCES WITH SHORT HALF VALUE PERIODS COULD BE DISPLACED FOR THE TIME BEING IN THE HITHERTO CUSTOMARY PROTECTIVE PACKING. A FURTHER PROBLEM CONCERNS THE FULFILLMENT OF THE OBLIGATIONS CONCERNING DAMAGE COMPENSATION IN CONNECTION WITH THE TRANSPORT OF RADIOACTIVE MATERIALS.

GERMANY + LAW + LIABILITY + TRANSPORTATION AND HANDLING

3-12856 GIBSON R
TRANSPORT REGULATIONS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, LONDON
4 PAGES, ANN. OCCUPATIONAL HYGIENE, 7, PP. 59-62 (JANUARY 1964)

PROBLEMS ARISING FROM MOVEMENT OF RADIOACTIVE MATERIALS OUTSIDE OF ATOMIC ENERGY ESTABLISHMENTS ARE DISCUSSED IN RELATION TO CONTAINMENT, SHIELDING, CRITICALITY CONTROL, AND HEAT TRANSFER MEASURES. COMMON CONSTITUENTS IN A SET OF TRANSPORT REGULATIONS BASED ON THE I.A.E.A. MODEL ARE IDENTIFIED.

CRITICALITY SAFETY + HEAT TRANSFER + REGULATION, IAEA + SHIELDING + STRUCTURAL INTEGRITY + TRANSPORTATION AND HANDLING + UNITED KINGDOM

3-12857 ENGELBERT U
TRANSPORT OF RADIOISOTOPES
ISOTOPES DIVISION, AUSTRALIAN A.E.C.
5 PAGES, ATOMIC ENERGY, 5(3), PP. 11-15 (JULY 1962)

SAFETY REGULATIONS AND TYPES OF CONTAINERS ARE OUTLINED FOR THE TRANSPORT OF ALPHA-, BETA-, GAMMA-, AND NEUTRON-EMITTING SUBSTANCES.

AUSTRALIA + EQUIPMENT DESIGN + REGULATION, GENERAL + TRANSPORTATION AND HANDLING

3-12858 BLATZ H
TRANSPORTATION OF LARGE QUANTITIES OF RADIOACTIVE MATERIALS
6 PAGES, AMERICAN MEDICAL ASSOCIATION ARCHIVES OF INDUSTRIAL HEALTH, 14, PP. 1-6 (JULY 1956)

ACCESSION NUMBER 3-12852 TO 3-12858

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12858 *CONTINUED*
PRESENTS DISCUSSION OF THE HISTORY AND PROBLEM OF THE TRANSPORTATION OF RADIOACTIVE MATERIAL.
SEVERAL TRANSPORT INCIDENTS ARE PRESENTED.

ACCIDENT, TRANSPORTATION + INCIDENT COMPILATION + PERSONNEL EXPOSURE, RADIATION

3-12859 VINARNICK L
THE TRANSPORTATION OF RADIOELEMENTS
CENTRE D ETUDES NUCLEAIRES DE SACLAY, FRANCE
7 PAGES, IND. AT., 9, PP. 54-60 (1965), IN FRENCH

AFTER A DISCUSSION ON THE CHARACTERISTICS OF THE RADIOELEMENTS AS PRODUCTS ON THE MARKET, THE POLICY AND THE CHIEF PROVISIONS OF THE REGULATIONS COVERING THE TRANSPORT OF THESE RADIOELEMENTS AS DEVELOPED FROM THE RECOMMENDATIONS OF THE I.A.E.A. ARE SUMMARIZED. TWO CATEGORIES OF RADIOELEMENTS BASED ON THEIR LIFE TIME AND ON THE TYPE OF PACKET THEY CONSTITUTE ARE GIVEN, THE PRACTICAL REQUIREMENTS FOR TRANSPORTING EACH OF THEM ARE DESCRIBED, WITH EMPHASIS ON THE COMPOSITION OF THE PACKAGING WHICH MAKES IT POSSIBLE FOR THEM TO BE HANDLED BY STANDARD TRANSPORT AGENCIES.

FRANCE + REGULATION, IAEA + SAFETY PRINCIPLES AND PHILOSOPHY + TRANSPORTATION AND HANDLING

3-12860 DUVAUX Y
THE TRANSPORTATION OF RADIOACTIVE MATERIALS
COMMISSARIAT A L ENERGIE ATOMIQUE, PARIS
CFA-1869 +. 7 PAGES, ENERGIE NUCLEAIRE, 2, PP. 295-301 (SEPTEMBER-OCTOBER 1960), IN FRENCH

THE PROBLEMS, PRESENT AND FUTURE, POSED BY THE TRANSPORTATION OF RADIOACTIVE MATERIALS ARE ANALYZED, A REVIEW IS GIVEN OF REGULATIONS AND OF RISKS INVOLVED IN REGULATORY SYSTEMS. IT IS PREDICTED THAT CAUTION AND CARRIER SPECIALIZATION ARE PREREQUISITES TO PROGRESS AND SAFETY IN RADIOACTIVE MATERIAL TRANSPORTATION.

FRANCE + REGULATION, GENERAL + REVIEW + SHIPPING ANALYSIS

3-12861 GRANGE A
TYPE B PACKAGES. DESIGN CRITERIA
ATOMIC WEAPONS RESEARCH ESTABLISHMENT, ALDERMASTON, ENGLAND
3 PAGES, NUCLEAR ENGINEERING, 7, PP. 274-6 (JULY 1962)

SAFETY CONSIDERATIONS IN THE DESIGN OF CONTAINERS MEETING THE INTERNATIONAL ATOMIC ENERGY AGENCY CLASS B STANDARDS ARE DISCUSSED. DROP, FIRE, AND WATER-IMMERSION TEST REQUIREMENTS FOR THE CONTAINERS ARE OUTLINED. CLASS B REQUIREMENTS FOR CONTAINERS FOR FISSILE MATERIALS ARE ALSO OUTLINED.

CRITICALITY SAFETY + REGULATION, IAEA + SAFETY ANALYSIS + TEST, PROOF + UNITED KINGDOM

3-12862 WILSON EJ
TRANSPORTING RADIOACTIVE MATERIAL
2 PAGES, NEW SCIENTIST, 126, PP. 522-3 (MAY 20, 1965)

NEW INTERNATIONAL REGULATIONS ON SAFETY PRECAUTIONS THAT FORM THE BASIS OF NATIONAL REGULATIONS FOR RADIOACTIVE CONSIGNMENTS BY LAND, SEA, AND AIR ARE DISCUSSED. FACTORS CONSIDERED IN DRAFTING THE NEW STANDARDS WERE - CONTAINMENT, SHIELDING, CRITICALITY, AND HEAT EMISSION.

REGULATION, IAEA + SAFETY STUDY

3-12863 AUPETIT A
THE USE OF LEAD FOR NUCLEAR SHIELDING IN FRANCE
4 PAGES, PP. 137-40 OF LEAD 62, LONDON, LEAD DEVELOPMENT ASSOCIATION, 1962

THE ECONOMIC ASPECTS OF LEAD SHIELDING AND THE TECHNICAL ASPECTS OF PREPARING LEAD-CLAD STEEL ARE DISCUSSED. THE APPLICATIONS OF LEAD-CLAD STEEL FOR LABORATORY DOORS, MARINE REACTORS, AND TRANSPORT CONTAINERS ARE ALSO CONSIDERED.

ECONOMIC STUDY + FRANCE + LEAD + SHIELDING

3-12864 AREFEVA ZS + BOCHKAREV VV + MIKHAILOV LM + TIMOFEEV LV
THE USE OF ADDITIONAL EXTERNAL PACKING IN THE TRANSPORTATION OF RADIOACTIVE PREPARATIONS
JPRS-11242 + TT-62-13513 +. 190 PAGES, TRANSLATION OF MED. RADIOL., 6(3), PP. 3-94 (MARCH 1961), PP. 142-6 OF MEDICAL RADIOLOGY

DISCUSSES THE USE OF AN EXTERNAL PERSONNEL BARRIER AROUND SHIPPING CONTAINERS. NOT ONLY IS THE PURPOSE TO CONTAIN BUT ALSO TO EXCLUDE PERSONNEL AND THUS REDUCE DOSE RATES AT ACCESSIBLE SURFACES.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$13.50 CY

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12864 *CONTINUED*
SHIELDING + SHIPPING CONTAINER + UNION OF SOVIET SOCIALIST REPUBLICS

3-12865 WOODWARD PE
WELDING BUILDS TRANSPORTATION CASKS FOR RADIOACTIVE MATERIALS
1 PAGE, WELDING JOURNAL, 37, P. 597 (JUNE 1958)

DISCUSSES WELDS USED ON THE 70-TON CASKS BUILT BY O.G. KELLY AND CO. FOR E. I. DUPONT CO.
FABRICATION + SHIPPING CONTAINER

3-12866 GIFFORD JF
CONTAINERS FOR RADIOACTIVE SAMPLES
U. S. ATOMIC ENERGY COMMISSION
U. S. PAT. 2,533,102 +. DECEMBER 5, 1950

A SHIELDED CARRIER OR TRANSFER DEVICE IS DISCLOSED WHICH HAS MULTIPLE CHAMBERS FOR RADIOACTIVE SPECIMENS AND MEANS FOR READILY OBTAINING ACCESS TO ANY INDIVIDUAL CHAMBER.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPARTMENT OF COMMERCE, WASHINGTON, D.C., \$0.25 CY
EQUIPMENT DESIGN + PATENTS + SHIPPING CONTAINER

3-12867 STRICKLAND G
CARRIER FOR RADIOACTIVE SLUGS
U. S. ATOMIC ENERGY COMMISSION
U. S. PAT. 2,514,909 +. JULY 11, 1950

A CARRIER FOR RADIOACTIVE SLUGS EMPLOYS A ROTATABLE MAGAZINE AND IS SO ARRANGED THAT INDIVIDUAL LOADING AND UNLOADING MAY BE ACCOMPLISHED WHILE MAINTAINING ADEQUATE SHIELDING.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPARTMENT OF COMMERCE, WASHINGTON, D.C., \$0.25 CY
EQUIPMENT DESIGN + PATENTS + SHIPPING CONTAINER

3-12868 GIFFORD JF + GARDEN NB
CONTAINER FOR NEUTRON IRRADIATED MATERIAL
U. S. PAT. 2,664,998 +. JANUARY 1954

ABSTRACT OF THIS UNITED STATES PATENT IS NOT AVAILABLE.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPARTMENT OF COMMERCE, WASHINGTON, D.C., \$0.25 PER COPY
PATENTS + SHIPPING CONTAINER

3-12869 GIFFORD JF
SHIELDED CONTAINER
U. S. ATOMIC ENERGY COMMISSION
U. S. PAT. 2,563,718 +. AUGUST 7, 1951

THIS PATENT DESCRIBES A SHIELDED CONTAINER FOR USE IN STORING, HANDLING, AND TRANSPORTING RADIOACTIVE MATERIALS. THE DEVICE IS PROVIDED WITH A SIMPLE AND EFFECTIVE LOCKING MEANS FOR A SERIES OF CONTAINER TRAYS.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY
EQUIPMENT DESIGN + PATENTS + SHIPPING CONTAINER

3-12870 BROWNE HJ + GARDEN NB
LOW WEIGHT CONTAINER FOR RADIOACTIVE MATERIALS
U. S. ATOMIC ENERGY COMMISSION
U. S. PAT. 2,743,372 +. APRIL 24, 1956

A LIGHT-WEIGHT PORTABLE CONTAINER FOR RADIOACTIVE MATERIALS OF MINIMUM WEIGHT AND DIMENSIONS HAVING A RELATIVELY CONSTANT AND SAFE LEVEL OF RADIATION ON ALL SURFACES IS DESCRIBED. THIS CONTAINER, MADE OF U OR W, CONSISTS OF A RELATIVELY THICK INNER CONTAINER, SUPPORTED CENTRALLY BY WEBS AND FITTINGS, SHAPED SO THAT ITS THICKNESS IS INVERSELY PROPORTIONAL AS THE RADIUS FROM THE CENTER TO THE CUBICAL SURFACE OF THE OUTER CONTAINER. FOR EXAMPLE, SINCE ONE CORNER OF THE OUTER CUBICAL CONTAINER IS FARTHER FROM THE RADIATION SOURCE, THE THICKNESS OF THE INNER CONTAINER AT THE CORRESPONDING POINT WOULD BE LESS IN ORDER TO ACHIEVE A CONSTANT RADIATION LEVEL ON THE OUTER SURFACE. THE CONTAINER BY REASON OF THIS DESIGN MAY SAFELY CARRY RADIOACTIVE MATERIALS UNDER SUCH LIMITATIONS AS WOULD BE IMPOSED BY THE USE OF AIR FREIGHT.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY
EQUIPMENT DESIGN + PATENTS + SHIPPING CONTAINER

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12871 HAWKINS MB + TOMPKINS ER
SHIPPING CONTAINER FOR RADIOACTIVE MATERIAL
U. S. ATOMIC ENERGY COMMISSION
U.S. PAT. 2,682,352 +. JUNE 29, 1954

THE CONTAINER CAN HAS A DUST-TIGHT SEALED CAP TO PREVENT THE ESCAPE OF RADIOACTIVE MATERIALS FROM THE CAN WHILE PERMITTING THE ESCAPE OF GASES WHICH MAY BE PRODUCED DURING THE NEUTRON TREATMENT. THE CONTAINER IS FURTHER PROVIDED WITH MEANS FOR SHEARING THE CAP TO FACILITATE THE REMOVAL OF THE CONTAINED RADIOACTIVE MATERIAL.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY

CONTAINMENT DESIGN + EQUIPMENT DESIGN + PATENTS

3-12872 COMINS JA
RADIOACTIVE SOURCE CONTAINER
CURTISS-WRIGHT CORPORATION
U.S. PAT. 3,026,414 +. MARCH 20, 1962

A CONTAINER IS DESIGNED FOR STORING AND SHIPPING RADIOACTIVE SOURCES AND FOR REPLACING THE SOURCE IN RADIOGRAPHIC CAMERAS. THE CONTAINER COMPRISES A BLOCK OF SHIELDING MATERIAL WITHIN A HOUSING AND HAVING AT LEAST ONE PASSAGEWAY LEADING TO THE OUTSIDE. THE PASSAGEWAY HAS A SHIELDED POSITION AND AN ELECTRICAL SWITCH FOR INDICATING THE PRESENCE OF A RADIOACTIVE SOURCE IN THE SHIELDED POSITION AND FOR POSITIONING IT THERE.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY

EQUIPMENT DESIGN + PATENTS + SHIPPING CONTAINER

3-12873 MONTGOMERY DW
DEVICE FOR THE STORAGE OF A HEAT EVOLVING MATERIAL
BABCOCK AND WILCOX COMPANY
U.S. PAT. 3,046,403 +. JULY 24, 1962

A STORAGE AND SHIPPING SHIELDED CASK IS DESIGNED FOR SPENT REACTOR FUEL. THE CASK COMPRISES A CYLINDRICAL STEEL VESSEL EMBEDDED IN A RECTANGULAR CASK OF RADIATION SHIELDING MATERIAL, AN EXTERIOR HEAT EXCHANGER, AND MEANS FOR CIRCULATING WATER FROM THE VESSEL CONTAINING THE FUEL ELEMENTS TO THE HEAT EXCHANGER FOR COOLING BY AIR.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY

HEAT TRANSFER + PATENTS + SHIPPING CONTAINER

3-12874 LOOS RA + JOHNSON SH
METHOD AND APPARATUS FOR LOADING AND HANDLING A RADIOACTIVE SOURCE
CURTISS-WRIGHT CORP.
U. S. PAT. 3,038,999 +. JUNE 12, 1962

AN IRRADIATION FACILITY FOR IRRADIATING GRAIN IS DESCRIBED WHICH USES A SOURCE OF A PLURALITY OF CO-60 SLUGS. THE SOURCE COMPRISES A METAL CYLINDER CONTAINING TWO CONCENTRIC CIRCULAR ROWS OF TUBES FILLED WITH SLUGS OF CO-60 OR COMPACTED RADIOACTIVE MATERIAL. A CASK WITH A PLUG FOR THE STORAGE OF THE SOURCE IS DESCRIBED. A SHIPPING CONTAINER AND LOADING DEVICE IS DESIGNED FOR LOADING THE SLUGS INTO THE SOURCE.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY

COBALT + PATENTS + SHIPPING CONTAINER

3-12875 NACHBAR HD + BIGGS BB + TARIELLO PJ + GEORGE KO
SHIPPING CONTAINER FOR RADIOACTIVE MATERIAL
U. S. ATOMIC ENERGY COMMISSION
U. S. PATENT 3,073,961 +. JANUARY 15, 1963

A SHIPPING CONTAINER IS DESCRIBED FOR TRANSPORTING A LARGE NUMBER OF RADIOACTIVE NUCLEAR FUEL ELEMENT MODULES WHICH PRODUCE A SUBSTANTIAL AMOUNT OF HEAT. THE CONTAINER COMPRISES A PRIMARY PRESSURE VESSEL AND SHIELD, AND A ROTABLE HEAD HAVING AN ACCESS PORT THAT CAN BE INDEXED WITH MODULE HOLDERS IN THE CONTAINER. IN ORDER TO REMOVE HEAT GENERATED IN THE FUEL ELEMENTS, A HEAT EXCHANGER IS ARRANGED WITHIN THE CONTAINER AND IN CONTACT WITH A HEAT EXCHANGE FLUID THEREIN. THE HEAT EXCHANGER COMMUNICATES WITH ADDITIONAL EXTERNAL HEAT EXCHANGERS, WHICH DISSIPATE HEAT TO THE ATMOSPHERE.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY

HEAT TRANSFER + PATENTS + SHIPPING CONTAINER

3-12876 ALLEN JW
APPARATUS UTILIZING LIQUID METAL COOLANT FOR TRANSPORTING THERMALLY HOT INTENSELY RADIOACTIVE MATERIAL
STANRAY CORPORATION
U.S. PAT. 3,133,197 +. MAY 12, 1964

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12876 *CONTINUED*

AN APPARATUS FOR TRANSPORTING SPENT REACTOR FUEL ELEMENTS OR OTHER RADIOACTIVE MATERIAL, IS DESIGNED WHICH PROVIDES BOTH EFFICIENT HEAT CONDUCTION AND EFFICIENT RADIATION SHIELDING. THE APPARATUS COMPRISES A PRESSURE-RETAINING CASK, A QUANTITY OF LOW-MELTING METAL, AND MEANS FOR TRANSFERRING THE MOLTEN METAL INTO AND OUT OF THE CASK. THE METAL IS PREFERABLY A BISMUTH-LEAD ALLOY, AND THE APPARATUS IS MOUNTED ON A SPECIALLY FITTED RAILROAD CAR.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY

HEAT TRANSFER + PATENTS + SHIELDING + SHIPPING CONTAINER

3-12877 ALLEN JW

CONTAINER FOR TRANSPORTING THERMALLY HOT INTENSELY RADIOACTIVE MATERIAL
STANRAY CORPORATION

U.S. PAT. 3,119,932 +. JANUARY 28, 1964

A CONTAINER IS DESCRIBED WITH AN INNER AND OUTER SHELL OF HIGH-STRENGTH HIGH-THERMAL-CONDUCTIVITY MATERIAL WITH RADIATION-ABSORBING MATERIAL INTERPOSED BETWEEN THE SHELLS. WEB SECTIONS ARE PROVIDED IN THE ABSORBER FOR THERMAL CONDUCTANCE FROM THE INNER TO THE OUTER SHELL.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY

HEAT TRANSFER + PATENTS + SHIPPING CONTAINER

3-12878 ALLEN JW

CASK CONSTRUCTION FOR RADIOACTIVE MATERIAL
STANRAY CORPORATION

U. S. PAT. 3,113,215 +. DECEMBER 3, 1963

CASKS DESIGNED FOR TRANSPORTING RADIOACTIVE MATERIALS ARE DESCRIBED. THE CASKS HAVE INNER AND OUTER SHELLS IN SPACED RELATION WITH SHIELDING MATERIAL BETWEEN THE SHELLS. THE SHELLS ARE CONSTRUCTED OF FINNED SECTIONS TO PROVIDE HIGH THERMAL CONDUCTIVITY. THE OUTER SHELL HAS ATTACHED BANKS OF FINS TO PROVIDE ADDITIONAL THERMAL CONDUCTIVITY.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY

HEAT TRANSFER + PATENTS + SHIPPING CONTAINER

3-12879 ROGERS AN

AIR-COOLED SHIPPING CONTAINER FOR NUCLEAR FUEL ELEMENTS
BALDWIN-LIMA-HAMILTON CORP.

