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LMFBR SAFETY

**6. Review of Current Issues
and
Bibliography of Literature
1977**

J. R. Buchanan - G. W. Keilholtz

Prepared for the U.S. Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
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LMFBR SAFETY

6. REVIEW OF CURRENT ISSUES AND BIBLIOGRAPHY
OF LITERATURE (1977)

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Science Applications, Inc.

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Oak Ridge, Tennessee 37830
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UNION CARBIDE CORPORATION
for the
DEPARTMENT OF ENERGY

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PARTS AND METHOD OF INDEXING ABSTRACTS

FOREWORD

The Nuclear Safety Information Center (NSIC), which was established in March 1963 at Oak Ridge National Laboratory, is principally supported by the U.S. Nuclear Regulatory Commission's Office of Nuclear Regulatory Research. Support is also provided by the Division of Reactor Development and Demonstration of the Department of Energy. NSIC is a focal point for the collection, storage, evaluation, and dissemination of safety information to aid those concerned with the analysis, design, and operation of nuclear facilities. Although the most widely known product of NSIC is the technical progress review *Nuclear Safety*, the Center prepares reports and bibliographies as listed on the inside covers of this document. The Center has also developed a system of key words to index the information which it catalogs. The title, author, installation, abstract, and key words for each document reviewed are recorded at the central computing facility in Oak Ridge. The references are cataloged according to the following categories:

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7. Fission Product Release, Transport, and Removal
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LMFBR SAFETY

6. REVIEW OF CURRENT ISSUES AND BIBLIOGRAPHY
OF LITERATURE (1977)

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Science Applications, Inc.

ABSTRACT

This report discusses the current status of liquid-metal fast breeder reactor (LMFBR) development. Selected bibliographic information on LMFBRs relative to the development and safety of the breeder reactor is presented for the year 1977. The bibliography consists of approximately 198 abstracts covering research and development, operating experience, and design practices. Keyword, author, and permuted-title indexes are included for completeness.

INTRODUCTION

This bibliography of abstracts of literature relating to the liquid-metal fast breeder reactor (LMFBR) from the computer file of the Nuclear Safety Information Center (NSIC) provides valuable background information for those engaged in research, design, analysis, and licensing of breeder reactors. This is the sixth volume of a series on LMFBR safety and covers selected literature added to the NSIC computer file in 1977. This introduction to the bibliography includes a brief discussion of the current status of breeder development.

The Energy Research and Development Administration (ERDA), its predecessor the Atomic Energy Commission, and others have considered the development of the breeder reactor to be essential to the assurance of adequate long-range supplies of nuclear fuel.^{1,2} The LMFBR is the favored fast breeder reactor system in Great Britain, Federal Republic of Germany, the U.S.S.R., Japan, Italy, and France. However, the United States is currently pursuing a policy of nonproliferation of plutonium, which is an important component of nuclear weapons. Since plutonium production is also inherent in the current LMFBR fuel cycle, the U.S. breeder program

is under critical review. The recently created Department of Energy is evaluating various breeder cycles with the goal of establishing a proliferation-proof fuel cycle. At this writing, the future of the Clinch River Breeder Reactor Plant (CRBRP) is uncertain.

Current-generation LMFBRs use mixed-oxide (plutonium-uranium) fuel cooled by liquid sodium. Coolant temperatures range from 400°C (750°F) at the core inlet to 540°C (1000°F) at the outlet while the system is kept at a low pressure of 2 to 10 atm.³ The feasibility of developing commercially attractive LMFBRs in the U.S. is founded on the extensive body of both light-water reactor (LWR) experience and sodium reactor technology.⁴⁻⁹ The latter includes several years of experience each with the Sodium Reactor Experiment and the Hallam, SEFOR, and Fermi reactors; 10 years of operating experience with the Experimental Breeder Reactor (EBR-II) plus experience with its predecessor EBR-I;¹⁰ the fuels and manufacturing technology developed for the Fast-Flux Test Facility (FFTF);¹¹ and the component designs for the CRBRP;^{12,13} as well as the utilization of data and experience gained from the LMFBR development programs in Europe.¹⁴⁻²³ Selected plant characteristics are given in Table 1 for the world's LMFBRs.¹³

As for any nuclear reactor, the safety of the fast reactor depends upon ensuring the continuity of heat removal from the hot radioactive core. At the same time provisions must be made for shutting down the reactor (i.e., terminating the nuclear fission process) when required, so that heat production after shutdown is by decay heat only. Thus, a major task is to ensure that the reactor can be shut down, or scrammed, when required. All shutdown system designs of the present generation incorporate two independent neutron-absorber systems. Less than half the capacity of either system is usually sufficient to scram the reactor. Swelling and creep phenomena in materials due to radiation-induced void formation has received considerable attention. The removal of decay heat, generally through diverse heat-removal systems, is recognized as a major design objective. Other areas of investigation relate to the energetics and mechanical consequences of a core-disruptive accident. Major research and development programs are under way to provide further understanding

Table 1. Characteristics of various LMFBR plants

Reactor	Nation	Criticality ^a	Power [MW(t)]	Fuel	Fuel loading (kg _m)	Heat transport system ^{b,c}
EBR-1	U.S.	1951	1.2	U	64	1 loop
BR-5	USSR	1958	5+10	PuO ₂ (UC)	49.6	2 loop
DFR	U.K.	1959	60	UO ₂	200	24 loop
EBR-II	U.S.	1963	62.5	U	363	Pool
Enrico Fermi	U.S.	1963	300	U	2000	3 loop
Rapsodie	France	1966	20+40	Pu-UO ₂	300	2 loop
SEFOR	U.S.	1969	20	Pu-UO ₂	1920	1 loop + ACS
BOR-60	USSR	1970	60	UO ₂	176	2 loop
FARET ^d	U.S.	1972	50	Pu-UO ₂	260	1 loop + ACS
BN-350	USSR	1972	1000	Pu-UO ₂	2050	6 loop
Phenix	France	1973	560	Pu-UO ₂	3500	Pool
PFR	U.K.	1974	600	Pu-UO ₂	6000	Pool
FFTF	U.S.	1978	400	Pu-UO ₂	3000	3 loop
JOYO	Japan	1977	100	Pu-UO ₂	903	2 loop + ACS
BN-600	USSR	1979	1470	Pu-UO ₂	3900	Pool
SNR-300	F.R. Germany	1981	736	Pu-UO ₂	5000	3 loop + ACS
PEC	Italy	1980	~125	Pu-UO ₂	?	2 loop semipool
MONJU	Japan	1983	540	Pu-UO ₂	7900	3 loop
Super Phenix	France	1982	2900	Pu-UO ₂	?	Pool
CRBRP	U.S.	1983	975	Pu-UO ₂	7561	3 loop

^aThe dates given are the latest published dates and in some instances may be optimistic.

^bACS = Auxiliary Cooling System.

^cThe loop system uses pipes to connect the reactor vessel, coolant pump, and heat exchanger; whereas the pool concept immerses the core, heat exchanger, and coolant pump in a single pool of sodium. The former has a smaller vessel, a smaller inventory of sodium, and greater ease in isolating components for maintenance. The pool-type system has a greater heat capacity because of the larger sodium inventory, and since there are no external pipes in this system, there is less concern about leakage.

^dThe FARET project was canceled in 1965.

of these safety phenomena, and ultimate development of the breeder in the U.S. depends upon successful completion of this effort.

The Comptroller General of the U.S. in a report²⁴ to Congress found that "there are . . . environmental and safety uncertainties regarding the LMFBR that remain to be resolved. These include hypothetical core-disruptive accidents which may lead to . . . recriticality. . . . Only the recriticality issue is unique to the LMFBR and other fast reactors. The other issues are common to nuclear fission power in general, but their resolution is critical because the LMFBR would exacerbate the problems."

The LMFBR has one very important safety advantage over the LWR;²⁵ that is, there is no need for high-pressure components within the reactor containment. With no natural pressure source, the concern then becomes a question of whether there are any combinations of malfunctions that could lead to a power excursion of sufficiently high ramp rate to generate excessive pressure. Other advantages accrue from the good heat-transfer characteristics of the sodium and its chemical reactivity, which make it efficient in retaining many fission products. On the other hand, the rapid oxidation, or burning, of sodium is an important safety concern of the LMFBR as is, in the case of large LMFBRs, the reactivity associated with incidents that lead to voiding of sodium near the center of the core.

Design Philosophy

The approach to safety in the design of LMFBRs is similar to the "defense-in-depth" philosophy used in LWR design²⁶ (see Table 2). The philosophy, founded on the supposition that the probability of accidents decreases rapidly with their severity, defines three levels of safety:¹³

1. Care in design, construction, and operation.
2. Standby engineered safety features such as redundant decay-heat-removal systems, emergency power systems, and two independent shutdown systems that are designed to control the consequences of equipment failures, operator error, and anticipated transients.
3. Other features, such as dynamic loading conditions for specific components, the reactor vessel, or containment structure, designed to

Table 2. Multilevel safety design of an LMFBR plant

Level	Objective	Operating category	Typical events within operating capacity	Typical safety design features
1	Provision of a plant of simple, reliable, and functional design free of defects, with inherent safe performance, fabricated and operated to the highest proven standards	Normal operation	Events that will normally occur. Full-power operation Startup and shutdown Random fuel-pin failure Refueling	Fuel assembly design to prevent flow blockage Fuel of proven performance through life Core restraint to provide negative power coefficient Adequate Doppler coefficient Low-pressure coolant system with wide margin to boiling Maximum use of proven technology and hands-on maintenance Radioactive-waste-treatment system
2	Provision of protection systems to provide adequate response of system in the event of all identified transients	Anticipated faults	Events that, based on experience, are expected to occur at least once in the life of the plant: Loss of off-site power Loss of power to one pump Operator error Spurious scrams	Multiple reactor coolant loops Decay-heat-removal redundancy Battery power supplies for vital services Guard vessels for leak protection Inert atmospheres in sodium cells
		Unlikely faults	Events which are not expected to occur individually but which might occur once during the life of the plant, based on the total list of such events. Pump seizure Failure of dump system Steam-generator leak	Two independent shutdown systems Sodium-water reaction protection system
3	Provision of extra capability to cope with extremely unlikely events that are never expected to occur and additional design requirements to provide prudent margin for unforeseen events	Extremely unlikely faults	Events that are never expected to occur. Maximum flood, or earthquake, or tornado Large sodium fire Large sodium-water reaction	Site selection Flood barriers Containment isolation Low-leakage containment
		Hypothetical events	Design margins to provide for unforeseen events	Capability to accept extra thermal loads in the core support structure Capability to accept dynamic loads in vessel and primary system components Geometric requirements around the vessel Control-room radiological protection