U. S. PAT. 3,111,586 +. NOVEMBER 19, 1963

A CONTAINER FOR SPENT FUEL ELEMENTS, WHICH REQUIRES NO MOVING PARTS OR DRIVING MEANS FOR ITS COOLING EQUIPMENT, IS DESCRIBED. WATER IMMERSION IS NOT NECESSARY FOR A HIGH SAFETY FACTOR, BUT INSTEAD, NATURAL CONVECTIVE AIR FLOW IS SUFFICIENT.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY

HEAT TRANSFER + MAIN COOLING SYSTEM + PATENTS + SHIPPING CONTAINER

3-12880 STONE LR + RADCLIFFE TJ + SOWER GW

RADIOACTIVE SOURCE HOLDER
REPUBLIC STEEL CORPORATION

U. S. PAT. 3,197,639 +. JULY 27, 1965

A RADIOACTIVE SOURCE HOLDER IS DESIGNED TO PROVIDE ADEQUATE SHIELDING AGAINST UNCONTROLLED RADIATION AND YET BE SUFFICIENTLY LIGHT AND CONVENIENT FOR INSTALLATION AT A SUBSTANTIAL HEIGHT AT THE EXTERIOR OF A BLAST FURNACE. THE HOLDER IS A LEAD-LINED CONTAINER EQUIPPED WITH A LEVER-OPERATED SHUTTER. WHEN THE SHUTTER IS OPEN, A NARROW RADIATION BEAM EMERGES FROM THE FRONT OF THE HOLDER AND PASSES THROUGH THE RELATED BEAM PORT. WHEN THE SHUTTER IS CLOSED, THE BEAM IS BLOCKED BY PB, AND THE HOLDER IS A SAFE STORAGE AND SHIPPING CONTAINER. THE HOLDER IS INTENDED AS PART OF A SYSTEM FOR DETECTING THE POSITION OF STOCK WITHIN A BLAST FURNACE.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY

CONTAINMENT, SOURCE + PATENTS

3-12881 AUPETIT A + BLUM P + JOUIN J

CONTAINER FOR RADIOACTIVE MATERIALS
COMMISSARIAT A L ENERGIE ATOMIQUE, FRANCE

U. S. PATENT 3,175,087 + BRITISH PATENT 986,344 +. MARCH 23, 1965

A CONTAINER ADAPTED FOR TRANSPORTING CARTRIDGES OF FISSILE MATERIAL IS MADE UP OF TWO STAINLESS STEEL CHAMBERS WITH LEAD FILLING THE SPACE BETWEEN THEM. THE OUTER CHAMBER IS EQUIPPED WITH COOLING FINS AND DEVICES FOR HANDLING AND SECURING PURPOSES. A CARTRIDGE CARRIER BASKET FITS INSIDE THE INNER CHAMBER. PLUGS FOR EACH CHAMBER PROVIDE A DOUBLE FLUID-TIGHT SEAL AND RADIATION SHIELDING. THE CONTAINER IS LOADED IN A BATH AND IS PROVIDED

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12881 *CONTINUED*
WITH AN EXHAUSTING DEVICE.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY
FRANCE + PATENTS + SHIPPING CONTAINER + UNITED KINGDOM

3-12882 MONTGOMERY DW
DEVICE FOR THE STORAGE OF A HEAT EVOLVING MATERIAL
BABCOCK AND WILCOX COMPANY
U. S. PAT. 3,230,373 +. JANUARY 18, 1966

A SPENT FUEL STORAGE AND SHIPPING CASK INCLUDES A CYLINDRICAL STEEL PRESSURE VESSEL EMBEDDED IN A RECTANGULAR CASK OF RADIATION SHIELDING MATERIAL IN CONJUNCTION WITH AN EXTERIOR HEAT EXCHANGER FOR THE REMOVAL OF HEAT PRODUCED BY THE DECAY OF FISSION PRODUCTS IN THE ELEMENTS. A RADIATION SHIELDING LINING IS PROVIDED INSIDE THE PRESSURE VESSEL. THE CASK IS SUFFICIENTLY LARGE TO CONTAIN ENOUGH FUEL ELEMENTS TO LOWER THE SHIPPING COSTS BUT SMALL ENOUGH TO BE SHIPPED ON ANY STANDARD RAILROAD CAR.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY
HEAT TRANSFER + PATENTS + SHIPPING CONTAINER

3-12883 BONILLA CF + BROWN KP + BROWN SH
SHIPPING CONTAINER FOR SPENT NUCLEAR REACTOR FUEL ELEMENTS
NATIONAL LEAD COMPANY
U. S. PAT. 3,229,096 +. JANUARY 11, 1966

IN A SHIPPING CONTAINER FOR SPENT FUEL ELEMENTS, A NESTING ARRANGEMENT OF THE FUEL ELEMENTS PERMITS THE STORING OF MORE ELEMENTS IN A GIVEN SHIELDED SPACE TO REDUCE SHIPPING COSTS. THE ELEMENTS ARE EITHER GAS OR WATER COOLED WITHIN THE CONTAINER AND ARE SUPPORTED IN PROPER POSITION TO PREVENT CRITICALITY AND YET TO ENSURE PROPER COOLING. SPECIAL PROVISION IS MADE FOR STORING ELEMENTS THAT HAVE FAILED OR RUPTURED IN A CLOSED CONTAINER HAVING ITS OWN VENT AND PARTICULATE FILTER.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.25 CY
CONTAINMENT DESIGN + HEAT TRANSFER + PATENTS + SHIPPING CONTAINER

3-12884 RADIATION SHIELDING CONTAINERS
FARREL-BIRMINGHAM COMPANY, INC.
BRITISH PAT. 790,156 +. NUCLEAR ENGINEERING 3, P. 360 (AUGUST 1958)

DESCRIBES SEVERAL NESTING CONTAINERS FOR VERSATILE RADIOISOTOPE SHIPMENTS.

AVAILABILITY - THE PATENT OFFICE, 25 SOUTHAMPTON BUILDING, LONDON, W.C. 2, ENGLAND, \$0.49 CY
PATENTS + SHIPPING CONTAINER + UNITED KINGDOM

3-12885 UNTERMAYER S
PORTABLE SHIELDED CONTAINER FOR A RADIOACTIVE SOURCE OF RADIATION
BRITISH PAT. 766,852 +. NUCLEAR ENGINEERING, 2, P. 224 (MAY 1957)

DESCRIBES A SMALL SHIELDED CONTAINER DESIGNED TO HOLD A RADIOACTIVE CAPSULE.

AVAILABILITY - THE PATENT OFFICE, 25 SOUTHAMPTON BUILDING, LONDON, W.C. 2, ENGLAND, \$0.49 CY
PATENTS + SHIPPING CONTAINER + UNITED KINGDOM

3-12886 FRASER-SMITH RF
IMPROVEMENTS IN OR RELATING TO SHIELDED CONTAINERS FOR RADIOACTIVE MATERIAL
BRITISH PAT. 844,346 +. AUGUST 10, 1960

A SHIELDED CONTAINER FOR THE CARRIAGE AND STORAGE OF RADIOACTIVE MATERIALS WERE CONSTRUCTED IN SUCH A WAY THAT THE CARRIED MATERIAL IS ADEQUATELY SHIELDED AND YET CAN BE IMMEDIATELY EXPOSED BY A SIMPLE PIVOTING MOVEMENT. THE CONTAINER COMPRISES TWO SEMISPHERICAL, PIVOTABLE PARTS, ONE POSITIONED ABOVE THE OTHER WITH CONVEX-CONCAVE MATING SURFACES, THE TOP CONVEX PART HAVING A HOLE FOR HOLDING CAPSULED RADIOACTIVE MATERIAL. IN THE CLOSED CONDITION THE CAPSULE IS ADJACENT TO THE MATING SURFACE, BUT THE CURVATURE OF THE SURFACE ENSURES THAT NO RADIATION ESCAPES. IN THE OPEN CONDITION, THE CAPSULE IS EXPOSED IN ONE DIRECTION ONLY. THE CAPSULE-CARRYING STEM IS DESIGNED FOR EASY LOADING AND UNLOADING OF THE CONTAINER BEHIND A SHIELD.

AVAILABILITY - THE PATENT OFFICE, 25 SOUTHAMPTON BUILDING, LONDON, W.C. 2, ENGLAND, \$0.49 CY
PATENTS + SHIPPING CONTAINER + UNITED KINGDOM

3-12887 WOLSTENHOLME S + TREUHERZ W + SCHOFIELD HP

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12887 *CONTINUED*
IMPROVEMENTS IN OR RELATING TO CONTAINERS FOR THE ISOLATION OF RADIOACTIVE MATTER
EVERGLADES LTD.
BRITISH PAT. 849,655 +. SEPTEMBER 28, 1960

A RESILIENT CONTAINER FOR STORAGE OR TRANSPORT OF RADIOACTIVE MATTER OR RADIOISOTOPES MAY BE MADE FROM A HOMOGENEOUS MIXTURE OF LEAD POWDER AND RUBBER OR SYNTHETIC RESIN, THE PREFERRED LEAD CONTENT OF THE MIXTURE BEING BETWEEN 80 AND 88 %. THE ADVANTAGE OF THIS CONTAINER OVER CONVENTIONAL LEAD CONTAINERS IS THAT PROTECTION FROM MECHANICAL SHOCK IS INCREASED, ESPECIALLY WHEN ITS INTERIOR IS CORRUGATED TO PROVIDE A FIRM YET FLOATING SUPPORT FOR GLASS CAPSULES, ETC. TWO ALTERNATIVE FORMS OF THIS CONTAINER ARE SHOWN. ONE IS A SIMPLE ONE, WHILE THE OTHER IS A NEST OF TIGHTLY FITTING CONCENTRIC CONTAINERS. MEANS ARE DESCRIBED FOR HOLDING THE DETACHABLE LID IN POSITION. SEVERAL EXAMPLES ARE GIVEN OF THE PREPARATION AND MOLDING OF LEAD-RUBBER-SYNTHETIC RESIN MIXTURES.

AVAILABILITY - THE PATENT OFFICE, 25 SOUTHAMPTON BUILDING, LONDON, W.C. 2, ENGLAND, \$0.49 CY

IMPACT SHOCK + PATENTS + SHIPPING CONTAINER + UNITED KINGDOM

3-12888 ACKROYD RT + KENYON D
IMPROVEMENTS IN OR RELATING TO CONTAINERS FOR STORING FISSILE MATERIAL
BRITISH PAT. 855,420 +. JULY 1956

ABSTRACT OF THIS BRITISH PATENT IS NOT AVAILABLE.

AVAILABILITY - THE PATENT OFFICE, 25 SOUTHAMPTON BUILDING, LONDON, W.C. 2, ENGLAND, \$0.49 PER COPY

CRITICALITY SAFETY + PATENTS + SHIPPING CONTAINER + UNITED KINGDOM

3-12889 MONTGOMERY DW
A STORAGE AND SHIPPING CASK FOR A HEAT EVOLVING RADIATION SOURCE
BABCOCK AND WILCOX COMPANY
BRITISH PAT. 909,692 +. OCTOBER 31, 1962

A STORAGE AND SHIPPING CASK FOR A HEAT-EVOLVING RADIATION SOURCE IS DESCRIBED. THE CASK CONSISTS OF A PRESSURE VESSEL WITHIN WHICH THE RADIATION SOURCE IS POSITIONED, RADIATION SHIELDING ASSOCIATED WITH THE PRESSURE VESSEL, AND A HEAT EXCHANGER TO REMOVE HEAT GENERATED WITHIN THE PRESSURE VESSEL.

AVAILABILITY - THE PATENT OFFICE, 25 SOUTHAMPTON BUILDING, LONDON, W.C., 2, ENGLAND, \$0.49 CY

HEAT TRANSFER + PATENTS + SHIPPING CONTAINER + UNITED KINGDOM

3-12890 IMPROVEMENTS IN OR RELATING TO SHIPPING CASKS FOR TRANSPORTING RADIOACTIVE MATERIALS
EDLOW LEAD COMPANY
BRITISH PAT. 067,267 +. MAY 3, 1961

AN IMPROVED SHIPPING CASK FOR TRANSPORTING RADIOACTIVE MATERIAL, WHICH HAS THE PROPERTY OF GOOD HEAT CONDUCTION BETWEEN THE INSIDE AND OUTSIDE OF THE CASK, IS DESCRIBED. THE CASK CONSISTS OF AN INNER CONTAINER HAVING A CYLINDRICAL WALL, A CONCENTRIC OUTER CASING, AND A RADIATION-SHIELDING MATERIAL DISPOSED BETWEEN THE CONTAINER AND THE CASING. THE SHIELDING MATERIAL IS A MONOLITHIC CAST-LEAD MASS. THE CASK IS CHARACTERIZED BY PROVISIONS FOR A PLURALITY OF HEAT CONDUCTING ELEMENTS ATTACHED TO THE OUTER CASING AND EXTENDING INTO THE CAST-LEAD MASS.

AVAILABILITY - THE PATENT OFFICE, 25 SOUTHAMPTON BUILDING, LONDON, W.C., 2, ENGLAND, \$0.49 CY

HEAT TRANSFER + PATENTS + SHIPPING CONTAINER + UNITED KINGDOM

3-12891 PONTET HC
IMPROVEMENTS IN AND RELATING TO CONTAINERS FOR RADIOACTIVE ISOTOPES
BRITISH PAT. 919,643 +. FEBRUARY 27, 1963

A CONTAINER IS PROVIDED COMPOSED OF TWO PARTS SO MOUNTED THAT WHEN IN CLOSED POSITION THEY PROVIDE A PERFECT RAY-PROOF HOUSING BUT WHEN SEPARATED INTO OPEN POSITION PRESENT THE ISOTOPE FOR USE.

AVAILABILITY - THE PATENT OFFICE, 25 SOUTHAMPTON BUILDING, LONDON, W.C., 2, ENGLAND, \$0.49 CY

CONTAINMENT, SOURCE + PATENTS + UNITED KINGDOM

3-12892 CONTAINER FOR RADIOACTIVE MATERIAL
ABBOTT LABORATORIES
BRITISH PAT. 1,003,179 +. SEPTEMBER 2, 1965

A DEVICE FOR SHIPPING AND STORING RADIOACTIVE MATERIAL IS MADE UP OF A PRIMARY CONTAINER FOR CONTAINING THE RADIOACTIVE MATERIAL AND A SECONDARY SHIELDING CONTAINER. THE PRIMARY CONTAINER HAS A BODY PORTION AND A BASE PORTION HAVING AN OBLIQUE FLOOR AND AT LEAST TWO SIDE WALLS IN THE BASE PORTION. A SHOULDER PORTION IS DISPOSED ADJACENT TO THE INNER END OF EACH WALL AND IS SPACED AT AN EQUAL DISTANCE FROM THE TOP OF THE PRIMARY CONTAINER. THE PRIMARY

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12892 *CONTINUED*

CONTAINER HAS A NECK WITH MEANS TO RECEIVE A SCREW-THREADED CAP. THE SECONDARY CONTAINER COMPLETELY ENCLOSES THE PRIMARY CONTAINER AND HAS A SUBSTANTIALLY FLAT FLOOR AND AT LEAST TWO PROJECTIONS HAVING A SUPPORTING SURFACE.

AVAILABILITY - THE PATENT OFFICE, 25 SOUTHAMPTON BUILDING, LONDON, W.C., 2, ENGLAND, \$0.49 CY

PATENTS + SHIPPING CONTAINER + UNITED KINGDOM

3-12894 INOU K

METHOD FOR TRANSFERRING A SPECIMEN HOLDER INTO ITS CONTAINER, AND THE STRUCTURE OF THE CONTAINER
URAGA HEAVY IND., LTD.
JAPANESE PAT. 1964-23459 +. OCTOBER 21, 1964

THE METHOD AND CONTAINER PROPOSED ARE USED FOR TRANSFERRING A SPECIMEN HOLDER WITH AN IRRADIATED SPECIMEN INTO THE CONTAINER FROM THE REACTOR IRRADIATION HOLE. THE CONTAINER, ADEQUATELY SHIELDED, IS SUITABLE FOR TRANSPORTING THE IRRADIATED SPECIMEN TO THE LABORATORY. THE SPECIMEN HOLDER IS PLACED NEAR THE REACTOR CORE IN THE IRRADIATION HOLE, IT IS THEN ATTACHED TO THE END OF A LONG TUBE, WHICH CONNECTS THE HOLDER TO THE HOLE PLUG. WHEN REMOVING THIS HOLDER WITH AN IRRADIATED SPECIMEN AFTER IRRADIATION, THE DISCONNECTION OF THE HOLDER FROM THE TUBE AND THE CLOSING OF THE CONTAINER AFTER CONTAINMENT ARE DONE AT THE SAME TIME. THE CONTAINER FOR THIS PURPOSE CONSISTS OF A GEAR SYSTEM FOR CLOSING (OR OPENING) THE LID, TWO CUTTERS INSTALLED ON THE INNER SIDE OF THE LID, AND A DEVICE FOR WORKING THE TWO CUTTERS SIMULTANEOUSLY. THE ENTIRE TRANSPORT CONTAINER WITH SHIELDING IS DIVIDED INTO TWO PARTS PUT TOGETHER BY MEANS OF FEMALE AND MALE CONES.

AVAILABILITY - PHOTOCOPIES MAY BE OBTAINED FROM THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.30 PER PAGE

JAPAN + PATENTS + SHIPPING CONTAINER

3-12895 MUROTA K

NUCLEAR FUEL TRANSPORT CONTAINER
NIPPON ATOMIC IND. GROUP CO., LTD.
JAPANESE PAT. 1964-23458 +. OCTOBER 21, 1964

THE FUEL TRANSPORT CONTAINER PROPOSED FACILITATES HEAT REMOVAL FROM THE SPENT FUEL CONTAINED AND IS EASY TO HANDLE. THE ENTIRE TRANSPORT CONTAINER CONSISTS OF AN OUTER MASSIVE WALL, WHICH FORMS A CYLINDRICAL BODY, AND AN INNER SPACE FOR THE FUEL RODS. WHEN CONTAINED, THESE FUEL RODS ARE GROUPED INTO BUNDLES WITH SPACES BETWEEN THE RODS, IN EACH BUNDLE, THE RODS ARE SUPPORTED AT THE TOP AND BOTTOM BY PLATES. NEUTRON-ABSORBING RODS ARE PLACED AT REGULAR INTERVALS IN THE SPACES BETWEEN THE FUEL RODS. WATER IS INTRODUCED FOR COOLING THE FUEL RODS. THEN THE LID OF THE CONTAINER IS PLACED ON. THE HEAT CONVECTION, HENCE, HEAT REMOVAL IN THE TRANSPORT CONTAINER, IS GREATLY IMPROVED BY THE SPACES PRODUCED IN THE STRUCTURE.

AVAILABILITY - PHOTOCOPIES MAY BE OBTAINED FROM THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.30 PER PAGE

HEAT TRANSFER + JAPAN + PATENTS + SHIPPING CONTAINER

3-12896 GERMOND P + VICTOR P

IMPROVEMENTS TO LEAD CASKETS
COMMISSARIAT A L ENERGIE ATOMIQUE
BELGIAN PATENT 574,515 +. JANUARY 21, 1958

THE LID OF THE CASKET IS REASONABLY LIGHT AS IT FITS INTO A HOLLOW CYLINDER. AT THE BOTTOM OF THE CYLINDER IS THE RADIOACTIVE SUBSTANCE IN ITS CONTAINER. SURROUNDING THE CONTAINER, AND INSIDE THE HOLLOW CYLINDER, IS A VESSEL WHICH CAN BE MOVED UP AND DOWN THE HOLLOW CYLINDER BY MEANS OF A LANYARD FROM OUTSIDE THE CASKET. THIS MOTION FACILITATES THE REMOVAL OF THE RADIOACTIVE SUBSTANCE IN ITS CONTAINER.

AVAILABILITY - PHOTOCOPIES MAY BE OBTAINED FROM THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C., \$0.30 PER PAGE

BELGIUM + EURATOM + PATENTS + SHIPPING CONTAINER

3-12897 RADIOACTIVE STORAGE CONTAINER

UNIVERSITY OF CALIFORNIA, BERKELEY
CAPE-12 +. 1960

DRAWING GIVES DIMENSIONS OF A PORTABLE CONTAINER FOR STORAGE OR TRANSPORT OF RADIOACTIVE SOURCES. VARIABLE THICKNESS LEAD SHIELD MAY BE USED. INSIDE DIMENSIONS WITH 2 IN. LEAD SHIELD ARE 2 1/6 IN. DIAMETER BY 6 IN. HIGH. TEXT DESCRIBES COMPONENTS AND METHODS OF USE.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12898 65 LITRE WASTE DISPOSAL CARRIER

ACCESSION NUMBER 3-12892 TO 3-12898

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12898 *CONTINUED*
ARGONNE NATIONAL LABORATORY, LEMONT, ILL.
CAPE-32 +. 1960

DRAWINGS GIVE DIMENSIONS AND ASSEMBLY DIRECTIONS FOR A 68.5-LITER CONTAINER FOR DISPOSABLE WASTES.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER + WASTE TRANSPORTATION

3-12899 CP-5 FUEL ELEMENT CARRIER
ARGONNE NATIONAL LABORATORY, LEMONT, ILLINOIS
CAPE-65 +. 1960

THIS SET OF DRAWINGS CONTAINS ASSEMBLY AND DETAIL DRAWINGS ON THE CP-5 (ANL RESEARCH REACTOR) CARRIER USED FOR THE TRANSPORT OF IRRADIATED FUEL ELEMENTS.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12900 DRAWINGS FOR A FUEL ELEMENT CARRIER
ARGONNE NATIONAL LABORATORY, LEMONT, ILL.
CAPE-64 +. 1960

THESE DRAWINGS ARE FOR A FUEL ELEMENT CARRIER. THE CONTAINER CARRIES TWO MTH FUEL ELEMENTS FOR USE WITH GAMMA IRRADIATION FACILITY. SEE CAPE-63 AND CAPE-104.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + MTR (MATERIAL TESTING REACTOR) + REACTOR, TEST + SHIPPING CONTAINER

3-12901 95 LITRE WASTE POT
ARGONNE NATIONAL LABORATORY, LEMONT, ILL.
CAPE-127 +. 1960

THIS WASTE CONTAINER HOLDS 95 LITRES AND IS 20 5/8 IN. DEEP AND 20 3/16 IN. IN DIAMETER. THERE IS A 1-11/16 IN. LEAD FILLING COMPLETELY SURROUNDING THE POT.

AVAILABILITY - U.S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER + WASTE TRANSPORTATION

3-12902 RADIOACTIVE STORAGE CONTAINER TYPE S.C.-2
UNIVERSITY OF CALIFORNIA, BERKELEY
CAPE-102 +. 1960

THIS STORAGE CONTAINER IS 6 1/4 IN. IN DIAMETER AND 12 IN. HIGH. THE LEAD LINER IS ABOUT 1 3/4 IN. THICK, LEAVING A STORAGE SPACE OF 2-1/16 IN. IN DIAMETER AND 5-1/4 IN. DEEP.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12903 SLUG POT M-2.5
ARGONNE NATIONAL LABORATORY, LEMONT, ILL.
CAPE-149 +. 1960

THIS SHIELDED CONTAINER IS USED FOR SHIPPING REACTOR SLUGS. IT IS ABOUT 22-1/2 IN. IN DIAMETER AND 23-1/3 IN. HIGH INCLUDING ITS COVER HANDLE. IT IS SHIELDED WITH 8-1/2 IN. OF LEAD.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12904 STR (MARK II) FUEL ELEMENT SHIPPING CONTAINER
WESTINGHOUSE ELECTRIC CORPORATION, PITTSBURGH
CAPE-128 +. 1960

DRAWINGS ARE AVAILABLE FOR GRAPPLER GUIDES, SECONDARY SHIELDING, SHIPPING AND REMOVAL

ACCESSION NUMBER 3-12898 TO 3-12904

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12904 *CONTINUED*
CONTAINERS FOR USE WITH THE STR (MARK II FUEL ELEMENT).

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12905 SHIELDED TRANSFER TANK
OAK RIDGE NATIONAL LABORATORY
CAPE-175 +. 1960

THE RADIOISOTOPE CARRIER HAS A STORAGE CAPACITY OF 250 GAL. AND A WORKING CAPACITY OF 212. IT CONSISTS OF A 60-IN. STAINLESS-STEEL-CLAD SPHERE SHIELDED WITH 5.54 IN. OF LEAD. IT IS MOUNTED ON AN 84-IN.-SQUARE SKID.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + LIQUID FUEL + SHIPPING CONTAINER

3-12906 POT - HOT ROCK
ARGONNE NATIONAL LABORATORY, LEMONT, ILL.
CAPE-150 +. 1960

THIS SHIELDED CONTAINER WEIGHS ABOUT 8075 LBS AND IS ABOUT 45 IN. HIGH AND 36 IN. IN DIAMETER, INCLUDING THE LIFTING YOKE. IT IS SHIELDED WITH 5 IN. OF LEAD.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12907 UF-6 CYLINDERS - SHIPPING CONTAINERS
OAK RIDGE GASEOUS DIFFUSION PLANT, TENNESSEE
CAPE-323 +. 1960

THE 10 TON CYLINDER IS 118-1/2 IN. LONG WITH A 48-IN. I.D. AND WEIGHS 4,500 LB WHEN EMPTY. THE 2.5-TON CYLINDER IS 81-1/2 IN. LONG WITH AN I.D. OF 30 IN. AND WEIGHS 1,650 LB WHEN EMPTY. BOTH CYLINDERS USE 1-IN. SUPERIOR VALVES AND ARE CONSTRUCTED OF STEEL. THE MD CYLINDER IS 53 IN. LONG WITH A 12-IN. I.D., WEIGHS 185 LB WHEN EMPTY, HAS A CAPACITY OF 450 LB AND IS CONSTRUCTED OF NICKEL. THE WITHDRAWAL ON 5-IN. CYLINDER IS 34-3/4 IN. LONG WITH AN I.D. OF 5 IN., A WEIGHT OF 54 LB WHEN EMPTY AND HAS A 55-LB CAPACITY. BOTH THE MD AND THE LATTER CYLINDER USE 3/4-IN. KEROTEST OR SUPERIOR VALVES. THESE CONTAINERS ARE USED FOR NONCRITICAL OF NORMAL ASSAYING OF UF6. ENHANCED MATERIAL REQUIRES THE USE OF SPECIAL CYLINDERS.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER + URANIUM HEXAFLUORIDE

3-12908 8 1/2 INCH COBALT SHIPPING CONTAINER
OAK RIDGE NATIONAL LABORATORY
CAPE-217 +. 1962

THE OUTSIDE DIMENSIONS OF THE STAINLESS STEEL SHIPPING CONTAINER ARE 22-3/4 INCHES HIGH AND 20 INCHES IN DIAMETER. IT IS SHIELDED WITH A MINIMUM OF 8-1/2 INCHES OF LEAD. THE CELL FOR THE COBALT IS 4 INCHES DEEP AND ABOUT 2-1/2 INCHES IN DIAMETER.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

COBALT + EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12909 RETURNABLE CONTAINER FOR SOLID MATERIALS
OAK RIDGE NATIONAL LABORATORY
CAPE-325 +. 1960

THE STAINLESS STEEL CONTAINER CAN MEASURE FROM 9-3/8 TO 13-3/8 IN. IN DIAMETER AND 12-1/8 TO 16-1/8 IN. HIGH AND IS FILLED WITH LEAD. AN ALUMINUM CONTAINER TO HOLD COBALT OR OTHER GAMMA EMITTERS FITS INSIDE THIS SHIPPING CONTAINER.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12910 SHIPPING CONTAINERS FOR SCRAP STAINLESS STEEL MATERIALS
Y-12 PLANT, OAK RIDGE, TENNESSEE
CAPE-324 +. 1961

THE MODIFICATIONS MADE ON A STANDARD 55 GAL. DRUM MAKE IT USEFUL AS A SHIPPING CONTAINER TO ACCOMMODATE 250 GRAMS OF DILUTE, URANIUM BEARING SOLUTIONS OR 2 KG. OF ALLOYS AND MIXTURES. IT IS FITTED WITH A 7 IN. STOVE PIPE 30 IN. LONG. IT IS SAFE, CHEAP AND DISPOSABLE BUT NOT USEFUL FOR METALLIC SCRAP. THE BIRD CAGE IS RECOMMENDED FOR SHIPPING URANIUM METAL AND DRY URANIUM COMPOUNDS OF 5 KG. UNDER CONTROLLED CONDITIONS. THE CONTAINER IS A CYLINDER 10 IN. IN DIAMETER AND 10 IN. DEEP MADE OF 1/8 IN. MILD STEEL. THE TOP IS 12 IN. IN DIAMETER. THIS CYLINDER FITS INTO A 20 BY 20 BY 20 IN. FRAME.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12911 HOT WASTE CONTAINER
SAVANNAH RIVER LABORATORY, AUGUSTA, GEORGIA
CAPE-376 +. 1960

THE SHIELDED CONTAINER HANDLES DRY OR LIQUID WASTE. THE CAVITY HOLDS A ONE-QUART ICE CREAM CARTON FOR DRY WASTE AND A 16-OUNCE BOTTLE FOR LIQUID WASTE. IT IS MADE OF STAINLESS STEEL AND IS LINED WITH ONE INCH OF LEAD. THE OVERALL DIMENSIONS ARE 5 1/2 INCHES IN DIAMETER BY 10 INCHES LONG, AND THE CAVITY MEASURES 3 3/4 INCHES IN DIAMETER BY 8 INCHES HIGH. A LOCKING DEVICE OPERATED BY A MANIPULATOR IS PROVIDED TO SECURE THE TOP AND BOTTOM SECTIONS TOGETHER.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12912 RADIOACTIVE GAS SHIPPING CONTAINER
OAK RIDGE NATIONAL LABORATORY
CAPE-326 +. 1960

THE 2 1/2 IN. O.D. ALUMINUM TUBE 9 1/2 IN. LONG 1/4 IN. THICK HAS A LOCKING CAP. PAPER WADDING IS PLACED INSIDE, AS SEPARATION AROUND A PYREX AMPOULE, HOLDING THE RADIOACTIVE GAS INSIDE THE TUBE. THIS IS CONTAINED IN A FIBERBOARD CARBON USING PAPER WADDING BETWEEN THE CONTAINER AND CARTON. USE OF THE CONTAINER REDUCES THE COST OF SHIPPING, DECONTAMINATION, SURVEYING, MAINTENANCE AND HANDLING.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12913 SHIELDED SAMPLE CARRIER
ARGONNE NATIONAL LABORATORY, LEMONT, ILL.
CAPE-420 +. 1960

THE CARRIER HOLDS A ONE OUNCE, SQUARE BOTTLE USED FOR STORING AND TRANSFERRING RADIOACTIVE SOLUTIONS. IT IS ALSO USED WHILE CAPPING AND DECAPPING THE BOTTLES AS THE BOTTLE EXTENDS ONE INCH ABOVE THE BODY OF THE CARRIER, THEREBY, PROVIDING VISIBILITY AND ACCESS FOR TONGS, SNARES AND DECAPPERS. THE LEAD FILLED CAST ALUMINUM BODY IS ABOUT 3 3/4 INCHES IN DIAMETER AND 4 INCHES HIGH. TWO PINS IN THE TOP SECTION FIT INTO SLOTS OF THE BODY RIM AND ARE SECURED BY ROTATION TO PREVENT ACCIDENTAL SEPARATION. THE SHIELDING IS EQUIVALENT TO ONE INCH OF LEAD. WITH THE TOP IN PLACE THE CARRIER IS 7 1/2 INCHES HIGH AND WEIGHS 15.6 POUNDS.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12914 DISSOLVER SOLUTION CONTAINER
SAVANNAH RIVER LABORATORY, AUGUSTA, GEORGIA
CAPE-377 +. 1960

THE CASK WILL SAFELY STORE UP TO 500 ML. OF SOLUTION CONTAINING 100 CURIES OF FISSION-PRODUCT GAMMA ACTIVITY. IT IS NOT SUITABLE FOR LONG DISTANCE SHIPPING BUT IS AN INEXPENSIVE CONTAINER FOR STORING AND TRANSFERRING RADIOACTIVE SOLUTIONS. THE OUTER SHELL IS A 23 IN. SECTION OF 20 IN. MILD STEEL PIPE WELDED TO A CIRCULAR BASE PLATE. THE 3 1/2 IN. ID STAINLESS STEEL INNER CONTAINER IS 6 IN. HIGH. THE LEAD FILL BETWEEN THE CONTAINERS PROVIDES ABOUT 8 IN. OF SHIELDING. OVERALL CASK DIMENSIONS INCLUDE A 26 IN. DIAMETER AND 34 IN. LENGTH. IT WEIGHS 3,200 LBS.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12915 WARM SAMPLE CARRIER
SAVANNAH RIVER LABORATORY, AUGUSTA, GEORGIA
CAPE-431 +. 1960

THE CARRIER IS USED TO TRANSPORT AND STORE 5 ML ANALYTICAL SAMPLES. THE CARRIER CONSISTS OF A 12 POUND SOLID STAINLESS STEEL CASK 3 1/2 IN. IN DIAMETER, 6 IN. HIGH WITH 1 3/16 IN. WALLS. A SPECIAL SQUARE BOTTLE IS USED. THE SCREW CAP OF THE BOTTLE IS ABOVE THE BASE PART OF THE CARRIER AND IS TURNED BY TONGS. THE CARRIER TOP IS ATTACHED TO THE BASE BY A NOTCHED ROTATABLE BAR LOCKING DEVICE. THE CARRIER IS EASY TO DECONTAMINATE BECAUSE OF THE ABSENCE OF BLIND HOLES OR CREVICES.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12916 NESTING CASKS
SAVANNAH RIVER LABORATORY, AUGUSTA, GEORGIA
CAPE-450 +. 1960

THE NESTING CASKS ARE MADE WITH A STEEL OUTER SHELL AND POURED LEAD LININGS TO STORE RADIOACTIVE MATERIALS. THE LOCKING DEVICES ON THE LIDS MAY BE ROTATED TO EITHER OF TWO POSITIONS 90 DEGREES APART. IN ONE POSITION THE LID ALONE IS LIFTED AND IN THE OTHER THE ENTIRE CASK IS LIFTED. THE 20 POUND CASK IS 6 3/4 INCHES HIGH, 3 1/2 INCHES IN DIAMETER WITH LEAD SHIELDING 1 INCH THICK. THE 90 POUND CASK IS 10 1/4 INCHES HIGH, 6 1/2 INCHES IN DIAMETER WITH 1 INCH SHIELDING. THE 450 POUND CASK IS 17 INCHES HIGH, 10 3/4 INCHES IN DIAMETER WITH 2 INCHES OF LEAD SHIELDING. THE 500 POUND CASK IS 21 1/2 INCHES HIGH, 10 3/4 INCHES IN DIAMETER, 1 5/16 INCHES OF LEAD SHIELDING.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12917 SLUG TRANSFER SHIELD
BROOKHAVEN NATIONAL LABORATORY
CAPE-449 +. 1960

THE SHIELD IS USED IN REMOVING A SPECIAL SLUG FROM A REACTOR IN OPERATION AND DISCHARGING IT IN A HOT CELL THROUGH A SLIDING DRAWER. A SIMPLE METHOD IS PROVIDED TO CUT THE ALUMINUM WIRE USED TO PULL THE SAMPLE CONTAINER FROM THE REACTOR. A NYLON CORD LOWERS THE CAN TO THE CELLS. THE LEAD FILLED SHIELD IS JACKETED STAINLESS STEEL. THE UNIT IS ABOUT 15 INCHES IN DIAMETER AND 18 INCHES HIGH AND OPERATES EITHER HORIZONTALLY OR VERTICALLY.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12918 URANIUM SHIELDED CASK
SAVANNAH RIVER LABORATORY, AUGUSTA, GEORGIA
CAPE-451 +. 1960

THE CASK HAS 180 ML CAPACITY AND IS INTERCHANGEABLE WITH A 5 ML LEAD SHIELDED CASK AS THEY HAVE THE SAME OUTSIDE DIMENSIONS. THE CAPACITY DIFFERENCE IS DUE TO THE GREATER EFFECTIVENESS OF DEPLETED URANIUM AS A SHIELD. WITH INCREASED CAPACITY, LARGER SAMPLES MAY BE TAKEN WITH EQUIPMENT DESIGNED TO TAKE SMALLER SAMPLES. THE STAINLESS STEEL CASK, LINED WITH 1 INCH OF URANIUM WEIGHS 90 POUNDS, AND IS 5 1/2 INCHES IN DIAMETER BY 9 INCHES HIGH WITH A 2 1/2 INCH DIAMETER AND A 4 INCH DEEP CAVITY. A SWIVEL PLATE ON THE LID HELPS TO POSITION THE LID FOR REMOVAL.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER + URANIUM

3-12919 WASTE DISPOSAL CASK
KNOLLS ATOMIC POWER LABORATORY
CAPE-467 +. 1960

THE CASK IS USED IN TRANSPORTING WASTE CANS CONTAINING SOLID HIGH-LEVEL RADIOACTIVE WASTE TO A LONG-TERM STORAGE AREA. SOLID WASTE UP TO 3 1/4 IN. IN DIAMETER AND 36 IN. LONG IS HANDLED WITHOUT EXPOSING PERSONNEL. THE CASK IS A VERTICAL TUBE WITH 6 IN. LEAD WALLS TOPPED BY A SHIELDED PLUG. A PIN ACROSS THE BOTTOM SUPPORTS THE WASTE CAN. AN UNDERLINER PAN ATTACHED BY CHAINS PREVENTS THE WASTE CAN FROM DROPPING IF THE PIN WORKS LOOSE.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER + WASTE TRANSPORTATION

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12920 RADIOISOTOPE SHIPPING CONTAINER (LIQUID GAMMA EMITTERS)
OAK RIDGE NATIONAL LABORATORY
CAPE-548 +. 1960

THE CONTAINER FOR LIQUID GAMMA EMITTERS CONSISTS OF A 3/4 IN. PLYWOOD BOX 18 1/4 IN. LONG, 18 1/4 IN. WIDE AND 16 1/8 IN. DEEP. INSIDE THIS BOX IS A 3 IN. LEAD SHIELDED CONTAINER WHICH RANGES FROM 6 1/32 IN. TO 8 5/8 IN. IN DIAMETER AND FROM 4 5/8 IN. TO 7 7/16 IN. DEEP. IN THE TOP OF THE PLYWOOD BOX IS A BOTTLE CAP REMOVER AND A WRENCH.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12921 TRANSFER UNITS
LOS ALAMOS SCIENTIFIC LABORATORY, NEW MEXICO
CAPE-612 +. 1964

TWO TRANSFER UNITS AND A SAMPLE CAN AND LID ARE IN THIS CAPE PACKAGE. THE FIRST TRANSFER UNIT IS AN ATTACHMENT FOR THE FLOOR OF A DRY BOX AND IS USED WITH THE SAMPLE CAN AND LID TO TRANSFER RADIOACTIVE MATERIAL IN AND OUT OF THE BOX TO PREVENT CONTAMINATION OF THE SAMPLE CAN. THE SAMPLE CAN WITH LID IS A STAINLESS STEEL VESSEL 3 7/8 IN. ID AND 4 1/8 IN. DEEP USED TO TRANSPORT RADIOACTIVE MATERIAL. THE LAST UNIT IS USED FOR TRANSPORTING RADIOACTIVE MATERIAL AND TRANSFERRING RADIOACTIVE MATERIAL INTO OR OUT OF THE DRY BOX. DURING TRANSFER THE ASSEMBLY IS HELD TO THE BOTTOM OF THE DRY BOX BY MEANS OF A SCISSOR JACK.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12922 SHIELDED COBALT CARRIER
OAK RIDGE NATIONAL LABORATORY
CAPE-666 +. 1964

THE SHIPPING CONTAINER IS DESIGNED TO CARRY A MAXIMUM OF 1,000 CURIES OF CO-60. IT CAN BE USED WITH A SPECIALLY ARRANGED COBALT IRRADIATOR THAT IS BURIED IN THE GROUND. THE IRRADIATOR CONSISTS OF A CENTRAL CAVITY SURROUNDED BY TUBES CONTAINING CO-60 WITH THE SAME NUMBER OF TUBES IN THE IRRADIATOR AND THE CONTAINER. EACH OF THE REMOVABLE TUBES IS LOADED WITH A LEAD SLUG AND IS PLACED IN THE BOTTOM OF THE CONTAINER. TO DISCHARGE THE COBALT INTO THE IRRADIATOR, THE BOTTOM PLATE IS REMOVED AND THE CONTAINER IS POSITIONED OVER THE IRRADIATOR WITH THE CONTAINER TUBES ALIGNED WITH THE IRRADIATOR TUBES. THE CARRIER IS 21 IN. OD AND 22 IN. HIGH AND WEIGHS APPROXIMATELY 3300 LBS. IT CONTAINS 12 STAINLESS STEEL COBALT TUBES 11-13/16 IN. LONG AND 1/2 IN. IN DIAMETER. THE CENTER PLUG HOLDING THE TUBES IS 5 3/4 IN. IN DIAMETER AND THE CARRIER IS SHIELDED WITH 8 IN. OF LEAD.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

COBALT + EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12923 SHIPPING CONTAINER, 2 R EQUIVALENT
LAWRENCE RADIATION LABORATORY, LIVERMORE
CAPE-671 +. 1965

THE SHIPPING CONTAINER AND NEUTRON SHIELD WERE DESIGNED TO SAFELY TRANSPORT HIGH LEVEL RADIOACTIVE MATERIAL. THE NEUTRON SHIELD PROVIDES THE EQUIVALENT OF ONE FOOT OF WATER AROUND THE SHIPPING CONTAINER. AIR SPACES PROVIDE A SAFEGUARD FOR FREEZING DURING COLD WEATHER. THE CAVITY IS 2 1/2 IN. IN DIAMETER BY 5 1/8 IN. HIGH. THE SHIPPING CONTAINER WITHOUT THE SHIELD WEIGHS 1770 LBS. AND INCORPORATES BOTH NEUTRON AND GAMMA SHIELDINGS.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER + SOURCE, NEUTRON

3-12924 RADIOISOTOPE SHIPPING CONTAINERS
OAK RIDGE NATIONAL LABORATORY
CAPE-793 +. 1961

THERE ARE TWO TYPES OF SHIELDED CONTAINERS USED IN SHIPPING RADIOISOTOPES INCLUDED IN THIS PACKAGE - THE BLOCK TYPE AND THE PALLET TYPE. SPECIFICATIONS FOR DIFFERENT SIZES ARE GIVEN FOR BOTH TYPES. INCLUDED ALSO IS A SAMPLER TRANSFER DEVICE. THE PALLET TYPE USES A STAINLESS-STEEL SHELL 5 1/2 IN. TO 9 3/8 IN. DEEP AND 7 3/4 IN. TO 11 3/4 IN. IN DIAMETER WITH CAVITIES FROM 1 3/8 TO 3 1/8 IN. IN DIAMETER AND 2 INCHES TO 9 3/8 IN. DEEP. THE TOP IS FROM 6 5/8 IN. TO 10 5/8 IN. IN DIAMETER AND 4 11/16 TO 6 7/16 IN. HIGH. THE LEAD SHIELD DEPENDS ON THE BOTTLE SIZE, A 15 ML BOTTLE USES 2 1/2 IN. OF LEAD AND A 500 ML BOTTLE USES 3 1/2 IN. OF LEAD. THE BLOCK TYPE CONTAINER CAN CARRY BOTTLES OF 15 ML TO 200 ML USING LEAD OF 1 TO 2 IN. THICK. THE HEIGHT MAY BE VARIED FROM 3 5/8 TO 5 3/8 IN. AND THE DIAMETER 3 TO 5 3/8 INCH. THE CAVITY MAY BE VARIED FROM 2 TO 4 1/4 IN. IN DEPTH AND FROM 1 1/8 TO 2 3/8 IN. IN DIAMETER. THE TOP WOULD BE FROM 2 15/16 TO 3 7/16 IN. HIGH AND FROM 3 TO 5 3/8 IN. IN DIAMETER. THERE ARE A TOTAL OF FIVE DRAWINGS IN THE SET.