control the consequences of events such as a major core-disruptive accident that have been judged to be of low probability.

The first level of safety emphasizes accident prevention through intrinsic design features such as quality assurance, redundancy, testability, inspectability, and fail-safe characteristics.

The second level of safety is implemented in the plant protection systems, reliability programs, heat-removal-system protection, redundant power supplies, etc. An extensive reliability program is currently under way for the CRBRP to help set the design basis for the plant protection system.²⁷ The reliability criterion used is that stated in the regulatory guidance provided for the analogous accident in LWRs, "Anticipated Transient Without Scram" (ATWS),²⁸ as follows: "The safety objective is that the likelihood of all accidents with significant consequences not included in the design basis envelope should not be greater than one in one million per year, i.e., should not occur with a failure rate greater than 10^{-6} per year. For the particular potential failure path of ATWS, the staff believes that a failure rate of the order of one-tenth of the overall safety objective is an appropriate objective."

The third level of safety supplements the first two by providing plant response to low-probability faults. Analysis of the hypothetical core-disruptive accident (HCDA) illustrates the present state of technology in treating the third level of safety and shows that the provision of design margin involves an evaluation of the entire reactor plant. The core-disruptive accident is the most controversial area of LMFBR safety evaluation. The prime conceivable mechanistic initiator of a core-disruptive accident is a combination of events, such as complete loss of coolant flow, with a total inability to shut down the reactor (i.e., a disabling failure in the second level of safety). For this reason, a major effort is being put forth in the LMFBR development program to demonstrate that the reliability of scram, as well as system structural integrity and post-shutdown core cooling, is so high as to preclude choice of the HCDA as a design basis.

Recently to supplement the three levels of safety, DOE has been developing four lines of assurance (LOA) identified as follows:²⁹

- LOA 1 — Prevent accidents
- LOA 2 — Limit core damage
- LOA 3 — Control accident progression
- LOA 4 — Alternate radiological consequences

Instructions for Using the Bibliography

The abstracts in this bibliography were selected from the NSIC computer file using REACTOR, LMFBR, and REACTOR, LMCR as keywords. The document descriptions added to the file prior to 1970 are found in Vol. 1 (ORNL/NUREG/NSIC-125); those for 1970 to 1972 are in Vol. 2 (ORNL/NUREG/NSIC-129); those for 1972 to 1974 are in Vol. 3 (ORNL/NUREG/NSIC-132); those for 1975-1976 are in Vol. 5 (ORNL/NUREG/NSIC-139); and this volume contains selections from abstracts added to the file in 1977. Abstracts added after 1977 will be issued in follow-up volumes covering periods of approximately one year.

The previous volumes in this series (1 through 5) included all abstracts added to the computer file during the period covered. This volume was composed in a different manner. Rather than publishing the entire collection of over 1600 abstracts, we selected 198 of the most interesting and representative to include in this bibliography. Some were selected from each of the active NSIC categories. Users of this bibliography who wish to see the abstracts not included herein are encouraged to request a retrospective search of the NSIC computer files based upon a keyword or combination of keywords of interest. There is no charge for this service to Nuclear Regulatory Commission (NRC) and Department of Energy (DOE) personnel or their direct contractors.

The abstracts in this volume are sorted into the NSIC category scheme and listed essentially in chronological order, with the assigned accession numbers in numerical order. The bibliography is followed by keyword, author, and permuted-title indexes.

A brief explanation of the scope of each category* in which the abstracts are presented follows:

1. General Safety Considerations — Deals with all safety aspects of radiation policy, safeguards, standards, codes, cost, financial liability, and insurance. Also covers the comparative risk to public health and safety from nuclear and nonnuclear hazards.
2. Siting of Nuclear Facilities — Considers factors used in evaluating sites, for example, facility design, proposed operation, population density, use characteristics of the environs, physical characteristics of the site, and earthquake considerations.
3. Transportation and Handling of Radioactive Materials — Pertains to shipping containers, shipping regulations, criticality safety, transportation accidents, design of tiedowns, shipping condition (impact, fire, vibration, etc.), heat-transfer capability, etc.
5. Heat Transfer and Thermal Hydraulics — Considers all facets of the analysis of postulated accidents. Includes burnout heat flux, heat transfer, reliability analysis, thermal-mechanical effects, in-reactor experiments, coolant-activity buildup, and experiments such as in LOFT.
6. Reactor Transients, Kinetics, and Stability — Includes the studies, analytical and experimental, such as those conducted in TREAT and SPERT, in which the transient behavior of reactors and criticality accidents are examined. Deals, for example, with reactivity effects due to voids and temperature, Doppler coefficient, etc.
7. Fission Product Release, Transport, and Removal — Pertains to the release of fission products from various materials and their movement within a nuclear facility containment system. Transport of fission products involves the physical and chemical characterization of the released radionuclides and also includes mechanisms such as deposition, adsorption, filtration, fallout, plateout, etc.
8. Sources of Energy Release Under Accident Conditions — Considers nuclear, Wigner, and gamma energies, energy release by chemical reactions,