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12924 *CONTINUED*
AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12925 SHIELDED CONTAINER M-130
KNOLLS ATOMIC POWER LABORATORY
CAPE-713 +. 1961

THIS IS A STANDARDIZED CONTAINER TO HANDLE SPENT FUEL MODULES REMOVED FROM ANY CURRENT NAVAL PRESSURIZED WATER REACTOR. IT IS A HOLLOW RIGHT CIRCULAR CYLINDER 53 IN. O.D., 29 IN. I.D. AND ABOUT 13 FT. HIGH. THE SURROUNDING HEAT EXCHANGE SYSTEM EXTENDS THE OVERALL O.D. TO APPROXIMATELY 8.0 FT. THE INTERNAL USEABLE HEIGHT (INNER BOTTOM OF INNER LINER TO BOTTOM OF CLOSURE HEAD) IS 132 IN. THE INNER LINER, WHICH CONFINES THE SPENT FUEL MODULES, IS SURROUNDED BY A WATER JACKET WHICH IS IN TURN SURROUNDED BY LEAD SHIELDING. AN OUTER LINER ENCASES THE ENTIRE MASS PROVIDING THE NECESSARY STRUCTURAL QUALITIES. A STRUCTURAL STEEL SHIPPING CRADLE IS PROVIDED TO HOLD THE CONTAINER TO THE RAIL CAR AND TO DISTRIBUTE THE WEIGHT.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12926 FUEL STORAGE PIT
HANFORD ATOMIC PRODUCTS OPERATION
CAPE-801 +. 1961

TO INSURE NUCLEAR SAFETY IN THE STORAGE AND TRANSPORTATION OF PRTR FUEL ELEMENTS, A NEW FUEL STORAGE PIT, A TRANSFER STORAGE PIT AND A STORAGE BASIN ARE USED. THE NEW FUEL STORAGE PIT CONSISTS OF A 9 X 5 UNIT ARRAY OF FUEL ELEMENTS AT A CENTER-TO-CENTER SPACING OF 8 INCHES. THE 45 FUEL ELEMENTS ARE SUBCRITICAL IN AIR FOR ANY LATTICE SPACING. THEY ARE SUBCRITICAL IN LIGHT WATER BUT WOULD BE SUPERCRITICAL IN HEAVY WATER. IN THE FUEL TRANSFER STORAGE PIT, THERE ARE TWO ROWS OF FUEL ELEMENTS SPACED ON 33-INCH CENTERS. EACH ROW HAS POSITIONS FOR 5 CLUSTERS SPACED ON 9 INCH CENTERS. FUEL ELEMENTS ARE STORED IN THE STORAGE BASIN IN 17 ROWS OF 12 CLUSTERS PER ROW, WITH A CENTER-TO-CENTER DISTANCE BETWEEN ROWS OF 10 INCHES, AND A CENTER-TO-CENTER DISTANCE BETWEEN CLUSTERS WITHIN A ROW OF 8 INCHES. THIS ARRAY IS SAFE IN AIR OR LIGHT WATER.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

CRITICALITY SAFETY + EQUIPMENT DESIGN + FUEL STORAGE

3-12927 FOUR LITER DISSOLVER SOLUTION CASK (SRL)
SAVANNAH RIVER LABORATORY, AIKEN, S.C.
CAPE-858 +. 1965

THE CASK IS USED TO STORE AND TRANSFER RADIOACTIVE SOLUTIONS LOCALLY. TRANSFERS OF ACTIVE SOLUTION FROM THE CASK MAY BE MADE BY DISPLACEMENT WITH A LIGHT ORGANIC SOLVENT IF PRECISE CONTROL OF FLOW RATE FROM CASK TO PROCESS EQUIPMENT IS REQUIRED. THE CASK IS 24 IN. HIGH, 26 IN. IN DIA, AND WEIGHS 3,000 LB. THE 6 IN. ID STAINLESS STEEL INNER CONTAINER IS 12 IN. HIGH. THE LEAD FILLER BETWEEN THE TWO CONTAINERS PROVIDES 6 IN. OF SHIELDING. THIS CAPE PACKAGE CONSISTS OF 3 DRAWINGS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPT. OF COMMERCE, SPRINGFIELD, VIRGINIA

EQUIPMENT DESIGN + SHIPPING CONTAINER + WASTE TREATMENT, LIQUID

3-12928 SHIPPING CONTAINERS
MALLINCKRODT CHEMICAL WORKS, ST. LOUIS, MISSOURI
CAPE-862 +. 1962

THE FIVE-INCH CYLINDER BIRDCAGE SUPPORTS AND TRANSPORTS A FIVE-INCH CYLINDER OF URANIUM HEXAFLUORIDE. IT IS 2 FT 6 IN. X 2 FT 6 IN. X 3 FT 2 IN. HIGH. THE MD TYPE BIRDCAGE IS USED WITH A 12 IN. DIA. CYLINDER AND THE CAGE IS 3 FT 1 1/4 IN. X 3 FT 1 1/4 IN. X 4 FT 10 IN. IT WEIGHS 27 LBS AND WILL SUPPORT 185 LBS. THE BIRDCAGE FOR THE URANIUM DIOXIDE SHIPMENTS IS 3 FT 7 IN. X 3 FT 7 IN. X 3 FT 8 IN. HIGH. IT WEIGHS 275 LBS AND WILL SUPPORT 365 LBS. IT HOLDS A 16 GAL, 20 GAUGE STEEL DRUM 1 FT 6 IN. IN DIA. X 1 FT 5 1/2 IN. LONG. THE MISCELLANEOUS PRODUCT BIRDCAGE IS 2 FT 6 IN. X 2 FT 6 IN. X 3 FT 2 IN. HIGH AND SUPPORTS A CYLINDER 6 1/16 IN. IN DIA. IT WEIGHS 185 LBS AND WILL SUPPORT 40 LBS. THE CONTAINER FOR HIGHLY ENRICHED METAL AND COMPOUNDS IS 2 FT 6 IN. IN DIA AND IS 1 FT 5 IN. HIGH. IT WEIGHS 60 LBS AND HAS A SHIPPING CONTAINER THAT CAN CARRY 11 KG. THIS PACKAGE CONSISTS OF 5 DRAWINGS.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

EQUIPMENT DESIGN + SHIPPING CONTAINER + URANIUM DIOXIDE + URANIUM HEXAFLUORIDE

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12929 BIRDCAGE, 5 IN. CYLINDER SHIPPING CONTAINER
OAK RIDGE GASEOUS DIFFUSION PLANT, OAK RIDGE, TENNESSEE
CAPE-941 +. 1963

THE BIRDCAGE IS USED WITH A 5 IN. CYLINDER SHIPPING CONTAINER. IT IS 36 7/8 IN. HIGH, 42 7/8 IN. HIGH INCLUDING THE CAP, AND IS 30 IN. SQ. THE WOOD FRAME IS COVERED WITH 18 GAUGE EXPANDED METAL, 1/2 IN. STANDARD MESH. THIS CYLINDER CAN BE USED WITH THE BIRDCAGE TO TRANSPORT 55 POUNDS OF URANIUM HEXAFLUORIDE (SEE CAPES-323, 324, AND 062 FOR ADDITIONAL URANIUM HEXAFLUORIDE SHIPPING CONTAINERS). THIS CAPE PACKAGE CONSISTS OF 2 DRAWINGS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

EQUIPMENT DESIGN + SHIPPING CONTAINER + URANIUM HEXAFLUORIDE

3-12930 SPENT FUEL SHIPPING CASK FOR PIQUA AND ELK RIVER REACTORS
KNAPP MILLS, INC., WILMINGTON, DEL.
CAPE-1011 +. 1965

THIS SHIPPING CASK IS USED TO TRANSPORT 19 SPENT FUEL ASSEMBLIES FROM THE ELK RIVER OR PIQUA POWER REACTORS. THE FUEL ASSEMBLIES MAY BE SENT FOR REFUELING 120 DAYS AFTER REACTOR SHUTDOWN. THE MAXIMUM WEIGHT OF THE LOADED CASK IS 30 TONS. THE MAXIMUM WEIGHT OF THE CASK INCLUDING THE SHIPPING STRUCTURE IS 32 TONS. OVERALL DIMENSIONS ARE 55 IN. IN DIA BY 108 IN. HIGH. THE DIMENSIONS, INCLUDING THE REQUIRED SPACE ENVELOPE AND SHIPPING STRUCTURE, ARE 7 FT WIDE BY 10 FT LONG BY 10 FT HIGH. INTERNAL SURFACES ARE MADE OF STAINLESS STEEL AND EXTERNAL SURFACES ARE MADE OF PAINTED CARBON STEEL. THE CLOSURE HEAD CONSISTS OF FLAT CYLINDRICAL PLATES WELDED TO A FLANGED CARBON STEEL HEAD. THE FUEL BASKET IS AN AL CYLINDER WITH MACHINED CAVITIES TO RECEIVE THE FUEL ASSEMBLIES OF THE PIQUA POWER REACTOR. WITH AL ADAPTERS, IT WILL RECEIVE FUEL ASSEMBLIES FROM THE ELK RIVER REACTOR. REQUESTS FOR COPIES OF DRAWINGS AND SPECIFICATIONS SHOULD BE DIRECTED TO THE DIVISION OF TECHNICAL INFORMATION EXTENSION.

AVAILABILITY - U. S. ATOMIC ENERGY COMMISSION, DIVISION OF TECHNICAL INFORMATION EXTENSION, OAK RIDGE, TENNESSEE

ELK RIVER + EQUIPMENT DESIGN + PIQUA + REACTOR, BOILING WATER + REACTOR, ORGANIC COOLED + SHIPPING CONTAINER

3-12931 SHIELDED COBALT CARRIER (ENGINEERING MATERIALS)
OAK RIDGE NATIONAL LABORATORY
CAPE-1054 +. 1963

THIS PACKAGE CONTAINS 2 DRAWINGS. THE STAINLESS STEEL CARRIER, KNOWN AS THE NOTRE DAME-TYPE, IS DESIGNED FOR USE IN CONJUNCTION WITH A SPECIALLY ARRANGED COBALT IRRADIATOR THAT IS BURIED IN THE GROUND. THE IRRADIATOR CONSISTS OF A CENTRAL CAVITY SURROUNDED BY TUBES CONTAINING CO-60. THE TUBES OF THE CARRIER ARE LOADED BY FIRST PLACING A LEAD SLUG IN THE BOTTOM OF THE TUBE, THEN CO-60, AND THEN ANOTHER LEAD SLUG. TO DISCHARGE THE COBALT INTO THE IRRADIATOR, THE BOTTOM PLATE IS REMOVED AND THE CARRIER IS POSITIONED OVER THE IRRADIATOR. THE CONTAINER TUBES ARE ALIGNED WITH THE IRRADIATOR TUBES. REMOVAL OF A SCREW AT THE TOP OF THE TUBE TO BE EMPTIED ENABLES A ROD TO BE INSERTED AND SCREWED INTO THE TOP PART OF THE COBALT ROD CAPSULE. THE INDICATOR POINTER ALIGNS THE DISCHARGE TUBE AND THE CAPSULE IS REMOVED. THE CONTAINER IS DESIGNED TO TAKE UP TO 5000 C OF CO-60. IT IS 22 IN. HIGH, 21 IN. IN DIA AND WEIGHS 3300 LB. THE LEAD SHIELDING USED IS AT LEAST 5 IN. THICK.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

COBALT + EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12932 SHIPPING CONTAINERS (ENGINEERING MATERIALS)
OAK RIDGE NATIONAL LABORATORY
CAPE-1055 +. 1964

THIS PACKAGE CONTAINS 3 DRAWINGS. SHIELDED CONTAINERS WERE DEVELOPED TO SHIP LIQUID ISOTOPES. THE MODIFIED 3-P RADIOISOTOPE CONTAINER IS USED WITH 15, 25, 50, 100, AND 200 ML BOTTLES. THE SPACE FOR THE BOTTLE CAN BE FROM 1.688 IN. IN DIA TO 2.906 IN. WITH A DEPTH OF FROM 3.062 TO 4.187 IN. THE CARRIER IS 8.125 IN. DIA WITH THE HEIGHT VARYING ACCORDING TO THE SIZE OF THE BOTTLE USED. THE MODIFIED 2-P RADIOISOTOPE CONTAINER IS A STAINLESS STEEL BOTTLE CONTAINER. FOR THE 15 ML BOTTLE IT IS 1.360 IN. OD AND 2.938 IN. DEEP. THE CONTAINER FOR THE 25 ML BOTTLE IS 1.660 IN. OD AND 3.438 IN. DEEP. THE CARRIER IS 6.625 IN. OD WITH THE HEIGHT VARYING ACCORDING TO THE BOTTLE SIZE. THE MODIFIED 52-P RADIOISOTOPE CONTAINER IS MADE OF STAINLESS STEEL AND IS 7 IN. OD WITH THE HEIGHT DEPENDING ON THE BOTTLE CONTAINER. FOR THE 25 ML BOTTLE AND THE CONTAINER IS 1.660 IN. OD AND 3.438 IN. DEEP. FOR THE 15 ML BOTTLE THE CONTAINER IS 2.938 IN. DEEP AND 1.360 IN. OD.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12933 FOAMGLAS SHIPPING CONTAINER (ENGINEERING MATERIALS)
Y-12 PLANT, OAK RIDGE, TENNESSEE

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12933 *CONTINUED*
CAPE-1199 +. 1 DRAWING, 1965

A DRAWING IS PRESENTED FOR A CONTAINER THAT IS USED FOR COMMERCIAL SHIPMENTS OF DRY ENRICHED U COMPOUNDS OR METAL. A TOTAL OF FORTY CONTAINERS CAN BE SHIPPED. EACH CONTAINER IS LOADED TO A MAXIMUM OF 20 KILOGRAMS OF U CONTAINING 94.0% U-235 AND IS PLACED IN AN INNER CONTAINER OF 4 LITERS VOLUME. THE CONTAINER IS CONSTRUCTED OF CARBON STEEL AND IS INSULATED WITH FOAMGLAS. THE DRUM IS 22 IN. HIGH AND 22 1/2 IN. ID. THE INNER CONTAINER IS 6 6/8 IN. OD, 9 IN. DEEP, AND IS CONSTRUCTED OF 1.25 COKE PLATE, NO. 135, TIN. (FOR DETAILS, SEE TID-4100).

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

CRITICALITY SAFETY + EQUIPMENT DESIGN + SHIPPING CONTAINER

3-12934 PLUTONIUM SHIPPING CONTAINERS (ENGINEERING MATERIALS)
DOW CHEMICAL COMPANY, ROCKY FLATS PLANT, DENVER
CAPE-1170 +. 1965

THIS PACKAGE CONTAINS 34 DRAWINGS. FOR A LISTING OF INDIVIDUAL TITLES SEE THE ENGINEERING MATERIALS LIST (TID-4100). THESE SHIPPING CONTAINERS ARE USED TO TRANSPORT PLUTONIUM FOR POWER REACTORS AND TO ELIMINATE DISCREPANCIES FOUND IN SHIPPING AND IN RECEIVING. THE L-10 PU(NO3)4 CONTAINER CONSISTS OF A 55-GAL DRUM, WHICH CONTAINS A STAINLESS STEEL PRESSURE CHAMBER OF 5.563-IN. OD, 4.813-IN. ID, AND A HEIGHT OF 53 IN. A POLYETHYLENE BOTTLE OF 4.665-IN. ID AND A HEIGHT OF 51 IN. IS USED. THE L-3 PU(NO3)4 CONTAINER CONSISTS OF A 55-GAL DRUM WHICH ENCLOSES A STAINLESS STEEL PRESSURE CHAMBER OF 5.563-IN. OD, 4.813-IN. ID, AND A HEIGHT OF 18.5 IN. THE POLYETHYLENE BOTTLE IS 4.740-IN. ID AND 16.8 IN. IN HEIGHT.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

EQUIPMENT DESIGN + PLUTONIUM + SHIPPING CONTAINER

3-12935 KSO PLUTONIUM SHIPPING CONTAINERS (ENGINEERING MATERIALS)
DOW CHEMICAL COMPANY, ROCKY FLATS PLANT, DENVER
CAPE-1200 +. 5 DRAWINGS, 1965

TWO CONTAINERS ARE DESCRIBED. THE FIRST TYPE CONSISTS OF A 30 GAL, 27 1/2 IN. HIGH DRUM, FABRICATED OF 18 GAUGE STEEL, WITH A REMOVABLE HEAD. AN INNER CONTAINER, WHICH HOLDS THE MATERIALS BEING SHIPPED, IS 15 IN. LONG AND 4 3/4 IN. OD WITH A WALL THICKNESS OF 3/16 IN. THE INSIDE WALL OF THE INNER CONTAINER IS FABRICATED OF 99.9% PURE CD WHICH IS BONDED TO AN OUTER GALVANIZED STEEL WALL. THE SECOND TYPE CONTAINER IS ALSO A 30 GAL DRUM, 29 1/8 IN. HIGH, WITH A WELDED SLEEVE 5 3/4 IN. ID, AND A LOCKING LID. LAMINATED WHITE OAK IS USED FOR INSULATION. (FOR DETAILS, SEE TID-4100).

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

CRITICALITY SAFETY + EQUIPMENT DESIGN + PLUTONIUM + SHIPPING CONTAINER

3-12936 AIR NAVIGATION ORDERS - PT. 33, CARRIAGE OF DANGEROUS GOODS (INCLUDING SPECIFICATIONS FOR SHIPPING CONTAINERS)
DEPARTMENT OF CIVIL AVIATION, MELBOURNE

ABSTRACT OF THIS DOCUMENT IS NOT AVAILABLE.

SHIPPING CONTAINER

3-12937 GUIDE FOR DESIGN AND OPERATION OF SHIPPING CONTAINERS FOR IRRADIATED SOLID FUEL FROM NUCLEAR REACTORS
AMERICAN STANDARD ASSOCIATION, INC.
8 PAGES, DECEMBER 15, 1964

DESCRIBES RECOMMENDED PRACTICE IN THE DESIGN AND OPERATION OF CONTAINERS FOR OFF-PLANT SHIPMENT OF IRRADIATED SOLID FUEL FROM NUCLEAR REACTORS BY CUSTOMARY LAND TRANSPORTATION OR BY TRANSPORTATION INVOLVING BOTH LAND AND WATER VEHICLES IN ORDER TO PROVIDE A HIGH AND CONSISTENT DEGREE OF PROTECTION TO THE PUBLIC.

REGULATION, GENERAL

3-12938 ATOMIC RADIATION. PART II. MONITORING, RADIATION PROTECTION, RADIOACTIVE SHIPMENT, WASTE DISPOSAL
RCA SERVICE COMPANY, INC., CAMDEN
127 PAGES, 1962

A MANUAL IS PRESENTED EXAMINING THE PRACTICAL ASPECTS OF RADIATION PROTECTION. TOPICS DISCUSSED INCLUDE MONITORING INSTRUMENTS AND TECHNIQUES, HEALTH PHYSICS, RADIATION EXPOSURE CONTROL, FACILITY DESIGN, PROTECTIVE DEVICES, DECONTAMINATION, PERMISSIBLE EXPOSURE LEVELS, EMERGENCY PROCEDURES, HANDLING AND SHIPPING OF RADIOACTIVE MATERIAL, AND DISPOSAL OF RADIOACTIVE WASTE. A DETAILED TABLE OF RADIOISOTOPE DATA ALSO IS INCLUDED. BOTH MILITARY

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12938 *CONTINUED*
AND NONMILITARY INFORMATION SOURCES WERE USED IN COMPILING THIS VOLUME. A TYPICAL RADIOLOGICAL INSTALLATION HAS BEEN ASSUMED, AND DISCUSSIONS HAVE BEEN DIRECTED TO ITS REQUIREMENTS RELATING TO RADIATION PROTECTION.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

EMERGENCY PROCEDURE + RADIATION SAFETY AND CONTROL + SAFETY PRINCIPLES AND PHILOSOPHY + TRANSPORTATION AND HANDLING

3-12940 VERTUT J
CENDRILLON CONTAINERS FOR THE TRANSPORT AND DISPENSING OF RADIOACTIVE LIQUIDS
COMMISSARIAT A L ENERGIE ATOMIQUE, SACLAY, FRANCE
7 PAGES, PROCEEDINGS OF CONFERENCE HOT LABORATORY EQUIPMENT, 11TH, NEW YORK, 1963, PP. 339-45

PUMPKIN-SHAPED CONTAINERS WERE DEVELOPED FOR SAFE TRANSPORT AND DISPENSING OF RADIOACTIVE LIQUIDS. FOUR DIFFERENT SIZES VARYING IN CAPACITY FROM 3.5 TO 50 LITERS ARE AVAILABLE. HOWEVER, LIQUIDS WITH CRITICALITY HAZARDS CANNOT BE HANDLED IN THESE CONTAINERS. THE SHAPE WAS CHOSEN TO MAKE THE CONTAINER REST FIRMLY ON A FLAT SURFACE AND TO PREVENT IT FROM BEING TURNED OVER AND REMAINING UPRIGHT. THE LIQUID IS HELD IN AN INNER CONTAINER OF STAINLESS STEEL. IT IS SURROUNDED BY A PROTECTIVE LEAD SHELL MADE IN TWO HALVES, SO THAT THE UPPER HALF CAN BE TAKEN OFF. THE LEAD ITSELF IS CAST INTO STEEL SHELLS TO PROVIDE ADDITIONAL STRENGTH. BOTH HALVES ARE RENDERED LIQUID TIGHT BY ASBESTOS PACKING.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

EQUIPMENT DESIGN + FRANCE + TRANSPORTATION AND HANDLING

3-12941 PACKAGING OF RADIOACTIVE MATERIAL FOR TRANSPORT
8 PAGES, FEDERAL REGISTER, 31(141), PP. 9941-49 (JULY 22, 1966)

THE REGULATIONS OF THE AEC REQUIRE THAT BEFORE AN APPLICATION FOR LICENSE TO POSSESS, USE, OR TRANSFER BY-PRODUCT, SOURCE, OR SPECIAL NUCLEAR MATERIAL, THE AEC MUST DETERMINE THAT THE PROGRAM AND CONTAINER ARE ADEQUATE TO PROTECT HEALTH AND MINIMIZE DANGER TO LIFE AND PROPERTY. THIS REGULATION INDICATES HOW A SHIPPING CONTAINER MUST PERFORM TO QUALIFY FOR APPROVAL.