* Categories 4, 14, 15, and 19 through 21 are inactive; therefore, they are not included.

metal-water reactions, and all other types of energy that might be released as a result of a nuclear accident.

9. Nuclear Instrumentation, Control, and Safety Systems — Includes the design of control and safety systems for various nuclear processes, as well as the required instrumentation and hardware. The problems involved are the performance required of safety systems; the specification of instrumentation; the concepts of coincidence, redundancy, failure modes, and reliability; adequacy of shutdown margins; design features of mechanical devices; and related subjects.

10. Electrical Power Systems — Deals with routine and emergency means of supplying electrical power to nuclear facilities of any kind. Includes all phases of the generation and distribution of electrical power to and within a nuclear power plant. Considers the reliability of the power system and the effects of system disturbances on safety and operation of the reactor.

11. Containment of Nuclear Facilities — Encompasses all aspects of pressure containment for all types of nuclear facilities. Includes fuel cladding, piping, pressure vessels, containment, and reactor buildings. Major concerns are design considerations, penetrations, structural integrity, leak testing, quality assurance, and radiation damage.

12. Plant Safety Features — Reactor — Covers all engineered safety features of reactors except containment. Includes systems for reducing temperature and pressure, air cleaning, disposal of liquid waste, and emergency core cooling. Other topics include maintenance, decontamination, fuel-element protective devices, etc.

13. Plant Safety Features — Nonreactor — Deals with facilities associated with the external fuel cycle and with the use of radioactive materials created by nuclear fission. Major divisions are mining, ore conversion, enrichment, fuel-element fabrication, hot cells, fuel processing, fuel conversion, waste disposal, and radioisotopes.

16. Meteorological Considerations — Considers not only diffusion and deposition of radioactive material near the surface of the earth in connection with reactor operations, but also the atmospheric transport and fallout in the troposphere and stratosphere as a result of nuclear weapons tests.

17. Operational Safety and Experience — Covers the safety aspects of routine reactor operation and of incidents or unusual operating occurrences, large and small. Includes power, research, and test reactors, also fuel-processing plants.

18. Design, Construction, and Licensing — Deals largely with safety-analysis and design reports for reactors not yet operational. The reports are generated by facility designers and by the NRC Regulatory Staff.

22. Safeguards of Nuclear Materials — Includes the topics of theft or diversion of nuclear materials, safeguards research and rule-making, protection against sabotage, nonproliferation, and consideration of postulated malevolent nuclear acts.

References on mathematical models and codes usually appear in Category 5 or 18; however, some may be expected to occur in any of the categories depending on the subject matter of the model or code.

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26. U.S. Atomic Energy Commission, *The Safety of Nuclear Power Reactors (Light-Water-Cooled) and Related Facilities*, WASH-1250 (July 1973).
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118532
MEGY JM + CONTE F + NOEL H + GODDET J
PHENIX CONSTRUCTION AND OPERATING EXPERIENCE
COMMISSARIAT A L'ENERGIE ATOMIQUE, FRANCE + ELECTRICITE DE FRANCE, PARIS
7 PPS, 3 TABS, COMBUSTION, 47(12), PP. 25-31 (JUNE 1976)

THE OBJECTIVE WAS TO CONFIRM THE VALIDITY AND RELIABILITY OF THE ENTIRE SYSTEM BY SHOWING THAT IT WAS POSSIBLE TO BUILD A FAST-NEUTRON POWER PLANT AND TO OPERATE IT SATISFACTORILY. PRELIMINARY STUDIES STARTED IN 1965 CONSTRUCTION AND FABRICATION STARTED IN 1969. CONSTRUCTION WORK WAS PRACTICALLY COMPLETED IN 1972, AND CRITICALITY WAS ACHIEVED IN AUGUST 1973. THE AVAILABILITY FACTOR FOR 1975 WAS 70.26%. THE OVERALL INSTALLATION DEMONSTRATES ALMOST PERFECT STABILITY BOTH WITH RESPECT TO THE REACTOR AND THE BALANCE OF THE PLANT. OPERATOR INTERVENTIONS ARE INFREQUENT. AN EXAMINATION OF THIS SURVEY SHOWS THAT LAUNCHING THE CONSTRUCTION OF SUPER PHENIX HAS EXCELLENT CHANCES OF SUCCESS.

REACTOR, LMFBR + PHENIX (LMFBR) + CONSTRUCTION + TESTING + OPERATION + COMPONENTS

118533
NEMZEK TA
PROSPECTS AND IMPACTS OF BREEDER COMMERCIALIZATION
U.S. ERDA, WASHINGTON
4 PPS, 5 FIGS, COMBUSTION, 47(12), PP. 21-24 (JUNE 1976)

REQUIRES LOOKING AHEAD 25 YEARS WITH RESPECT TO U.S. ELECTRIC ENERGY NEEDS AND THE CONTRIBUTION THAT FISSION ENERGY CAN MAKE IN FULFILLING THOSE NEEDS. FOUR POINTS ARE PREREQUISITE TO UNDERSTANDING THE FUTURE: (1) ELECTRICAL ENERGY DEMAND GROWTH BETWEEN 4-5% PER YEAR; (2) THE GROWTH MUST BE ACCOMMODATED PRINCIPALLY BY COAL AND NUCLEAR; (3) THE RATE OF GROWTH OF NUCLEAR FOR THE LOW GROWTH CASE GIVES 200 GWE BY 1996, 800 GWE BY 2000; AND (4) THE BREEDER IS NECESSARY FOR LONG TERM USE OF THE FISSION ENERGY OPTION. COAL IS PLENTIFUL, BUT THE COAL MINING IS FACING AN ENORMOUS TASK OVER THE NEXT QUARTER CENTURY. THE ACCUMULATING DEPLETED URANIUM STOCKPILE FROM THE URANIUM ENRICHMENT PLANTS REPRESENTS A TREMENDOUS, PRE-MINED RESOURCE FOR THE BREEDER INDUSTRY.

REACTOR, BREEDER + REACTOR, LMFBR + URANIUM + FORECAST + ELECTRIC POWER + COAL

118534
LIQUID METAL FAST BREEDER REACTOR: DECISION PROCESS AND ISSUES
7 PPS, COMBUSTION, 47(12), PP. 14-20 (JUNE 1976)

A SERIES OF CHARTS ARE GIVEN TO HELP CLARIFY THE DECISION MAKING PROCESS ON WHETHER PROGRESS OF THE LMFBR SHOULD BE SLOWED OR ACCELERATED - BASED ON ELECTRIC DEMAND, COAL TECHNOLOGY, AND URANIUM SUPPLY. PERHAPS THE MOST IMPORTANT UNCERTAINTY WITH RESPECT TO TIMING IS THE INCREASE IN DEMAND FOR ELECTRICITY. IF COAL CAN BE USED IN AN ENVIRONMENTALLY EXCEPTABLE MANNER, AND IF MINING AND RAILROAD REQUIREMENTS CAN BE MET, THEN LMFBR DEVELOPMENT SHOULD BE SLOWED. BUT IT IS EXPECTED THAT COAL WILL BE EXPENSIVE. AVAILABILITY OF URANIUM IS AN UNCERTAINTY IN PLANNING.

REACTOR, LMFBR + R AND D PROGRAM + ECONOMICS + COAL + URANIUM + RESOURCE, NATURAL

119262
BODANSKY D + SCHMIDT FH
SAFETY ASPECTS OF NUCLEAR ENERGY
UNIVERSITY OF WASHINGTON
47 PPS, PP. 9-54, BOOK PUBLISHED BY PRENTICE-HALL INC., ENGLEWOOD CLIFFS, N.J., 1976

CHAPTER 1 OF THE BOOK 'THE NUCLEAR POWER CONTROVERSY' DEALS WITH THE TECHNICAL ASPECTS OF REACTOR SAFETY AS WELL AS WASTE STORAGE AND PLUTONIUM DIVERSION. THE PAPER IS INTENDED AS A BRIEF INTRODUCTION TO THE TECHNICAL ASPECTS OF NUCLEAR POWER PRODUCTION AND AN IDENTIFICATION OF THE CHIEF AREAS OF CONFLICT. THESE MATTERS ARE, OF COURSE, CENTRAL TO ANY CONSIDERATION OF NUCLEAR POWER.

N-POWER, SAFETY OF + POWER PLANT, NUCLEAR + RADIATION EFFECT + PLUTONIUM + WASTE HANDLING + ACCIDENT, LOSS OF COOLANT + REACTOR, BREEDER + BROWNS FERRY 3 (BWR) + FIRE + SABOTAGE + THEFT/DIVERSION

120096
OTT KD
RISK-ASSESSMENT METHODOLOGY FOR FAST BREEDER REACTORS
ARGONNE NATIONAL LABORATORY, ILLINOIS
ANL-76-39 +, 58 PPS, 12 FIGS, 17 REFS, APRIL 1976