REGULATION, AEC

3-12942 BARKER RF
CRITICALITY ASPECTS OF THE TRANSPORT OF FISSILE MATERIALS--THE TECHNICAL BASIS OF THE PROPOSED I.A.E.A. REGULATIONS
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA
6 PAGES, PP. 433-9 OF CRITICALITY CONTROL IN CHEMICAL AND METALLURGICAL PLANT, EUROPEAN NUCLEAR ENERGY AGENCY, PARIS, 1961

INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA) REGULATIONS INTENDED TO INSURE CRITICALITY SAFETY IN THE TRANSPORT OF FISSILE MATERIALS, HIGH-ACTIVITY MATERIALS, AND LOW-ACTIVITY RADIOISOTOPES, ORES, AND RESIDUES ARE REVIEWED. THE REGULATIONS ARE ALSO CONCERNED WITH OTHER EFFECTS OF RADIOACTIVITY, SUCH AS HEAT GENERATION AND IONIZING RADIATION.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

CRITICALITY SAFETY + HEAT TRANSFER + REGULATION, IAEA

3-12943 FEDERAL-STATE RELATIONSHIPS IN THE ATOMIC ENERGY FIELD. HEARINGS BEFORE THE JOINT COMMITTEE ON ATOMIC ENERGY, CONGRESS OF THE UNITED STATES, EIGHTY-SIXTH CONGRESS, FIRST SESSION ON FEDERAL-STATE RELATIONSHIPS IN THE ATOMIC ENERGY FIELD, MAY 19, 20, 21, 22, AND AUGUST 26, 1959
JOINT COMMITTEE ON ATOMIC ENERGY, WASHINGTON, D.C.
509 PAGES, 1959

FEDERAL-STATE RELATIONSHIPS ARE DISCUSSED RELATIVE TO RADIATION PROTECTION STANDARDS, MEDICAL USE OF RADIOISOTOPES, TRANSPORTATION OF NUCLEAR MATERIALS, AND WASTE DISPOSAL PROCESSES INVOLVING REACTORS AND THE URANIUM MINING AND MILLING INDUSTRY. LEGISLATION REGARDING THE PREVENTION OF MAJOR DISASTERS IN MINES IS GIVEN.

AVAILABILITY - U. S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C., 20402

CODES AND STANDARDS + CONGRESSIONAL ACTIVITY + REGULATION, GENERAL

3-12944 THE EFFICIENT IMPORTATION AND DISTRIBUTION OF RADIOISOTOPES. SUGGESTIONS FOR THE MOST ECONOMIC IMPORTATION OF RADIOISOTOPES
26 PAGES, TECHNICAL REPORT SERIES NO. 19, 1963

IMPORT PROCEDURES GOVERNING RADIOISOTOPES ARE REVIEWED. IT IS POINTED OUT THAT IN MOST COUNTRIES THE IMPORTATION OF RADIOISOTOPES IS SUBJECT TO THE GENERAL LAWS AND REGULATIONS REGARDING CONTROL OF FOREIGN EXCHANGE, IMPORT LICENSE, AND CUSTOMS CLEARANCE, PLUS SPECIAL

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12944 *CONTINUED*

LAWS AND REGULATIONS COVERING SPECIAL HAZARDS INVOLVED. AUTHORIZATIONS THAT MAY BE NECESSARY FOR EACH SHIPMENT ARE OUTLINED. OTHER TOPICS DISCUSSED INCLUDE THE CHOICE OF SUPPLIERS, MEANS OF TRANSPORTATION, SIZE OF SHIPMENTS, THE IMPORTATION OF LABELED COMPOUNDS, THE PRODUCTION OF SHORT-LIVED RADIOISOTOPES, THE DISTRIBUTION OF ISOTOPES, AND THE DOMESTIC PRODUCTION OF LABELED COMPOUNDS.

REGULATION, GENERAL + TRANSPORTATION AND HANDLING

3-12945 HANDBOOK OF FEDERAL REGULATIONS APPLYING TO TRANSPORTATION OF RADIOACTIVE MATERIALS
U. S. ATOMIC ENERGY COMMISSION, WASHINGTON
52 PAGES, 1955

REGULATIONS ARE SUMMARIZED WHICH GOVERN THE TRANSPORTATION OF RADIOACTIVE MATERIALS WITHIN THE UNITED STATES.

AVAILABILITY - U. S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C., 20402, \$0.25 COPY

REGULATION, AEC + TRANSPORTATION AND HANDLING

3-12946 HYDEMAN LM + BERMAN WH
INTERNATIONAL CONTROL OF NUCLEAR MARITIME ACTIVITIES
UNIVERSITY OF MICHIGAN, ANN ARBOR
397 PAGES, 1960

THE PROBLEMS OF INTERNATIONAL CONTROL OF NUCLEAR MARITIME ACTIVITIES IS TREATED IN DETAIL PARTICULARLY FROM THE STANDPOINT OF HEALTH AND SAFETY CONTROL. THE TOPICS COVERED INCLUDE TRANSPORT AND SEA DISPOSAL OF RADIOACTIVE MATERIALS, NUCLEAR-POWERED SHIPS, ACCESS TO PORTS AND WATERS, AND LEGAL ASPECTS. RECOMMENDATIONS ARE GIVEN FOR THE DEVELOPMENT OF INTRANATIONAL AND INTERNATIONAL LAW ON THIS SUBJECT.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

CODES AND STANDARDS + LAW + OCEAN AND SEA + RADIATION SAFETY AND CONTROL + TRANSPORTATION AND HANDLING + WASTE DISPOSAL, OCEAN

3-12947 I.A.T.A. REGULATIONS RELATING TO THE CARRIAGE OF RESTRICTED ARTICLES BY AIR
INTERNATIONAL AIR TRANSPORT ASSOCIATION, MONTREAL
84 PAGES, 1962, 7TH EDITION

STATUTORY POSITION IN THE UNITED KINGDOM. ARTICLE 34 OF THE AIR NAVIGATION ORDER 1960, PROVIDES THAT DANGEROUS GOODS (WHICH INCLUDE RADIOACTIVE MATERIALS) MAY NOT BE CARRIED IN ANY AIRCRAFT IN OR OVER THE UNITED KINGDOM OR IN ANY AIRCRAFT REGISTERED IN THE UNITED KINGDOM WHEREVER IT MAY BE, WITHOUT THE WRITTEN PERMISSION OF THE MINISTER OF AVIATION. MOST AIR TRANSPORT OPERATORS SERVING THE U.K. HAVE BEEN GIVEN WRITTEN PERMISSION TO CARRY GOODS IN ACCORDANCE WITH THE I.A.T.A. REGULATIONS RELATING TO THE CARRIAGE OF RESTRICTED ARTICLES BY AIR IN WHICH THE ABOVE PROVISIONS CONCERNING RADIOACTIVE MATERIALS ARE INCLUDED.

AIRCRAFT + REGULATION, GENERAL + TRANSPORTATION AND HANDLING + UNITED KINGDOM

3-12948 BURNS RH
THE LEGAL ASPECTS OF ATOMIC WASTE DISPOSAL AND TRANSPORT OF RADIOACTIVE MATERIALS
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL
14 PAGES, 1961, PP. 187-201 OF ATOMIC ENERGY WASTE. ITS NATURE, USE AND DISPOSAL, E. GLUECKAUF, EDITOR, NEW YORK, INTERSCIENCE PUBLISHERS INC.

AN ACT GOVERNING THE HANDLING OF RADIOACTIVE SUBSTANCES IN GREAT BRITAIN WAS PASSED IN JUNE, 1960, AND IS EXPECTED TO EXERCISE EFFECTIVE CONTROL OVER WASTES FROM ALL USERS OF RADIOACTIVE MATERIALS IN THAT COUNTRY. PROVISIONS OF THE ACT ARE OUTLINED. THE PROVISIONS ARE REVIEWED OF THE U.S. ATOMIC ENERGY ACT OF 1954, WHICH ESTABLISHES THE BASIS FOR FEDERAL CONTROL OF ATOMIC ENERGY. THE TRANSPORT OF RADIOACTIVE MATERIALS IS DISCUSSED FROM THE STANDPOINT OF SAFETY.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

LAW + RADIATION SAFETY AND CONTROL + REGULATION, GENERAL + TRANSPORTATION AND HANDLING + UNITED KINGDOM

3-12949 LEAD FOR RADIATION SHIELDING
LEAD DEVELOPMENT ASSOCIATION
33 PAGES, 29 FIGURES, 19 ILLUSTRATIONS, 1 TABLE, PUBLISHED BY LEAD DEVELOPMENT ASSOCIATION, 1965

THIS COMPREHENSIVE PUBLICATION SUCCEEDS THE PREVIOUS FOUR BOOKLETS ISSUED SEPARATELY. GENERAL CONSIDERATIONS AFFECTING THE CHOICE OF MATERIAL ARE FIRST DISCUSSED AND BENEFITS DERIVED FROM THE USE OF LEAD ARE GIVEN. THE VARIOUS FORMS IN WHICH LEAD IS AVAILABLE FOR RADIOACTIVE SHIELDING ARE DESCRIBED TOGETHER WITH MECHANICAL AND PHYSICAL PROPERTIES OF THE METAL AND ITS ALLOYS. THE FABRICATION OF TRANSPORT, WORKING AND STORAGE CONTAINERS IS DISCUSSED IN RELATION TO DESIGN AND SAFETY CONSIDERATIONS WHILST A SECTION ON SPACE SHIELDING DESCRIBES THE USE OF LEAD SHEET AND LAMINATES. METHODS OF LOCAL SHIELDING ARE DESCRIBED SEPARATELY AND

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12949 *CONTINUED*
UNDER MISCELLANEOUS SHIELDING MATERIALS MENTION IS MADE OF THE THREE BASIC TYPES OF LEAD PLASTIC COMPOSITES.

AVAILABILITY - LEAD DEVELOPMENT ASSOCIATION, 34 BERKELEY SQUARE, LONDON W1, ENGLAND

EQUIPMENT DESIGN + LEAD + PROPERTY, PHYSICAL + SHIELDING

3-12950 NATIONAL FIRE CODES. VOLUME 9. OCCUPANCY STANDARDS AND PROCESS HAZARDS
NATIONAL FIRE PROTECTION ASSOCIATION
1 PAGE, NATIONAL FIRE CODES, 9, P. 683 (1965-66)

SELECTED NATIONAL FIRE PROTECTION ASSOCIATION STANDARDS AND MANUALS ON OCCUPANCIES AND PROCESS HAZARDS RELATED TO MARINE, AVIATION, AND GROUND TRANSPORTATION AND INCLUDING SOME OCCUPANCY AND PROCESS HAZARDS ASSOCIATED WITH THESE THREE FORMS OF TRANSPORTATION ARE PRESENTED. SEPARATE ABSTRACTS WERE PREPARED ON THE SECTIONS ON HANDLING RADIOACTIVE MATERIALS AND FIRE PROTECTION PRACTICES FOR NUCLEAR REACTORS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

CODES AND STANDARDS + FIRE + TRANSPORTATION AND HANDLING

3-12951 LOADING, TRANSPORT BY SEA AND UNLOADING OF RADIOACTIVE SUBSTANCES
MINISTRY OF MERCANTILE MARINE, ITALY
1959, IN ITALIAN

ABSTRACT OF THIS ITALIAN DOCUMENT IS NOT AVAILABLE.

RADIATION SAFETY AND CONTROL + TRANSPORTATION AND HANDLING

3-12952 MINOR JE + RASTRELLI LU
INVESTIGATION OF LOW-LEVEL RADIOACTIVE WASTE CONTAINERS IN AN ACCIDENT ENVIRONMENT
SOUTHWEST RESEARCH INSTITUTE
CONF-650103-6 + SC-RR-65-98 (P. 302-320) +. 28 PAGES, JANUARY 14, 1965, INTERNATIONAL SYMPOSIUM ON PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIAL, ALBUQUERQUE, N. MEX.

A SUMMARY IS PRESENTED OF THE WORK ACCOMPLISHED DURING AN AEC-SPONSORED EFFORT TO INVESTIGATE THE STRUCTURAL INTEGRITY OF LOW-LEVEL RADIOACTIVE WASTE CONTAINERS IN AN ACCIDENT ENVIRONMENT. THE EFFORT ASSOCIATED WITH THIS PROGRAM WAS CONCENTRATED IN TWO MAJOR AREAS - (1) A SURVEY OF CURRENT PRACTICE FOR LOW-LEVEL RADIOACTIVE WASTE TRANSPORT AND DISPOSAL AND (2) THE STRUCTURAL ANALYSIS OF TYPICAL LOW-LEVEL RADIOACTIVE WASTE CONTAINERS IN AN ACCIDENT ENVIRONMENT. EACH OF THESE AREAS IS DISCUSSED AND SUMMARIZED, AND CONCLUSIONS CONCERNING THE DYNAMIC RESPONSE OF TYPICAL CONTAINERS ARE OUTLINED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA., \$2.00 CY

ACCIDENT ANALYSIS + EQUIPMENT DESIGN + SHIPPING CONTAINER + STRUCTURAL INTEGRITY + WASTE TRANSPORTATION

3-12953 NUCLEAR SAFETY RESEARCH
U. S. ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.
10 PAGES, 1964, PP. 155-65 OF FUNDAMENTAL NUCLEAR ENERGY RESEARCH

REACTOR SAFETY STUDIES CONCENTRATING ON REACTOR KINETICS, FUELS, AND CONTAINMENT ARE REPORTED. ASSOCIATED STUDIES ON PIPE RUPTURES AND FUEL SHIPPING CONTAINERS ARE DISCUSSED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

SAFETY REVIEW (OPERATIONS, EXPERIMENTS) + SAFETY STUDY + SHIPPING CONTAINER

3-12954 KETZLACH N
NUCLEAR SAFETY CONSIDERATIONS IN THE HANDLING AND STORAGE OF REACTOR FUELS
NUCLEAR ENGINEERING PART VI, CHEMICAL ENGINEERING PROGRESS, SYMPOSIUM SERIES, 55(23), P. 35 (1959),
NUCLEAR ENGINEERING AND SCIENCE CONFERENCE, CHICAGO, MARCH 17-21, 1958, PREPRINT 29

ABSTRACT IS NOT AVAILABLE.

FUEL HANDLING + FUEL STORAGE

3-12955 APPLETON GJ + SERVANT JY
PACKAGING STANDARDS
1 PAGE, CHEMICAL ENGINEERING PROGRESS, SYMPOSIUM SERIES, 61(56), P. 50 (1965)

THE AGENCY REGULATIONS FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIALS WERE FIRST PUBLISHED IN 1960. AT THIS TIME THE CONCEPT OF TWO TYPES OF PACKAGING, TYPE A AND TYPE B, WAS INTRODUCED WITH GENERAL DEFINITIONS IN TERMS OF NORMAL CONDITIONS OF TRANSPORT AND THE SO-CALLED MAXIMUM

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12955 *CONTINUED*

CREDIBLE ACCIDENT, RESPECTIVELY. DURING THE REVISION OF THE REGULATIONS IN 1963, IT WAS AGREED THAT MORE DETAILED PACKAGING DESIGN STANDARDS SHOULD BE PROVIDED TO FACILITATE THE INTERNATIONAL ACCEPTANCE OF PACKAGING. THIS PAPER REVIEWS THE ANALYSIS THAT WAS MADE OF THE NORMAL AND ACCIDENT TRANSPORT ENVIRONMENT TO SELECT A SERIES OF PHYSICAL AND MECHANICAL TESTS, AND DESCRIBES THESE TESTS.

REGULATION, IAEA + SHIPPING CONTAINER + TEST, PROOF

3-12956 THOMPSON JT + LEIMKUEHLER FF
AN OPERATIONS RESEARCH STUDY OF THE TRANSPORTATION OF HIGHLY RADIOACTIVE MATERIALS. PROGRESS REPORT, APRIL 1959
JOHNS HOPKINS UNIVERSITY, BALTIMORE
63 PAGES, APRIL 1959, PP. 1724-87 OF HEARINGS ON INDUSTRIAL RADIOACTIVE WASTE DISPOSAL, VOLUME 2

THE TRANSPORTATION OF HIGHLY RADIOACTIVE MATERIALS IS TREATED AS AN OPERATIONS RESEARCH PROBLEM OF SELECTING THAT COMBINATION OF CONTROLLABLE TRANSPORTATION FACTORS WHICH MINIMIZES COST AND MAXIMIZES SAFETY. MAXIMUM SAFETY IS EQUATED WITH MINIMUM EXPECTED HAZARD COST, WHICH MAKES IT POSSIBLE TO CONSTRUCT DECISION MODELS IN TERMS OF A TOTAL TRANSPORTATION COST, INCLUDING THE EXPECTED HAZARD COST. A DETAILED ANALYSIS IS MADE OF THE SIGNIFICANT FACTORS IN THE TRANSPORTATION PROBLEM, AND VARIOUS METHODS OF EVALUATING TRANSPORTATION HAZARDS ARE EXAMINED. EXAMPLES AND APPLICATIONS OF THE DECISION MODELS ARE PRESENTED IN CONSIDERABLE DETAIL.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

ANALYTICAL MODEL + ECONOMIC STUDY + HAZARDS ANALYSIS + TRANSPORTATION AND HANDLING

3-12957 TERMAN AV
PROBLEMS IN RADIATION PROTECTION DURING STORING AND TRANSPORTING RADIOACTIVE ISOTOPES
135 PAGES, MOSCOW, PUBLISHING HOUSE MEDITSINA, 1964

A SYSTEMATIC SURVEY IS MADE OF PROTECTIVE MEASURES FOR STORING, AND TRANSPORTING RADIOISOTOPES. DESCRIPTIONS ARE GIVEN OF THE DESIGN AND CONSTRUCTION OF EQUIPMENT FOR HANDLING, STORING, AND TRANSPORTING RADIOACTIVE MATERIALS WITHIN THE BUILDING (PLANTS, HOSPITALS, OR LABORATORIES) AND IN TRANSPORT. EXPOSURE STANDARDS AND RADIATION PROTECTION REGULATIONS ARE DISCUSSED. MEASURES FOR PREVENTING ACCIDENTS DURING TRANSPORTATION ARE REVIEWED. EXTENSIVE REFERENCES ARE INCLUDED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

CODES AND STANDARDS + EQUIPMENT DESIGN + RADIATION SAFETY AND CONTROL + TRANSPORTATION AND HANDLING + UNION OF SOVIET SOCIALIST REPUBLICS

3-12958 ERGINSOY MC
PRESENTATION OF CRITICALITY ASPECTS OF THE TRANSPORT OF FISSILE MATERIALS
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA
15 PAGES, PP. 441-55 OF CRITICALITY CONTROL IN CHEMICAL AND METALLURGICAL PLANT, PARIS, EUROPEAN NUCLEAR ENERGY AGENCY, 1961

THE DETAILS OF THE PROPOSED I.A.E.A. REGULATIONS CONCERNING TRANSPORT OF FISSILE MATERIALS ARE SUMMARIZED. THE CONSTRUCTION OF CONTAINERS FOR THESE MATERIALS IS DESCRIBED, AND THE SAFETY CRITERIA FOLLOWED IN ARRIVING AT THE REGULATIONS ARE OUTLINED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

CRITICALITY SAFETY + EQUIPMENT DESIGN + REGULATION, IAEA + SAFETY PRINCIPLES AND PHILOSOPHY

3-12959 SAFETY STANDARDS FOR THE PACKAGING OF RADIOACTIVE AND FISSILE MATERIALS
U. S. ATOMIC ENERGY COMMISSION
AUGUST 22, 1966, AEC MANUAL, CHAPTER 0529

THIS CHAPTER ESTABLISHES THE RESPONSIBILITIES AND STANDARDS TO BE USED IN GRANTING AEC APPROVAL TO CONTRACTORS FOR PACKAGING OF FISSILE MATERIALS AND LARGE QUANTITIES OF RADIOACTIVE MATERIALS. THE STANDARDS ARE IDENTICAL TO THOSE CONTAINED IN 10 CFR 71, PUBLISHED IN THE FEDERAL REGISTER, JULY 22, 1966.

REGULATION, AEC

3-12960 BLATZ H
RADIATION HYGIENE HANDBOOK
SECTION 3, MCGRAW-HILL COMPANY, 1959

PRESENTS A DETAILED OUTLINE OF ALL NATIONAL BUREAU OF STANDARDS HANDBOOKS, GOVERNMENTAL AND NONGOVERNMENTAL AGENCIES AND REGULATIONS APPLICABLE TO THE TRANSPORT OF RADIOACTIVE MATERIALS.