ALL METHODS ARE BASED ON THE CALCULATION OF ACCIDENT CONSEQUENCES FOR RELATIVELY FEW ACCIDENT SCENARIOS. UNCERTAINTIES IN FAST-REACTOR ACCIDENT ANALYSIS ARE DISCUSSED. THIS DISCUSSION SHOWS THE NEED FOR IMPROVEMENT OF THE METHODOLOGY. A GENERALIZED AND IMPROVED RISK-ASSESSMENT METHODOLOGY IS OUTLINED AND PROPOSED (ACCIDENT-SPECTRA-PROGRESSION APPROACH), WHICH CONSISTS OF AN EXPLICIT TREATMENT OF UNCERTAINTIES THROUGHOUT THE ACCIDENT PROGRESSION. THE ASSESSMENT OF THE RISK OF ONE OR A CERTAIN NUMBER OF NUCLEAR REACTORS CAN ONLY PROVIDE AN 'ISOLATED' RISK ASSESSMENT. THE GENERAL PROBLEM OF SAFETY RISK ASSESSMENT AND ITS RELATION TO PUBLIC ACCEPTANCE OF CERTAIN MODES OF POWER PRODUCTION IS A MUCH BROADER PROBLEM AREA, WHICH IS ALSO DISCUSSED.

120096 *CONTINUED*
 AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

BENEFIT VS RISK + REACTOR, FAST + REACTOR, BREEDER + MATHEMATICAL TREATMENT + JACOBS

121108
 LMFBR - FUEL CYCLE TECHNOLOGIES UNDERDEVELOPED--GAO
 1 PG, NUCLEAR NEWS, 20(1), PG. 37 (JAN. 1977)

THE GENERAL ACCOUNTING OFFICE HAS PROJECTED THAT THE FUEL CYCLE TECHNOLOGIES--REPROCESSING, FUEL FABRICATION, AND WASTE DISPOSAL--ASSOCIATED WITH THE LIQUID-METAL FAST BREEDER REACTOR ARE MORE LIKELY TO SLOW UP THE COMMERCIALIZATION OF THE LMFBR THAN THE DEVELOPMENT OF THE REACTOR ITSELF. THE GAO JUDGES THE LMFBR FUEL CYCLE TECHNOLOGIES TO BE LAGGING, AND THIS CONDITION MAY ALLOW ONLY FOUR TO SIX COMMERCIAL LMFBR'S TO BE IN OPERATION BY THE YEAR 2000. THE GAO RECOMMENDED THAT ERDA ASSEMBLE A MORE COORDINATED DEVELOPMENT PROGRAM FOR THE LMFBR AND ITS THREE SUPPORT TECHNOLOGIES.

FUEL CYCLE + REACTOR, LMFBR + AGENCY, ERDA + LEGALISTICS + FUEL REPROCESSING + WASTE MANAGEMENT

121153
 WEINBERG AM
 ENERGY POLICY AND ENERGY PROJECTIONS: THE CASE OF A NUCLEAR MORATORIUM
 INST. FOR ENERGY ANALYSIS, OAK RIDGE, TENN.
 14 PPS, PRESENTED AT ATOMIC INDUSTRIAL FORUM CONFERENCE ON U.S. ENERGY POLICY; WASHINGTON, D.C., JAN. 11, 1977

ENERGY NEEDS HAVE BEEN RE-EVALUATED AND NEW ESTIMATES AGREE CLOSELY WITH THE FORD FOUNDATION STUDY OF 1974 - FOR THE YEAR 2000 FROM 101 TO 126 QUADS. USING THESE LOWER ESTIMATES OF ENERGY NEEDS, A STUDY IS MADE OF A NUCLEAR MORATORIUM WHERE EITHER COAL OR SOLAR ENERGY WOULD HAVE TO SUPPLY ENERGY NEEDS. IT SEEMS VERY DOUBTFUL IF SOLAR COULD EVER BE ANY MORE THAN SUPPLEMENTARY, AND THE MAJOR RESTRICTION ON A COAL ECONOMY WOULD PROBABLY BE THE CO2 CATASTROPHE. THESE NEW PROJECTIONS SUGGEST THAT WE MAY HAVE MORE TIME FOR THE TRANSITION TO A LONG-RANGE FUTURE BASED ON BREEDERS THAN FIRST SUSPECTED.

AVAILABILITY - INSTITUTE FOR ENERGY ANALYSIS, OAK RIDGE ASSOCIATED UNIVERSITIES, OAK RIDGE, TENN. 37830

ENERGY + FORECAST + FUEL, NUCLEAR + FUEL, FOSSIL + REACTOR, BREEDER + CARBON DIOXIDE

122105
 APOSTOLAKIS GE + CAVE L + EPLER EP + ILBERG D + KASTENBERG WE
 LMFBR FUEL ANALYSIS TASK C: RELIABILITY ASPECTS OF LMFBR'S. FINAL REPORT JULY 1, 1975-SEPTEMBER 30, 1976
 UNIVERSITY OF CALIFORNIA, LOS ANGELES (PREPARED FOR NRC)
 NUREG-0148 + UCLA-ENG-76116 +, 144 PPS, JAN. 1977