RADIATION SAFETY AND CONTROL + REGULATION, GENERAL + SAFETY PRINCIPLES AND PHILOSOPHY

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12961 BARNES DE + TAYLOR D
RADIATION HAZARDS AND PROTECTION
GEORGE NEWNES LIMITED, LONDON
185 PAGES, 1958

INFORMATION IS PRESENTED ON THE FOLLOWING TOPICS - NATURE AND PROPERTIES OF RADIATION, UNITS OF RADIATION AND RADIOACTIVITY, RADIOACTIVITY, EFFECTS OF RADIATION OF THE HUMAN SYSTEM, NATURALLY OCCURRING RADIATIONS, THE STANDARD MAN, PERMISSIBLE DOSES, RADIATION OUTPUT, MEASUREMENT OF RADIATION, FUNDAMENTALS OF INSTRUMENTATION, BUILDING AND LABORATORY DESIGN, SHIELDING DESIGN, INSTRUMENTS FOR THE MEASUREMENT OF RADIATION DOSE-RATE, PERSONAL PROTECTION, INSTRUMENTS FOR MEASURING RADIATION DOSE, SURFACE CONTAMINATION, CONTAMINATION MONITORS, AIR SAMPLING, BIOLOGICAL MONITORING, APPARATUS AND METHODS OF RADIOASSAY, WASTE DISPOSAL, TRANSPORT OF RADIOACTIVE MATERIAL AND OTHER LEGAL ASPECTS, AND RADIATION FROM NUCLEAR WEAPONS.

CONTAMINATION + INSTRUMENTATION, NUCLEAR + LAW + RADIATION EFFECT + RADIATION UNIT + UNITED KINGDOM

3-12962 GEORGE TC
REGULATIONS FOR TRANSPORTATION OF EXPLOSIVES AND OTHER DANGEROUS ARTICLES BY LAND AND WATER IN RAIL FREIGHT SERVICE AND BY MOTOR VEHICLE (HIGHWAY) AND WATER, INCLUDING SPECIFICATIONS FOR SHIPPING CONTAINERS. TARIFF NO. 19
INTERSTATE COMMERCE COMMISSION, NEW YORK
SEPTEMBER 5, 1966, ICC TARIFF NO. 19

PRESENTS REGULATIONS GOVERNING THE SHIPMENT OF DANGEROUS ARTICLES (RADIOACTIVE MATERIAL) IN INTERSTATE COMMERCE. MAIN PARAGRAPHS OF CONCERN ARE 73.391 THROUGH 73.396, AND 78.250.

REGULATION, GENERAL + REGULATION, ICC

3-12963 REGULATIONS FOR THE TRANSPORT OF DANGEROUS MATERIALS BY RAILWAY, ROAD AND INLAND WATERWAYS
MINISTRY OF PUBLIC WORKS, TRANSPORT AND TOURISM, (IMPRIMERIE NATIONALE), PARIS, FRANCE
1950, IN FRENCH

ABSTRACT OF THIS FRENCH DOCUMENT IS NOT AVAILABLE.

FRANCE + REGULATION, GENERAL + TRANSPORTATION AND HANDLING

3-12964 INTERNATIONAL CONVENTION FOR THE TRANSPORT OF GOODS BY RAIL (C.I.M.) - ANNEX 1, REGULATIONS RELATIVE TO MATERIALS AND ARTICLES EXCLUDED FROM TRANSPORT OR ACCEPTED FOR TRANSPORT UNDER CERTAIN CONDITIONS (R.I.D.)
OFFICE CENTRAL DES TRANSPORTS INTERNATIONAUX PAR CHEMINS DE FER A BERNE
151 PAGES, JUNE 1, 1962

DOCUMENT IN FRENCH AND GERMAN. ABSTRACT IS NOT AVAILABLE.

FRANCE + GERMANY + REGULATION, GENERAL + TRANSPORTATION AND HANDLING

3-12965 MERCHANT SERVICE. RULES FOR THE TRANSPORT OF DANGEROUS MATERIALS BY SEA
MINISTRY OF PUBLIC WORKS, TRANSPORT AND TOURISM, (IMPRIMERIE NATIONALE), PARIS, FRANCE
238 PAGES, 1954, IN FRENCH

ABSTRACT OF THIS FRENCH DOCUMENT IS NOT AVAILABLE.

FRANCE + OCEAN AND SEA + REGULATION, GENERAL + TRANSPORTATION AND HANDLING

3-12966 GERMAN RAILWAYS FREIGHT TARIFF. PT. 1, SECTION A - RULES CONCERNING MATERIALS AND OBJECTS WHICH ARE NOT ACCEPTABLE FOR TRANSPORT OR ARE ACCEPTABLE UNDER CERTAIN CONDITIONS
BUNDESBAHNDIREKTION, HANNOVER, GERMANY
315 PAGES, JUNE 1962, IN GERMAN

ABSTRACT OF THIS GERMAN DOCUMENT IS NOT AVAILABLE.

GERMANY + REGULATION, GENERAL + TRANSPORTATION AND HANDLING

3-12967 SANITATION RULES IN HANDLING RADIOACTIVE MATERIALS AND IONIZING RADIATION SOURCES
65 PAGES, PP. 79-143 OF SBORNIK VAZHNEISHIKH OFITSIALNYKH MATERIALOV PO VOPROSAM GIGIENY TRUDA I PROIZVODSTVENNOI SANITarii, MOSCOW, MEDGIZ, 1962

SANITATION RULES AND STANDARDS ARE GIVEN FOR ALL LABORATORIES AND ESTABLISHMENTS HANDLING OR TRANSPORTING RADIOACTIVE MATERIALS. THE REGULATIONS COVER THE GENERAL CONDITIONS AND LOCATION OF LABORATORIES AND INSTALLATIONS, STORAGE AND TRANSPORTATION RULES, DOSIMETRIC DEVICES, VENTILATION, HEATING, PLUMBING, EMERGENCY MEASURES, WASTE DISPOSAL, AND PERSONAL HYGIENE AND SANITATION. PERMISSIBLE DOSES FOR VARIOUS RADIOISOTOPES AND SYMPTOMS OF RADIATION INJURIES ARE ENUMERATED. INVOICES AND OFFICIAL FORMS ARE INCLUDED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12967 *CONTINUED*
CODES AND STANDARDS + PERSONNEL EXPOSURE, RADIATION + REGULATION, GENERAL + TRANSPORTATION AND HANDLING +
UNION OF SOVIET SOCIALIST REPUBLICS

3-12968 BATIE RV + PATTERSON DE
SHIPPING OF RADIOACTIVE MATERIAL AT THE NATIONAL REACTOR TESTING STATION
IDAHO OPERATIONS OFFICE, U. S. ATOMIC ENERGY COMMISSION
SAFETY AND FIRE PROTECTION BULLETIN 6, 57 PAGES, OCTOBER 1960

PROCEDURES AND PROBLEMS ASSOCIATED WITH THE TRANSPORTATION OF A WIDE VARIETY OF RADIOACTIVE
MATERIALS ARE REVIEWED. OPERATIONS AT THE NATIONAL REACTOR TESTING STATION ARE SUMMARIZED.
ALL TYPES OF SHIPMENTS ARE DISCUSSED. EQUIPMENT AND PROCEDURES ARE DESCRIBED AND ILLUSTRATED
PHOTOGRAPHICALLY. DATA ARE APPENDED ON SHIPPING CONTAINERS AND FACTORS INFLUENCING LOAD
STABILITY ON A VEHICLE.

AVAILABILITY - U. S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C., 20402

OPERATING EXPERIENCE + SAFETY PRINCIPLES AND PHILOSOPHY + SHIPPING ANALYSIS

3-12969 NESSELMANN J
SHIPPING OF RADIOACTIVE MATERIALS
KERNREAKTOR BAU- UND BETRIEBS-GMBH, KARLSRUHE, GERMANY
3 PAGES, 1964, PP. 372-5 OF ATOMSTRAHLUNG IN MEDIZIN UND TECHNIK, MUNICH, VERLAG KARL THIEMIG KG

THE LEGAL SPECIFICATIONS FOR THE SHIPPING OF RADIOACTIVE MATERIALS IN GERMANY ARE BRIEFLY
INDICATED. THE PRACTICAL CONSEQUENCES THAT ARISE FROM CONFORMITY TO THESE REGULATIONS ARE
REPORTED. THE TRANSPORTATION COSTS FOR RADIOACTIVE MATERIALS ARE COMPARED WITH SUCH COSTS
FOR NONRADIOACTIVE MATERIALS.

ECONOMIC STUDY + GERMANY + LAW

3-12970 TUGGLE KH
STATUTORY RESPONSIBILITIES OF THE ICC WHICH PERTAIN TO THE TRANSPORTATION OF RADIOACTIVE WASTE MATERIALS
INTERSTATE COMMERCE COMMISSION, WASHINGTON, D.C.
9 PAGES, PP. 2646-54 OF HEARINGS ON INDUSTRIAL RADIOACTIVE WASTE DISPOSAL, VOLUME 4

UNDER FEDERAL STATUTES KNOWN AS THE TRANSPORTATION OF EXPLOSIVES ACT AND SECTION 204 OF THE
INTERSTATE COMMERCE ACT, THE COMMISSION HAS PRESCRIBED REGULATIONS GOVERNING THE SAFE
TRANSPORTATION OF RADIOACTIVE MATERIALS IN INTERSTATE COMMERCE. THE REGULATIONS ARE
APPLICABLE TO RAIL AND MOTOR CARRIERS AND TO SHIPPERS USING THOSE SERVICE AND THE SERVICES OF
WATER CARRIERS.

REGULATION, GENERAL + TRANSPORTATION AND HANDLING

3-12971 STANDARDS FOR THE TRANSPORT OF RADIOACTIVE MATERIALS
COMITATO NAZIONALE ENERGIA NUCLEARE, ROME, ITALY
146 PAGES, 1963

THE BOOK IS DIVIDED INTO THREE SECTIONS. THE FIRST PART (REGULATIONS FOR THE TRANSPORT OF
RADIOACTIVE MATERIALS) IS THE ITALIAN VERSION OF STI/PUB/4G NSA 15 - 23800). THE THIRD PART
(STANDARDS FOR PROTECTION AGAINST RADIATIONS DURING THE TRANSPORT OF IRRADIATED FUEL
ELEMENTS) IS THE AEC REGULATION 10 CFR, PART 72. THE SECOND PART CONCERNS INTERNATIONAL
REGULATIONS FOR THE TRANSPORTATION OF RADIOACTIVE MATERIALS BY RAIL. THE CLASSIFICATION OF
RADIOACTIVE MATERIALS IS GIVEN AND THE CONDITIONS FOR THE TRANSPORTATION WITH REGARD TO THE
PACKING, METHOD OF TRANSPORT, BILL OF LADING, TRANSPORTATION MATERIALS, PROHIBITIONS, AND
WARNING LETTERING ARE REPORTED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

ITALY + REGULATION, AEC + REGULATION, IAEA

3-12972 THE TRANSPORT OF RADIOACTIVE MATERIALS. INTERIM RECOMMENDATIONS FOR THE APPLICATION OF
ENVIRONMENTAL TESTS TO THE APPROVAL OF PACKAGING
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, RISLEY
117 PAGES, 1963

REGULATIONS MADE BY THE INTERNATIONAL ATOMIC ENERGY AGENCY FOR THE SAFE TRANSPORT OF
RADIOACTIVE MATERIALS REQUIRE THE CONTROL OF THE FOUR HAZARDS PECULIAR TO THESE MATERIALS BY
CONTAINMENT, SHIELDING, CRITICALITY CONTROL, AND HEAT TRANSFER. THE REGULATIONS DESCRIBE
THREE MAIN STANDARDS OF PACKAGING IN TERMS OF THE ENVIRONMENTAL CONDITIONS UNDER WHICH THE
PACKAGING MUST CONTRIBUTE TO THIS HAZARD CONTROL. TRANSPORT ENVIRONMENTAL CONDITIONS (BOTH
NORMAL AND ACCIDENT) ARE SURVEYED AND CORRESPONDING ENVIRONMENTAL TESTS THAT MAY BE USED,
WHEN NECESSARY, TO DEMONSTRATE THAT PACKAGING DESIGNS COMPLY WITH THE APPROPRIATE STANDARDS
ARE PROPOSED.

AVAILABILITY - (HER) MAJESTYS STATIONERY OFFICE, LONDON, ENGLAND

REGULATION, IAEA + UNITED KINGDOM

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-12973 LESHCHINSKII NI
TRANSPORTATION OF RADIOACTIVE MATERIALS
AEC-TR-6315 +. 195 PAGES, 1962, MOSCOW, GOSATOMIZDAT

REGULATIONS FOR SAFE TRANSPORTATION OF RADIOACTIVE MATERIALS IN THE SOVIET UNION ARE DISCUSSED, AND CHARTS OF MAXIMUM PERMISSIBLE AIR CONTAMINATION, PROTECTIVE MONITORING PROCEDURES, AND SIGNS SPECIFYING THE DANGER ARE INCLUDED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

CONTAMINATION + REGULATION, GENERAL + REGULATION, IAEA + TRANSPORTATION AND HANDLING + UNION OF SOVIET SOCIALIST REPUBLICS

3-12974 TRANSPORTATION RULES FOR RADIOACTIVE MATERIALS
30 PAGES, 1962, PP. 144-74 OF SBORNIK VAZHNEISHIKH OFITSIALNYKH MATERIALOV PO VOPROSAM GIGIENY TRUDA PROIZVODSTVENNOI SANITARII, MOSCOW, MEDGIZ

RULES AND REGULATIONS ARE GIVEN FOR PACKING AND TRANSPORTING RADIOACTIVE MATERIALS. THE CLASSIFICATION OF MATERIALS, CONTAINERS, LOADING, AND STANDARDS FOR VARIOUS MEANS OF TRANSPORTATION ARE DESCRIBED. PERMISSIBLE CONTAMINATION AND SAFETY AND WARNING SIGNS ARE DISCUSSED.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA

CODES AND STANDARDS + CONTAMINATION + REGULATION, GENERAL + UNION OF SOVIET SOCIALIST REPUBLICS

3-13632 INTERNATIONAL CONVENTIONS ON CIVIL LIABILITY FOR NUCLEAR DAMAGE, LEGAL SERIES NO. 4
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA
STI-PUB-102 +. 252 PAGES, MAY 1966

THIS FOURTH VOLUME IS DEVOTED TO CIVIL LIABILITY FOR NUCLEAR DAMAGE WHICH MIGHT OCCUR IN THE COURSE OF THE OPERATION OF A NUCLEAR INSTALLATION OR A NUCLEAR SHIP OR DURING TRANSPORT OF NUCLEAR MATERIAL. THE VOLUME CONTAINS THE FOUR MULTI-LATERAL CONVENTIONS ON THIS SUBJECT WHICH SO FAR HAVE BEEN CONCLUDED. THEY WERE ADOPTED AT THE FOLLOWING INTERNATIONAL CONFERENCES - INTERNATIONAL CONFERENCE ON CIVIL LIABILITY FOR NUCLEAR DAMAGE, VIENNA 1963 (VIENNA CONVENTION) - DIPLOMATIC CONFERENCE ON MARITIME LAW, BRUSSELS 1962 (CONVENTION ON THE LIABILITY OF OPERATORS OF NUCLEAR SHIPS) DIPLOMATIC CONFERENCE FOR THE CONCLUSION OF A CONVENTION SUPPLEMENTARY TO THE PARIS CONVENTION ON THIRD PARTY LIABILITY IN THE FIELD OF NUCLEAR ENERGY, BRUSSELS 1963.

AVAILABILITY - INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, AUSTRIA, \$5.00 COPY

*INSURANCE + *LIABILITY + ACCIDENT ANALYSIS + ADMINISTRATIVE CONTROLS AND PRACTICES + IAEA (INTERNATIONAL ATOMIC ENERGY AGENCY) + LAW + REACTOR, MARITIME + REACTOR, POWER + TRANSPORTATION AND HANDLING

3-13633 GUIDE TO TRANSPORTATION OF EXPLOSIVES AND OTHER DANGEROUS ARTICLES, INCLUDING DRIVERS GUIDE
5 PAGES, 1963 EDITION

THIS GUIDE PUBLISHED BY THE PRIVATE CARRIER CONFERENCE OF THE AMERICAN TRUCKING ASSOCIATION INC. TAKES ITS REGULATIONS FROM THE ICC REGULATIONS TARIFF NO. 19, T. C. GEORGE, AGENT.

AVAILABILITY - PRIVATE CARRIER CONFERENCE, INC, AMERICAN TRUCKING ASSOCIATIONS, INC., 1616 P ST., N.W., WASHINGTON 6, D.C.

*REGULATION, GENERAL + TRANSPORTATION AND HANDLING

3-13634 TITLE 49. TRANSPORTATION AND RAILROADS. CHAPTER I. INTERSTATE COMMERCE COMMISSION SUBCHAPTER A-GENERAL RULES AND REGULATIONS. PARTS 71-79 EXPLOSIVES AND OTHER DANGEROUS ARTICLES
INTERSTATE COMMERCE COMMISSION
122 PAGES, JANUARY 21, 1965, DOCKET NO. 3666

REVISED REACTIONS IN THE CODE OF FEDERAL REGULATIONS TITLE 49 PARTS 71-79 ARE GIVEN IN THE NOTICE OF PROPOSED RULE MAKING DOCKET NO. 3666 NOTICE NO. 66. THIS DOCUMENT DEALS WITH THE TRANSPORTATION OF EXPLOSIVES AND OTHER DANGEROUS ARTICLES, OF WHICH RADIOACTIVE MATERIALS IS ONE PART.

AVAILABILITY - INTERSTATE COMMERCE COMMISSION, WASHINGTON, D.C.

*REGULATION, AEC + SHIPPING CONTAINER + TRANSPORTATION AND HANDLING

3-13029 TRANSPORTATION OF RADIOACTIVE MATERIALS FILM AND LECTURE
ATOMIC ENERGY COMMISSION
6 PAGES, HEALTH AND SAFETY BULLETIN NO. 226, FEBRUARY 18, 1966

DESCRIBES THE SERIES OF LECTURE DEMONSTRATION MOTION PICTURES COVERING THE SUBJECTS OF PROBLEMS, ACCIDENTS, PRINCIPLES OF REGULATION, AND SHIPMENT OF FISSION MATERIAL. THE TEXT ON THE PROBLEM OF TRANSPORTATION OF RADIOACTIVE MATERIALS IS GIVEN WHICH DEFINES AND CLARIFIES

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-13829 *CONTINUED*
THE PROPERTIES AND ASPECTS OF RADIATION AND CONTAMINATION.

AVAILABILITY - AEC, DIVISION OF PUBLIC INFORMATION, WASHINGTON, D.C. 20545

*RADIATION, PUBLIC EDUCATION/ACCEPTANCE + RADIATION SAFETY AND CONTROL + REGULATION, AEC +
TRANSPORTATION AND HANDLING

3-14C64 SPALLER AE
STRUCTURAL ANALYSIS OF SHIPPING CASKS. VOLUME 2, RESISTANCE TO PUNCTURE
OAK RIDGE NATIONAL LABORATORY
ORNL-TM-1312 (VOL. 2) +. 58 PAGES, 40 FIGURES, 6 TABLES, SEPTEMBER 1966

A SMALL-SCALE MODEL OF A PROTOTYPE CASK WAS TESTED TO DETERMINE ITS PUNCTURE RESISTANCE, AND THE RESULTS WERE USED TO DEVELOP A TEST RIG SIMULATING ONE SIDE OF THIS MODEL. THE TEST RIG WAS THEN USED TO DEVELOP SCALE-MODEL PUNCTURE-RESISTANCE DATA FOR TWO MATERIALS- HOT-ROLLED STEEL, ASTM A245 GRADE A, AND TYPE 304L STAINLESS STEEL, ASTM A240. THE PUNCTURE-RESISTANCE DATA FROM THE SCALE-MODEL TESTS WERE EXTENDED TO APPLY TO FULL-SCALE CASKS, AND SEVERAL TESTS WERE CONDUCTED WITH A FULL-SCALE PROTOTYPE CASK. THE RESULTS OF THESE TESTS SUBSTANTIATED THE DATA EXTENDED FROM THE MODEL TESTS. TWO EMPIRICAL EQUATIONS ARE RECOMMENDED AS ALTERNATES TO THE PUNCTURE TESTS RECOMMENDED BY THE ATOMIC ENERGY COMMISSION. THEY ARE T EQUALS $(1.22 \times 10 \text{ TO THE MINUS } 3) W \text{ TO THE } 0.618\text{TH}$ FOR HOT-ROLLED STEEL, ASTM GRADE A OR ASTM A285 GRADE B, AND T EQUALS $(2.07 \times 10 \text{ TO THE MINUS } 5) W - (1.306 \times 10 \text{ TO THE MINUS } 10) W$ SQUARED FOR TYPE 304L STAINLESS STEEL, ASTM A240.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U.S. DEPT. OF COMMERCE, SPRINGFIELD, VA., \$3.00 COPY, \$0.75 MICROFICHE

ANALYTICAL MODEL + IMPACT SHOCK + STRUCTURAL INTEGRITY + TEST, DESTRUCTIVE + TEST, DROP

3-14331 LODGE JD
NEUTRON MULTIPLICATION MONITOR
GENERAL ELECTRIC COMPANY, HANFORD ATOMIC PRODUCTS OPERATION
HW-74640 +. 14 PAGES, AUGUST 21, 1962

TO SUPPLEMENT EXISTING METHODS OF CRITICALITY CONTROL, INSTRUMENTATION FOR MONITORING THE NEUTRON MULTIPLICATION FACTOR (K-EFF) OF A PROCESS VESSEL HAS BEEN UNDER DEVELOPMENT. SUCH A DEVICE CAN PROVIDE A CONTINUOUS INDICATION OF HOW NEAR A PROCESS VESSEL IS TO CRITICALITY. THE NEUTRON MULTIPLICATION MONITOR MEASURES THE NEUTRON LEAKAGE FROM A SUBCRITICAL VESSEL WHILE FISSIONABLE MATERIAL IS BEING PROCESSED THROUGH IT. AN ARTIFICIAL NEUTRON SOURCE IS USED TO INCREASE THE NUMBER OF NEUTRONS SUBJECT TO MULTIPLICATION AND PROVIDE A STEADY-STATE CONDITION FOR THE SUBCRITICAL SOLUTION. THIS REPORT DESCRIBES THE NEUTRON MULTIPLICATION MONITOR AND THE WORK BEING DONE TO DEVELOP IT INTO A PRACTICAL PROCESS INSTRUMENT.