THE RELIABILITY PROGRAM WHICH WAS ESTABLISHED FOR THE CLINCH RIVER FAST BREEDER REACTOR PROJECT IS REVIEWED. THE REVIEW REVEALS SEVERAL PROBLEMS AND UNCERTAINTIES WHICH NEED TO BE APPROPRIATELY ADDRESSED BY THE RELIABILITY PROGRAM. THE MAIN PROBLEMS ARE STATED TO BE THE CHOICE OF THE RELIABILITY CRITERION, THE PROSPECTS OF ATTAINING HIGH RELIABILITIES OF SYSTEMS AND CRITICAL STRUCTURES, THE ROLE OF EXTERNAL PHENOMENA AS WELL AS THE VERIFICATION BY TESTS AND THE RELIABILITY ASSURANCE PROGRAM.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

JACOBS + RELIABILITY ANALYSIS + REACTOR, LMFBR + CLINCH RIVER (LMFBR) + REVIEW + *DESIGN CRITERIA + *QUALITY ASSURANCE

122621
 FISSION, BREEDER, REPROCESSING AND *HAVE-NOTS*--ROSE OF MIT
 1 PG, NUCLEAR INDUSTRY, 24(3), PG. 25 (MARCH 1977)

IN A PHILOSOPHICAL ADDRESS THAT RANGED FROM THE GOSPEL ACCORDING TO ST. LUKE TO THE WISDOM OF DEREGULATING NATURAL GAS PRICES, PROF. DAVID ROSE OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY CONCLUDED THAT NUCLEAR FISSION PLUS THE BREEDER PLUS FUEL REPROCESSING IS--BY A PROCESS OF ELIMINATION--THE WORLD'S ONLY LONG-TERM ENERGY ANSWER, AND ALSO THAT ADVANCED NATIONS MUST HONOR THEIR MORAL IMPERATIVE TO PROVIDE FOR THE ENERGY NEEDS OF THE DEVELOPING WORLD AS WELL AS THEIR OWN.

REACTOR, BREEDER + FUEL REPROCESSING + POWER PLANT, NUCLEAR + SOLAR + FUSION

122625
 BREEDER REACTOR CALLED *BARGAIN*
 1 PG, THE ROANE COUNTY (TENN.) NEWS, PG. 3-A, APRIL 14, 1977

THE BREEDER REACTOR IS THE BEST BARGAIN FOR THE UNITED STATES SINCE THE LOUISIANA PURCHASE, SAID FORMER AEC COMMISSIONER CLARENCE LARSON. WITH THE PURCHASE THE FRENCH LOST THEIR POSITION OF POWER AND INFLUENCE IN THE UNITED STATES, HE SAID. *IT IS A SAD FACT THAT 175 YEARS LATER A POSSIBLE DECISION IN THIS COUNTRY TO FOREGO THE BREEDER COULD GIVE PRE-EMINENCE IN THE BREEDER FIELD TO THE FRENCH.* DR. LARSON SAID THAT HE FIRST URGED IN A SPEECH IN 1953 THAT THE NATION

122625 *CONTINUED*

STOP USING OIL AND NATURAL GAS FOR FUEL BECAUSE THESE FUELS WERE TOO SCARCE AND VALUABLE.

REACTOR, BREEDER + FRANCE + ENERGY + CONSERVATION + CLINCH RIVER (LMFBR)

123230

COTTRELL AH
NUCLEAR POWER AND THE PUBLIC INTEREST (EXTRACTED)
THE MASTER JESUS COLLEGE, CAMBRIDGE
2 PPS, ENERGY DIGEST, 5(5), PP. 4-5 (OCT. 1976)

THE AUTHOR BELIEVES THAT, AT ABOUT THE TURN OF THE CENTURY, ENGLAND WILL ENTER A PERIOD OF GRAVE ENERGY CRISIS UNLESS THEY DEVELOP ALL THE MAJOR ENERGY OPTIONS - FOSSIL FUELS, NUCLEAR, CONSERVATION, AND SOME RENEWABLE ENERGY SOURCES. ENGLAND HAS ENOUGH COAL RESERVES TO LAST THROUGH THE NEXT CENTURY, BUT THEY MUST START NOW TO INCREASE PRODUCTION. NUCLEAR CAPACITY IN THE YEAR 2000 SHOULD BE ABOUT FOUR TIMES LARGER THAN IT IS TODAY. ALSO, A STRENUOUS EFFORT FOR CONSERVATION WILL BE REQUIRED. THE FUTURE ROLE OF NUCLEAR POWER MUST DEPEND ON THE FAST BREEDER REACTOR. WITHOUT THE FBR CONTRIBUTION, URANIUM SUPPLIES WILL BE INSUFFICIENT. WITH THE FBR, FUEL SUPPLY LIMIT BECOMES LESS.