AVAILABILITY - MICROCARD EDITIONS, INC. (FOR SALE) ACCOUNTING AND SHIPPING DEPARTMENT, WEST SALEM, WISCONSIN 54669

*INSTRUMENTATION, NUCLEAR + *INSTRUMENTATION, PROCESS + *MEASUREMENT, REACTIVITY + CHAMBER, FISSION + MEASUREMENT, SUBCRITICALITY + MCNITOR, RADIATION, LIQUID

3-14407 WACHTELL GP + LANGHAAR JW
FIRE TEST AND THERMAL BEHAVIOR OF 15-TONE LEAD-SHIELDED CASK
SAVANNAH RIVER LABORATORY, AIKEN, SOUTH CAROLINA
DP-1070 +. OCTOBER 1966

TO PROVIDE BASIC INFORMATION FOR MORE RELIABLE PREDICTION OF TEMPERATURES IN A SHIPPING CASK UNDER EXTERNAL FIRE CONDITIONS, A 15-TON LEAD-SHIELDED CASK WAS SUBJECTED TO A LARGE, OPEN-AIR PETROLEUM FIRE. RESULTS WERE CORRELATED BY MEANS OF ELECTRIC ANALOG COMPUTATION, USING VARIOUS ASSUMED VALUES FOR IMPORTANT PARAMETERS. THE RADIANT ABSORPTIVITY OF THE CASK WAS FOUND BOTH BY THIS METHOD AND BY HAND CALCULATIONS TO BE ABOUT 0.6, BASED ON AN EFFECTIVE PIPE TEMPERATURE OF 1800 F AND AN EMISSIVITY OF UNITY, UNITY BEING APPROPRIATE IN THIS CASE BECAUSE OF THE METHOD OF MEASURING FIRE TEMPERATURE. CONVECTION OF MOLTEN LEAD IN THE WALLS WAS FOUND TO BE SUCH THAT THE HORIZONTAL TEMPERATURE GRADIENT IN THE MOLTEN LEAD WAS NEGLIGIBLE. ON THE OTHER HAND, THE VERTICAL TEMPERATURE GRADIENT WAS ABOUT 8 F PER INCH OF HEIGHT, WITH SOME INDICATION OF A HIGHER GRADIENT IN UPWARD-FACING WALLS THAN IN SIDEWARD-FACING WALLS.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA 22151, \$3.00 COPY, \$0.65 MICRONEGATIVE

*FIRE + HEAT TRANSFER EXPERIMENT + SHIPPING CONTAINER + THERMAL ANALYSIS

3-14408 DRAFT REVISION OF THE REGULATIONS FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIALS
INTERNATIONAL ATOMIC ENERGY AGENCY
92 PAGES, 10 TABLES, DECEMBER 15, 1964

THIS DRAFT WAS PUBLISHED, WITH ONLY MINOR CHANGES, AS SAFETY SERIES NO. 6, 1964, REVISED EDITION, BY THE IAEA IN VIENNA, 1965. THE PURPOSE OF THE REGULATIONS IS TO PROVIDE FRAMEWORK OF UNDERSTANDING AND TECHNICAL AWARENESS SUCH THAT INTERNATIONAL SHIPMENTS OF RADIOACTIVE MATERIAL HAVE A COMMON BASIS OF ACCEPTANCE BY COUNTRIES AFFECTED BY THE SHIPMENT.

*REGULATION, IAEA + TRANSPORTATION AND HANDLING

ACCESSION NUMBER 3-13829 TO 3-14408

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-14468 MERCER BW + SCHMIDT WC
STORAGE OF LONG-LIVED FISSION PRODUCTS ON ALUMINO-SILICATE ZEOLITES
PACIFIC NORTHWEST LABORATORY + GENERAL ELECTRIC COMPANY, HANFORD ATOMIC PRODUCTS OPERATION
RL-SA-58 + CONF-660208-3 +. 12 PAGES, DECEMBER 3, 1965, FROM SYMPOSIUM ON SOLIDIFICATION AND LONG-TERM STORAGE OF HIGHLY RADIOACTIVE WASTES, RICHLAND, WASHINGTON

AS A PART OF THE HANFORD WASTE MANAGEMENT PROGRAM THE LONG-LIVED RADIOISOTOPES CESIUM-137 AND STRONTIUM-90 WILL BE REMOVED FROM BOTH THE CURRENTLY GENERATED AND THE STORED HIGH-ACTIVITY WASTE AND PARTIALLY PURIFIED BY CHEMICAL PROCESSING. THESE SEMI-REFINED ISOTOPES COULD BE PACKAGED AND SAFELY STORED IN HIGH-INTEGRITY STAINLESS STEEL CONTAINERS ADSORBED ON ALUMINOSILICATE ION EXCHANGE ZEOLITES. THIS PAPER DESCRIBES THE TECHNOLOGY DEVELOPED TO PACKAGE LARGE QUANTITIES OF THESE RADIOISOTOPES SAFELY. THIS INCLUDES ADSORPTION OF THE ISOTOPES ON ALUMINOSILICATE ZEOLITES, DRYING THE ZEOLITES TO PREVENT EXCESSIVE PRESSURE AFTER A CONTAINER IS SEALED, SEALING THE CONTAINERS BY WELDING, AND ELUTION OF THE CONTAINERS TO RECOVER THE ISOTOPES.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA 22151, \$3.00 COPY, \$0.65 MICRONEGATIVE

*ION EXCHANGE + *WASTE MANAGEMENT + *WASTE STORAGE + CESIUM + HANFORD SITE + STRONTIUM

3-14469 KETZLACH N
CRITICALITY STUDY FOR HALLAM FUEL FABRICATION AND SHIPMENT
ATOMICS INTERNATIONAL
NAA-SR-MEMO-5975 +. 25 PAGES, DECEMBER 16, 1960

AN EVALUATION OF THE CRITICALITY PARAMETERS HAS BEEN MADE TO DETERMINE THE SAFE-HANDLING LIMITS OF URANIUM ALLOY ELEMENTS FOR THE HALLAM CORE LOADING. THE FUEL CONTAINS 3.6 PERCENT U235 ENRICHED URANIUM ALLOYED WITH MOLYBDENUM SO THAT THE ALLOY CONTAINS 10 PERCENT MOLYBDENUM BY WEIGHT. THE RESULTING ALLOY DENSITY IS 17.2 GRAMS/CM3. RESULTS INDICATE IT IS SAFE TO HANDLE 60 SLUGS (1.8 KG CONTAINED U235) OF 0.59-IN. DIAM HAVING A MAXIMUM LENGTH OF 12 INCHES. WHERE THERE IS NO CONTROL OF FUEL GEOMETRY (E.G., SAWDUST CHIPS, ETC.), THE MAXIMUM SAFE BATCH SIZE SHOULD CONTAIN NO MORE THAN 0.94 KG CONTAINED U235. WHERE THERE IS NO CONTROL OF SPACING BETWEEN FUEL RODS, THE MAXIMUM SAFE NUMBER IS 29.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA 22151, \$3.00 COPY, \$0.65 MICRONEGATIVE

*CRITICALITY SAFETY + *FUEL ELEMENT + *HALLAM + NEUTRON INTERACTION + REACTOR, GRAPHITE MODERATED + REACTOR, LIQUID METAL COOLED

3-14470 MALLETT AJ
PROTECTIVE PACKAGES FOR UF6 CONTAINERS
OAK RIDGE GASEOUS DIFFUSION PLANT
K-D-1926 + CONF-661011-2 +. 4 PAGES, SEPTEMBER 12, 1966, PRESENTED AT THE 1966 AEC - CONTRACTOR NUCLEAR MATERIALS MANAGEMENT MEETING, OCTOBER 3-5, 1966, BERKELEY, CALIFORNIA

THIS REPORT DESCRIBES BRIEFLY THE RESULTS OF THE DESIGN AND TESTING PROGRAM OF PACKAGES CONTAINING 5-, 8-, 12- AND 30-IN.-DIAM CYLINDERS USED FOR TRANSPORTING URANIUM HEXAFLUORIDE. SINCE INDIVIDUAL CONTAINER SHIPMENTS OF UF6 ARE VALUED TO SEVERAL HUNDRED THOUSAND DOLLARS, A PROTECTIVE PACKAGE WHICH CAN WITHSTAND SEVERE ACCIDENT AND FIRE DAMAGE HAS BEEN DESCRIBED BY THE AEC AS DESIRABLE AND NECESSARY. THE ORCDP DEVELOPMENT PROGRAM FOR SUCH PACKAGING FOLLOWED THE NORMAL ROUTINE OF DESIGN, CONSTRUCTION, TEST, REDESIGN, AND RETEST UNTIL A UNIT SUCCESSFULLY PASSED THE SEVERE TESTS OUTLINED IN AEC MANUAL CHAPTER 0529. CONCURRENT WITH THE PHYSICAL TESTING PROGRAM WERE THEORETICAL AND CRITICALITY EXPERIMENTAL STUDIES, WITH PARTICULAR EMPHASIS ON THE USE OF THE 30-IN. CYLINDER FOR BULK SHIPMENT OF UNMODERATED UF6. AS A RESULT, A SPECIAL PERMIT FROM THE ICC AND APPROVAL BY THE AEC HAVE BEEN OBTAINED FOR SHIPMENTS IN THE 30-IN. CYLINDER OF UF6 AT U235 ENRICHMENTS TO 4.5 PERCENT.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA 22151, \$3.00 COPY, \$0.65 MICRONEGATIVE

*EQUIPMENT DESIGN + *SHIPPING CONTAINER + *URANIUM HEXAFLUORIDE + ACCIDENT, CONSEQUENCES + FIRE + TEST, DESTRUCTIVE + TEST, DROP

3-14471 STANDARD SHIPPING CONTAINER FOR 30-INCH-DIAMETER UF6 CYLINDERS. PARTS 1-5
OAK RIDGE GASEOUS DIFFUSION PLANT
K-D-1920 +. 34 PAGES, JULY 20, 1966

TWO DESIGNS WHICH APPEAR SUITABLE AS STANDARD PROTECTIVE PACKAGES FOR CLASS-II SHIPMENT OF 30-IN.-DIAM X 81-IN. CYLINDERS CONTAINING MODERATION-CONTROLLED URANIUM HEXAFLUORIDE ENRICHED TO 4.5 PERCENT U-235 HAVE BEEN DEVELOPED AT THE OAK RIDGE GASEOUS DIFFUSION PLANT. A PHENOLIC HIGH-TEMPERATURE FOAM PLASTIC WITH FIBERGLASS ADDITIVE IS USED AS A STRUCTURAL AND FIRE-RESISTANT MATERIAL BETWEEN THE INNER AND OUTER CASINGS OF EACH UNIT. PROTOTYPES OF EACH DESIGN HAVE SUCCESSFULLY PASSED THE ACCIDENT TEST CONDITIONS SPECIFIED IN AEC MANUAL CHAPTER 0529. THE ATTACHED FINAL DESIGNS INCORPORATE ALL IMPROVEMENTS WHICH, BASED ON PROTOTYPE TEST DATA AND ENGINEERING EVALUATIONS, WERE CONSIDERED DESIRABLE WITH RESPECT TO IMPROVED STRUCTURAL INTEGRITY, FIRE PROTECTION, AND SHIPPING CONVENIENCE.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA 22151, \$3.00 COPY, \$0.65 MICRONEGATIVE

*EQUIPMENT DESIGN + *SHIPPING CONTAINER + *URANIUM HEXAFLUORIDE + ACCIDENT, CONSEQUENCES + FIRE + TEST, DESTRUCTIVE + TEST, DROP

CATEGORY 3
TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

3-14869 APPLETON G
SAFE TRANSPORT OF RADIOACTIVE MATERIALS
INTERNATIONAL ATOMIC ENERGY AGENCY
10 PAGES, INTERNATIONAL ATOMIC ENERGY AGENCY BULLETIN 8(4) PAGES 21-30 (DECEMBER 1966)

THIS ARTICLE WAS PREPARED FROM A LECTURE ON THE SAFE TRANSPORT OF RADIOACTIVE MATERIALS
DELIVERED TO THE AGENCY STAFF BY GEORGE APPLETON OF THE IAEA. THE TOPICS COVERED INCLUDE
METHODS OF SAFETY CONTROL, MARKING AND LABELING, LARGE SOURCES AND FISSILE MATERIAL,
FULL-LOAD STOWAGE, DOCUMENTATION, AND THE ROLE OF THE CARRIER.

CONTAINMENT DESIGN + IAEA (INTERNATIONAL ATOMIC ENERGY AGENCY) + REGULATION, IAEA +
TRANSPORTATION AND HANDLING

3-14870 SCHLAPP FW
STORAGE OF MODERATOR ELEMENTS IN HNPf MODERATOR STORAGE CELLS
ATOMICS INTERNATIONAL
NAA-SR-MEMO-12247 +. 7 PAGES, NOVEMBER 28, 1966

GROUNDWATER WAS ASSUMED TO CONTACT AND START DISSOLVING THE ACTIVATED STAINLESS STEEL PORTIONS
OF THE THREE IRRADIATED MODERATOR ELEMENTS NOW STORED IN THE HNPf MODERATOR-STORAGE CELLS.
THE SOLUBILITY AND DECOMPOSITION RATES OF THE METAL AND THE CONCENTRATION OF RADIOACTIVITY
RELEASABLE TO THE GROUNDWATER WERE ANALYZED. THE RESULTS SHOWED THAT INSIGNIFICANT
CONCENTRATIONS OF RADIOACTIVE MATERIALS CAN BE RELEASED, EVEN IF THE CONCRETE CELL STRUCTURE
AND THE STEEL LINERS ARE NEGLECTED IN CALCULATING THE DISSOLUTION AND DISPERSAL OF THE
MATERIAL.

AVAILABILITY - CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION, NATIONAL BUREAU OF
STANDARDS, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VIRGINIA 22151, \$3.00 COPY, \$0.65 MICRONEGATIVE

*FISSION PRODUCT RELEASE, GENERAL + *RADIOACTIVITY, RELEASE + FUEL INTEGRITY + GROUND WATER, GENERAL +
HALLAM + REACTOR, GRAPHITE MODERATED + REACTOR, LIQUID METAL COOLED

3-14895 DAVIS TH
SHIPPING AND STORAGE OF RADIOACTIVE MATERIALS - A LITERATURE SEARCH
DIVISION OF TECHNICAL INFORMATION
TID-3552 (REV. 2) +. 24 PAGES, 308 REFERENCES, AUGUST 1963

276 REFERENCES ARE INCLUDED (REPORTS AND PUBLISHED LITERATURE ON SHIPPING AND STORAGE OF
RADIOACTIVE MATERIALS). AN ADDITIONAL 32 REFERENCES TO ENGINEERING DRAWINGS ARE INCLUDED.
THE SEARCH CONTAINS AUTHOR AND REPORT-NUMBER INDEXES.

*BIBLIOGRAPHY + *TRANSPORTATION AND HANDLING + STORAGE CONTAINER

3-14897 PROTECTIVE SHIPPING PACKAGES FOR 8- AND 12-INCH DIAMETER UF6 CYLINDERS
OAK RIDGE GASEOUS DIFFUSION PLANT, OAK RIDGE, TENN.
K-D-1930 +. 18 PAGES, SEPTEMBER 27, 1966

THE STANDARD PROTECTIVE ENCLOSURE DESIGNS FOR THE 8- AND 12-IN.-DIAM CYLINDERS ARE SIMILAR TO
THE DESIGN FOR THE 5-IN.-DIAM-CYLINDER PACKAGE. THE MODIFIED PHENOLIC FOAM PLASTIC DEVELOPED
AT THE OAK RIDGE GASEOUS DIFFUSION PLANT IS AGAIN USED AS A STRUCTURAL AND FIRE-RESISTANT
LINING. PROTOTYPE PACKAGES FOR 8- AND 12-IN. CYLINDERS AT NORMAL FILL WEIGHT HAVE MET THE
REQUIREMENTS OUTLINED IN AEC MANUAL CHAPTER 0529. THE FINAL DESIGNS INCLUDED IN THIS REPORT
INCORPORATE ALL IMPROVEMENTS WHICH, BASED ON PROTOTYPE TEST DATA AND ENGINEERING EVALUATIONS,
WERE CONSIDERED DESIRABLE FOR IMPROVED STRUCTURAL INTEGRITY, FIRE PROTECTION, AND SHIPPING
CONVENIENCE. PACKAGES SO DESIGNED WILL MEET CLASS-II SHIPPING-CONTAINER CRITERIA.

*SHIPPING CONTAINER + *URANIUM HEXAFLUORIDE + FIRE + STRUCTURAL INTEGRITY + TEST, DESTRUCTIVE

INFORMATION AT NSIC IS DIVIDED INTO 19 CATEGORIES. AN ITEM OF INFORMATION MAY BE KEYED TO AS MANY AS THREE OF THESE. A COLLECTION OF SELECTORS OR KEY-WORDS IS USED TO DENOTE THE MAIN SAFETY RELATED POINTS COVERED IN AN ARTICLE. THE FOLLOWING INDEX IS AN ALPHABETICAL LISTING OF SELECTORS GIVING REFERENCES TO EACH ARTICLE WHICH WAS KEYED TO IT. THE CATEGORY NUMBER IS GIVEN FIRST, FOLLOWED BY THE ACCESSION NUMBER. THE ACCESSION NUMBERS ARE USED TO LOCATE BIBLIOGRAPHIC ITEMS WITHIN A CATEGORY.

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3-12964	3-12966	3-12969		3-11302	3-12570	3-12572	3-12573
GETR (GENERAL ELECTRIC TEST REACTOR)				3-12576	3-12825	3-13632	
3-12790				INTEGRITY			
GROUND WATER, GENERAL				3-03432	3-06760		
3-14870				IODINE			
HALLAM				3-04614	3-05755	3-08002	
3-12622	3-14469	3-14870		ION EXCHANGE			
HALOGEN				3-14468			
3-05755				ITALY			
HANFORD SITE				3-09968	3-12575	3-12576	3-12841
3-14468				3-12843	3-12849	3-12971	
HAZARDS ANALYSIS				JAPAN			
3-07275	3-07894	3-08558	3-10522	3-11221	3-12606	3-12771	3-12789
3-12530	3-12544	3-12551	3-12553	3-12802	3-12824	3-12894	3-12895
3-12556	3-12566	3-12582	3-12584	LAW			
3-12507	3-12595	3-12596	3-12598	3-03501	3-04329	3-04681	3-04818
3-12615	3-12617	3-12626	3-12633	3-04821	3-04822	3-04825	3-05291
3-12634	3-12642	3-12711	3-12714	3-12793	3-12794	3-12796	3-12809
3-12742	3-12782	3-12795	3-12826	3-12833	3-12855	3-12946	3-12948
3-12828	3-12831	3-12956		3-12961	3-12969	3-13632	
HEAT GENERATION, INTERNAL				LEAD			
3-12603	3-12620			3-04960	3-07992	3-08556	3-08910
HEAT TRANSFER				3-11381	3-12543	3-12567	3-12636
3-05191	3-05387	3-05401	3-06760	3-12802	3-12608	3-12829	3-12863
3-08402	3-08718	3-10309	3-12508	3-12949			
3-12533	3-12543	3-12547	3-12548	LIABILITY			
3-12559	3-12561	3-12562	3-12563	3-04818	3-04825	3-05291	3-08717
3-12564	3-12577	3-12580	3-12582	3-12570	3-12572	3-12793	3-12809
3-12583	3-12600	3-12603	3-12607	3-12825	3-12855	3-13632	
3-12611	3-12613	3-12620	3-12621	LICENSING STATUS OF NUCLEAR PROJECTS			
3-12622	3-12624	3-12626	3-12630	3-09287			
3-12633	3-12648	3-12649	3-12655	LIQUID FUEL			
3-12660	3-12661	3-12675	3-12677	3-11423	3-12347	3-12526	3-12534
3-12678	3-12688	3-12690	3-12691	3-12537	3-12544	3-12588	3-12669
3-12699	3-12713	3-12716	3-12752	3-12765	3-12905		
3-12757	3-12775	3-12778	3-12785	MAIN COOLING SYSTEM			

3-09526	3-12564	3-12633	3-12879	3-12967			
MAINTENANCE AND REPAIR				PERSONNEL PROTECTIVE DEVICE			
3-05415				3-12806			
MASS. TRANSFER				PIQUA			
3-07990				3-03582	3-07117	3-12626	3-12749
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3-07275	3-07777			PLOWSHARE PROGRAM			
MAXIMUM PERMISSIBLE DOSE (MPD)				3-10311			
3-04815	3-04817	3-04826	3-07777	PLUTONIUM			
3-07778				3-04952	3-05748	3-06666	3-06765
MEASUREMENT, REACTIVITY				3-07512	3-08124	3-08402	3-08515
3-14331				3-08561	3-09585	3-11382	3-11423
MEASUREMENT, SUBCRITICALITY				3-12669	3-12673	3-12693	3-12723
3-06666	3-12215	3-14331		3-12736	3-12759	3-12797	3-12934
MOCKUP				3-12935			
3-07894	3-08944	3-12545		PLUTONIUM OXIDE			
MODEL TESTING				3-07173	3-07470	3-08124	3-10055
3-12508	3-12545	3-12560	3-12594	POISON, BURNABLE			
3-12597	3-12600	3-12647	3-12650	3-05191			
3-12663	3-12664	3-12687	3-12718	POISON, SOLUBLE			
3-12802	3-12804			3-05191			
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3-04614				3-12764	3-12823		
MONITOR, RADIATION, LIQUID				PRESSURE, INTERNAL			
3-14331				3-08561	3-09529	3-09564	3-10056
MONITOR, RADIATION, NUCLEAR DETONATION				3-10308			
3-07968				PROCEDURES AND MANUALS			
MONITOR, RADIATION, SAMPLING				3-06765			
3-05755				PROPERTY, PHYSICAL			
MTR (MATERIAL TESTING REACTOR)				3-12829	3-12949		
3-11223	3-12505	3-12506	3-12572	PRTR (PLUTONIUM RECYCLE TEST REACTOR)			
3-12602	3-12603	3-12604	3-12607	3-12581			
3-12900				RADIATION DAMAGE			
N S SAVANNAH				3-12607			
3-12633				RADIATION EFFECT			
NETHERLANDS				3-04989	3-12518	3-12961	
3-09968	3-12852			RADIATION IN PERSPECTIVE			
NEUTRON INTERACTION				3-04826	3-08719	3-08720	
3-07992	3-10522	3-12519	3-12522	RADIATION PROTECTION, ORGANIZATION			
3-12565	3-12579	3-12605	3-12623	3-07778	3-07779	3-08298	3-08508
3-14469				3-08719	3-08720	3-12653	3-12815
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3-05755				3-12566	3-12628	3-12635	3-12653
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3-12707				3-12818	3-12820	3-12823	3-12826
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3-07968				3-12938	3-12946	3-12948	3-12951
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3-07968				RADIATION UNIT			
OCEAN AND SEA				3-12961			
3-07782	3-09529	3-12573	3-12574	RADIATION, PUBLIC EDUCATION/ACCEPTANCE			
3-12575	3-12576	3-12830	3-12946	3-13829			
3-12965				RADIOACTIVITY, RELEASE			
OMRE (ORGANIC MODERATED REACTOR EXPERIMENT)				3-10839	3-10841	3-12535	3-12553
3-12626				3-12587	3-12590	3-12617	3-12676
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3-09564	3-11423	3-12501	3-12525	3-12745	3-12767	3-12791	3-14870
3-12537	3-12543	3-12544	3-12577	RADIOCHEMICAL ANALYSIS			
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3-12743	3-12745	3-12762	3-12787	RADIOCHEMICAL PLANT SAFETY			
3-12790	3-12832	3-12845	3-12853	3-07955	3-07990		
3-12968				RADIOCHEMICAL PROCESSING			
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3-07990				3-12848			
ORR (OAK RIDGE RESEARCH REACTOR)				REACTOR SAFETY SYSTEM			
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OXIDE				REACTOR STABILITY			
3-06765				3-05191			
PATENTS				REACTOR TRANSIENT			
3-05841	3-06294	3-09528	3-09585	3-05191			
3-12866	3-12867	3-12868	3-12869	REACTOR, ARMY			
3-12870	3-12871	3-12872	3-12873	3-12694			
3-12874	3-12875	3-12876	3-12877	REACTOR, BOILING WATER			
3-12878	3-12879	3-12880	3-12881	3-03582	3-05415	3-12517	3-12577
3-12882	3-12883	3-12884	3-12885	3-12694	3-12749	3-12752	3-12930
3-12886	3-12887	3-12888	3-12889	REACTOR, BREEDER			
3-12890	3-12891	3-12892	3-12894	3-11382			
3-12895	3-12896			REACTOR, FAST			
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3-05415				REACTOR, GAS COOLED			
PERSONNEL EXPOSURE, RADIATION				3-12690			
3-07779	3-08719	3-08720	3-12528	REACTOR, GRAPHITE MODERATED			
3-12608	3-12787	3-12801	3-12858	3-12530	3-12533	3-12690	3-14469

3-14870				SAFETY REVIEW (OPERATIONS, EXPERIMENTS)				
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3-12581				3-12641	3-12644	3-12712	3-12815	
REACTOR, LIQUID METAL COOLED				3-12953				
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3-05191 3-12633	3-13632			3-12642	3-12657	3-12694	3-12741	
REACTOR, ORGANIC COOLED				3-12819	3-12862	3-12953		
3-03582 3-07117	3-12626	3-12749		SEISMOLOGY				
3-12752 3-12930				3-10311				
REACTOR, POOL TYPE				SENN (SOCIETA' ELETTRONUCLEARE NAZIONALE)				
3-12215				3-12568	3-12569	3-12575	3-12576	
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3-13632				3-07612	3-07778	3-07956	3-07990	
REACTOR, PRESSURE TUBE				3-07992	3-08910	3-11381	3-12516	
3-12581				3-12526	3-12547	3-12602	3-12613	
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3-06760 3-09028	3-12564	3-12633		3-12640	3-12690	3-12691	3-12694	
3-12694 3-12757				3-12752	3-12771	3-12776	3-12778	
REACTOR, RESEARCH				3-12784	3-12786	3-12796	3-12810	
3-09287 3-12691				3-12829	3-12842	3-12844	3-12856	
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3-12691 3-12790	3-12900			3-03264	3-03432	3-03502	3-03522	
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3-12540 3-12549	3-12556	3-12629		3-04617	3-04820	3-04821	3-04823	
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3-12715 3-12729	3-12734	3-12743		3-04960	3-04999	3-05080	3-05299	
3-12794 3-12803	3-12818	3-12836		3-05300	3-05387	3-05401	3-05451	
3-12941 3-12945	3-12959	3-12971		3-05452	3-05831	3-05841	3-05881	
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3-12541 3-12553	3-12566	3-12569		3-09528	3-09529	3-09564	3-10055	
3-12570 3-12571	3-12573	3-12575		3-10056	3-10251	3-10308	3-10309	
3-12576 3-12615	3-12616	3-12635		3-10310	3-10807	3-10808	3-10839	
3-12653 3-12655	3-12658	3-12662		3-11221	3-11222	3-11223	3-11301	
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3-12772 3-12803	3-12816	3-12851		3-12874	3-12875	3-12876	3-12877	
3-12860				3-12878	3-12879	3-12881	3-12882	
ROCKY FLATS				3-12883	3-12884	3-12885	3-12886	
3-07470				3-12887	3-12888	3-12889	3-12890	
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3-12564					3-03264	3-03502	3-03694	3-04329
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3-10311					3-05300	3-05451	3-07882	3-07957
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3-05191					3-12554	3-12586	3-12611	3-12627
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3-12694					3-05191	3-05300	3-05415	3-05451
SM 1 (STATIONARY MEDIUM POWER PLANT)					3-05755	3-05998	3-06438	3-06765
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3-12771	3-12923				3-09528	3-12601	3-12662	
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3-03694	3-04816	3-07777	3-07957		3-09101			
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3-12726	3-12819				3-04827	3-04828	3-04928	3-04952
STEEL					3-04957	3-04960	3-04999	3-05060
3-05191	3-05300	3-08910	3-10251		3-05191	3-05290	3-05291	3-05299
STORAGE CONTAINER					3-05300	3-05387	3-05401	3-05415
3-05748	3-06666	3-07513	3-07992		3-05451	3-05452	3-05831	3-05861
3-08107	3-08561	3-08943	3-10806		3-05881	3-05998	3-06293	3-06294
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3-12596	3-12597	3-12598	3-14468		3-08298	3-08428	3-08556	3-08558
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3-11301	3-11505	3-12517	3-12547		3-08910	3-08917	3-08944	3-09216
3-12560	3-12580	3-12582	3-12583		3-09528	3-09529	3-09849	3-09850
3-12584	3-12592	3-12594	3-12595		3-09968	3-10055	3-10056	3-10258
3-12596	3-12599	3-12600	3-12601		3-10307	3-10308	3-10309	3-10310
3-12619	3-12625	3-12640	3-12647		3-10807	3-10808	3-10839	3-10840
3-12655	3-12664	3-12669	3-12680		3-10841	3-10842	3-11221	3-11301
3-12683	3-12686	3-12687	3-12689		3-11423	3-11647	3-12347	3-12348
3-12691	3-12693	3-12698	3-12708		3-12502	3-12507	3-12511	3-12515
3-12715	3-12716	3-12717	3-12735		3-12523	3-12524	3-12525	3-12529
3-12736	3-12737	3-12738	3-12752		3-12536	3-12538	3-12540	3-12541
3-12761	3-12802	3-12804	3-12840		3-12549	3-12550	3-12568	3-12569
3-12856	3-12952	3-14064	3-14897		3-12570	3-12573	3-12574	3-12579
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3-07990					3-12618	3-12629	3-12632	3-12637
SWEDEN					3-12641	3-12644	3-12655	3-12672
3-12672					3-12700	3-12702	3-12707	3-12721
TEMPERATURE REACTIVITY EFFECT					3-12746	3-12751	3-12758	3-12764
3-07534					3-12766	3-12768	3-12769	3-12770
TEST, DESTRUCTIVE					3-12777	3-12782	3-12784	3-12797
3-07882	3-07957	3-08556	3-11222		3-12798	3-12801	3-12803	3-12807
3-11301	3-12517	3-12555	3-12558		3-12817	3-12822	3-12824	3-12831
3-12559	3-12567	3-12594	3-12601		3-12834	3-12835	3-12839	3-12841
3-12614	3-12665	3-12670	3-12675		3-12842	3-12843	3-12847	3-12849
3-12679	3-12680	3-12686	3-12689		3-12851	3-12852	3-12853	3-12854
3-12738	3-12739	3-12778	3-12789		3-12855	3-12856	3-12857	3-12859
3-14064	3-14470	3-14471	3-14897		3-12938	3-12940	3-12944	3-12945
TEST, DROP					3-12946	3-12947	3-12948	3-12950
3-07882	3-11222	3-12508	3-12517		3-12951	3-12956	3-12957	3-12963
3-12545	3-12560	3-12614	3-12650		3-12964	3-12965	3-12966	3-12967
3-12651	3-12662	3-12670	3-12680		3-12970	3-12973	3-13632	3-13633
3-12687	3-12689	3-12710	3-12716		3-13634	3-13829	3-14408	3-14865
3-12718	3-12737	3-12804	3-14064		3-14895			
3-14470	3-14471				UNION OF SOVIET SOCIALIST REPUBLICS			
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3-12586	3-12591	3-12593	3-12594		3-12813	3-12821	3-12834	3-12838
TEST, LEAK LOCATION					3-12864	3-12957	3-12967	3-12973
3-06830	3-06831	3-12848	3-12850		3-12974			
TEST, LEAK RATE					UNITED KINGDOM			
3-04252	3-04957	3-12347	3-12348		3-04815	3-04816	3-04817	3-04818
3-12589					3-04819	3-04820	3-04821	3-04824
TEST, NONDESTRUCTIVE					3-04828	3-05881	3-06829	3-08508
3-12567	3-12577	3-12713	3-12719		3-09968	3-11423	3-11847	3-12508
3-12738					3-12510	3-12511	3-12512	3-12513
TEST, PRESSURE VESSEL					3-12514	3-12566	3-12677	3-12697

3-12719	3-12731	3-12740	3-12751	3-07777	3-08943		
3-12763	3-12779	3-12780	3-12782	WASTE DISPOSAL, OCEAN			
3-12783	3-12798	3-12799	3-12805	3-12946			
3-12808	3-12828	3-12832	3-12853	WASTE DISPOSAL, SALT			
3-12854	3-12856	3-12861	3-12881	3-12277			
3-12884	3-12885	3-12886	3-12887	WASTE DISPOSAL, SOLID			
3-12888	3-12889	3-12890	3-12891	3-07534	3-07777	3-08943	
3-12892	3-12947	3-12948	3-12961	WASTE DISPOSAL, TERRESTRIAL			
3-12972				3-04989	3-07534		
URANIUM				WASTE HANDLING			
3-06709	3-08910	3-09101	3-11381	3-03496	3-04989	3-07990	3-12277
3-12683	3-12709	3-12723	3-12759	3-12536	3-12606		
3-12797	3-12910			WASTE MANAGEMENT			
URANIUM DIOXIDE				3-07990	3-12536	3-14468	
3-12928				WASTE STORAGE			
URANIUM HEXAFLUORIDE				3-03496	3-04989	3-07777	3-07990
3-10056	3-10842	3-12670	3-12907	3-09527	3-14468		
3-12928	3-12929	3-14470	3-14471	WASTE TRANSPORTATION			
3-14897				3-06758	3-07472	3-08560	3-11505
VBWR (VALLECITOS BOILING WATER REACTOR)				3-12277	3-12521	3-12531	3-12646
3-12517	3-12577			3-12683	3-12694	3-12781	3-12828
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WASTE DISPOSAL, ATMOSPHERIC				3-12927			
3-07777				YANKEE			
WASTE DISPOSAL, GENERAL				3-06760	3-09020	3-12757	
3-05191	3-07770	3-07990	3-08298	ZIRCONIUM			
3-08560				3-04003			
WASTE DISPOSAL, LIQUID							

FOLLOWING IS A LIST OF AUTHORS WHOSE DOCUMENTS
HAVE BEEN ABSTRACTED IN THIS PUBLICATION

ABBEY F				3-06666			
3-12514				BIGGS BB			
ABEE HH				3-12609	3-12704	3-12875	
3-12653				BINFORD FT			
ACKROYD RT				3-12527			
3-12888				BIRD RP			
ADCOCK FE				3-05755			
3-04952	3-06765	3-12673		BISHOP NF			
ADLER K				3-04297			
3-12626				BLANCO RE			
ADLER LB				3-07990			
3-05401	3-12561	3-12562	3-12563	BLATZ H			
AIKENS AE				3-12858	3-12960		
3-03668	3-12549	3-12556	3-12734	BLOMEKE JO			
AINSWORTH SI				3-06304	3-08943		
3-07956	3-12854			BLUM P			
ALBRECHT WL				3-12881			
3-08718				BOCHKAREV VV			
ALCORN JS				3-12864			
3-12509				BOCK E			
ALLEN JW				3-12755			
3-12633	3-12876	3-12877	3-12878	BOEGLY WJ			
ANDELIN RL				3-04989	3-12277		
3-11382				BONILLA CF			
ANDERSON D				3-12785	3-12883		
3-11847	3-12805			BONNET G			
ANTHONY JD				3-04329			
3-12565				BOYER LH			
APPLETON G				3-12602			
3-14869				BRADSHAW RL			
APPLETON GJ				3-04989	3-08943	3-12277	
3-07778	3-08515	3-12656	3-12955	BRANNIGAN FL			
AREFEVA ZS				3-12818			
3-12864				BRANSTETTER EE			
ARMSTRONG JB				3-04617			
3-04821				BRAY DT			
ARNOTT DG				3-12603			
3-12828				BREEN JE			
ARTHUR MG				3-12599			
3-12522				BRESLIN AJ			
ASHLEY RL				3-12820			
3-12786				BRODSKY A			
ASPINAL KJ				3-12744			
3-04612				BROCK AJ			
ASYEE J				3-05300	3-12678		
3-04325	3-12852			BROOKSBANK RE			
ATTA GJ				3-07990			
3-04617				BROWN CL			
AUPETIT A				3-12601	3-12743		
3-12661	3-12863	3-12881		BROWN KB			
BADER BE				3-07990			
3-12699				BROWN KP			
BAKER PS				3-12883			
3-10307				BROWN SH			
BAKER R				3-12538	3-12893		
3-12540				BROWNE HJ			
BARKER FB				3-12870			
3-12791				BROWNELL LE			
BARKER RF				3-12506			
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BARNES DE				3-12777			
3-12961				BUCKLAND CW			
BARNETT RL				3-12803			
3-12633				BULMER GH			
BARTON GB				3-04003			
3-06293	3-06294			BURCHSTED CA			
RATIE RV				3-12529			
3-12707	3-12807	3-12968		BURGHARDT J			
BEARD GV				3-12825			
3-12744				BURNS HM			
BECK C				3-12627			
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BEEBE RL				3-12948			
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BELLET J				3-06758			
3-09526				BYPNE JT			
BENITO AS				3-04952	3-06765	3-07512	3-08124
3-12844				3-10055			
BENNETT LL				CADWELL JJ			
3-12534				3-12589			
BERMAN WH				CALDWELL CE			
3-12946				3-10055			
BERNSTEIN GJ				CALLIHAN D			
3-05387				3-12839			
BERNSTEIN S				CHASTAIN JW			
3-07882	3-12670			3-07612			
BIERMAN SR				CHILENSKAS AA			

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3-09526				3-12857			
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3-10840	3-12545	3-12560	3-12647	3-07612			
3-12664	3-12717			ERGINSOY MC			
CLAY RG				3-12958...			
3-12720				ERKES P			
CLAYTON ED				3-06703			
3-05748	3-06666			ERNEST FA			
CLOYD DR				3-04957	3-12544		
3-08558				ESCHNAUER H			
COLE TA				3-12777			
3-05278				EVANS JH			
COMMINIS JA				3-12691			
3-12872				EVANS RD			
CORDES OL				3-12628			
3-05755				FAIRBAIRN A			
COWPER G				3-04612	3-04824	3-12512	3-12697
3-12518				FAIRBANKS FB			
COX GW				3-12516			
3-08508				FARMER FR			
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3-12577				FERGUSON DE			
CREAGAN RJ				3-07990			
3-12758				FIELDING JR			
CULLER FL				3-05755			
3-12531				FISHFR C			
CURTISS LF				3-12806			
3-12827				FISHER G			
DA NOVI P				3-12573	3-12574	3-12575	3-12633
3-12571				FORTUNATO DE			
DANIELS JT				3-05415			
3-04823...				FOX J			
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3-12528	3-12653			FRASER-SMITH RF			
DAVIS FC				3-12886			
3-09101				FREDRICKSON RH			
DAVIS TH				3-12554			
3-14895				FRYNTA Z			
DAWSON RK				3-12774			
3-12627				FUQUAY JJ			
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3-04329				FURUMASHI N			
DE STREEL A				3-12771			
3-04329				GARDEN NB			
DEFATTA VP				3-12868	3-12870		
3-12745				GARDNER EL			
DELNAY RL				3-12625			
3-04952	3-06765	3-07512	3-10055	GARLAND RJ			
3-12669				3-12767			
DEMIER WV				GARRETT PE			
3-12586	3-12591	3-12593		3-04039			
DINNEEN GA				GARRIC C			
3-05755				3-04329			
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3-05299	3-05300	3-10251	3-12508	3-11222			
3-12740	3-12783			GASPER GW			
DOMNING WE				3-12608			
3-07512				GATES JE			
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3-05452	3-09849	3-10840	3-12665	GAUERKE RC			
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3-12513				GAUTHIER RD			
DRYDEN CE				3-04952			
3-12784				CEIPEL W			
DUGAN FA				3-12845			
3-10808	3-12716			GEORGE KO			
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3-12666				GERMUND P			
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3-12618				GIBSON R			
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3-04817				GIFFORD JF			
DUNSTER HJ				3-12866	3-12868	3-12869	
3-08515				GILLIESON AH			
DUVAUX Y				3-12780			
3-12860				GLYNN JC			
DWIGHT DJ				3-12548			
3-04252				GOELLER HE			
EDLOW S				3-07990			
3-12672				GOIN RW			
EGAN JC				3-12837			
3-04297				GOODPASTURE DW			
EHPEN CA				3-12689			
3-12794				GRANGE A			
EIREK RJ				3-12861			
3-12775				GRILL LF			
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3-12688				3-12502			
HAASS WP				JUNKINS RL	3-12587	3-12590	3-12595
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HAFF KW				3-12597			
3-04418	3-07192	3-07957	3-12546	KALINOVA RS			
3-12654	3-12713	3-12788	3-12840	3-12525	3-12801		
HAGUET R				KARSON MJ			
3-12842				3-12643			
HAMER WJ				KAVANAUGH MT			
3-07882	3-12670			3-09529			
HANSON BL				KEHOE EJ			
3-12604				3-12831			
HARKRIDER MT				KELLER FR			
3-04617				3-12607			
HARRIS WB				KENDALL WR			
3-12820				3-12585			
HART JC				KENYON D			
3-12528				3-12888			
HAUENSTEIN GG				KETZLACH N			
3-12515				3-12578	3-12579	3-12581	3-12623
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3-12871				KHVGSTOV NN			
HENRY AF				3-12838			
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HENRY HF				3-12535			
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HERCIK F				3-07894			
3-07779				KLEINFELD M			
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3-12787				KLINGENSMITH RW			
HITCH JW				3-07612	3-07966		
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HODKIN DJ				3-12708			
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3-12710				3-06469	3-06758		
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3-12946				3-03499			
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3-12526				LESHCHINSKII NI			
JOHNSON EB				3-12811	3-12813	3-12973	
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3-12510				LEWIS RE			
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3-12874				LEWIS WB			
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3-12626				LLEWELLYN GH			
JONKE AA				3-12691			
3-12769				LLOYD RC			

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LODGE JD				3-12516			
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LOOS RA				3-07470	3-08402	3-10055	
3-12874				MUENSTER HJ			
LUKE CD				3-05280			
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3-12608				MURPHY T			
MAHER R				3-12513			
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MALECHA RF				3-08558			
3-05387				MYERS JL			
MALLET AJ				3-07882	3-12670		
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MCMURRY HL				3-03496			
3-12604				ONDERKO WE			
MEAD JC				3-12560			
3-12627				OSULLIVAN RA			
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3-12769				OTHMER RT			
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MERCER BW				3-04952			
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MESSINGER WL				3-04989	3-12277		
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3-12864				PATE WA			
MILES GS				3-09101			
3-12818				PATTERSON DA			
MINER FJ				3-05415			
3-07512				PATTERSON DE			
MINOR JE				3-12668	3-12721	3-12726	3-12745
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MORGAN JM				PEATEY BC			
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3-12714	3-12725			PEDIGO WR			
MORGAN KZ				3-07882	3-12670		
3-08719	3-12847			PELZER N			
MORIYA T				3-12793			
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3-12789				3-04039	3-12510		
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3-04816				3-12823			
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