UNITED KINGDOM + ENERGY + FORECAST + FUEL, FOSSIL + COAL + POWER PLANT, NUCLEAR + REACTOR, BREEDER

123381

PEARLSTEIN L
PROLIFERATION WORRY THREATENS TOTAL NUCLEAR OPTION
2 PPS, THE OAK RIDGE (TENN.), APRIL 12, 1977

REPORTS ON THE COMMITTEE APPOINTED BY PRESIDENT CARTER TO STUDY THE NEED FOR THE LMFBR. HE WARNED THAT CONCERN FOR PROLIFERATION WOULD ALMOST FOR CERTAIN DELAY OR CAUSE CANCELLATION OF BREEDER DEVELOPMENT AND COULD POSSIBLY CAUSE THE ENTIRE NUCLEAR OPTION TO BE HALTED. BY USING CHARTS AND GRAPHS ON URANIUM SUPPLIES AND ESTIMATED ENERGY NEEDS, HE SHOWED HOW BREEDER DEVELOPMENT COULD NOT BE DELAYED FOR VERY LONG WITHOUT CAUSING SERIOUS ENERGY SHORTAGES BY THE YEAR 2000. CULLER SAID OF THE 10 PEOPLE WHO SERVED ON THE COMMITTEE, 6 WERE PRO-BREEDER AND 4 WERE NOT. THREE REPORTS WERE ISSUED - ONE FOR THE PRO GROUP, ONE FOR THE OPPONENT GROUP, AND ONE REPORT ON ITEMS OF TOTAL AGREEMENT.

REACTOR, BREEDER + CLINCH RIVER (LMFBR) + OPPONENT + PROponent + ENERGY + PROLIFERATION + INDUSTRY, NUCLEAR

123704

YASINSKY JB
THE BREEDER STORY
WESTINGHOUSE ELECTRIC CORP.
17 PPS, PRESENTED AT WORKSHOP ON "NUCLEAR INFORMATION STRATEGIES: NEW SETTINGS, NEW APPROACHES", LAS VEGAS, NEV., SEPT. 28, 1976

DISCUSSES THE BREEDER R AND D PROGRAM, FUNDING, RESEARCH, ATTITUDES OF GOVERNMENT OFFICIALS, AND SCHEDULES. THE PROJECT HAS THREE GOALS, COMPLETION OF THE FFTF EXPERIMENTAL REACTOR, THE CLINCH RIVER DEMONSTRATION PLANT, AND THE PROTOTYPE LARGE BREEDER REACTOR.

AVAILABILITY - ATOMIC INDUSTRIAL FORUM INC., PUBLIC AFFAIRS & INFORMATION PROGRAM, 475 PARK AVENUE SOUTH, NEW YORK, N.Y. 10016

REACTOR, LMFBR + FFTF (TR) + CLINCH RIVER (LMFBR) + ECONOMICS + R AND D PROGRAM

124320

BUNDY M + KEENE SM + ABRAHAMSON S + KAYSEN C
NUCLEAR POWER ISSUES AND CHOICES
THE MITRE CORP.
418 PPS, PUBL. BY HALLING PUBLISHING CO., CAMBRIDGE, MASS., SPONSORED BY THE FORD FOUNDATION, 1977

PRESENTS THE RESULTS OF A YEAR LONG STUDY OF THE DEBATE OVER NUCLEAR POWER ISSUES SPONSORED BY THE FORD FOUNDATION GRANT TO THE MITRE CORP. MITRE PROVIDED ADMINISTRATIVE SUPPORT TO THE 21 MEMBERS OF THE PANEL, THE NUCLEAR ENERGY POLICY STUDY GROUP, WHO WERE ASSEMBLED TO PERFORM THE STUDY. THE GROUP SOUGHT TO DEVELOP A FRAMEWORK FOR ASSESSING THE DIFFICULT PROBLEMS RELATING TO NUCLEAR POWER NOW BEFORE THE U.S. GOVT. ISSUES CONSIDERED WERE: THE REPROCESSING AND RECYCLE OF PLUTONIUM; THE BREEDER REACTOR PROGRAM; THE MANAGEMENT OF NUCLEAR WASTES; THE EXPANSION OF URANIUM ENRICHMENT CAPACITY; AND THE EXPORT OF NUCLEAR TECHNOLOGY AND MATERIALS. MAJOR SECTIONS OF THE BOOK ARE ENTITLED: ENERGY ECONOMICS AND SUPPLY; HEALTH, ENVIRONMENT, AND SAFETY; NUCLEAR PROLIFERATION AND TERRORISM; AND ISSUES FOR DECISION.

*N-POWER, SAFETY OF + SAFETY PRINCIPLES AND PHILOSOPHY + FUEL RECYCLE + FUEL REPROCESSING + WASTE MANAGEMENT + EXPANSION + ENRICHMENT FACILITY + ECONOMICS + ENVIRONMENTAL QUALITY + PROLIFERATION + SABOTAGE + SAFEGUARDS, NUCLEAR MATERIAL + *N-POWER FORECAST + REACTOR, BREEDER + ATMOSPHERIC DIFFUSION + PLUTONIUM

124481

SUITA T + OYAMA A
PROGRAMME AND CURRENT STATUS OF FAST BREEDER REACTOR DEVELOPMENT IN JAPAN

124481 *CONTINUED*

ATOMIC ENERGY COMMISSION + POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORP., TOKYO, JAPAN
IAEA-CN-36/164 +. 20 PPS, FROM INTERNATIONAL CONFERENCE ON NUCLEAR POWER AND ITS FUEL CYCLE; SALZBURG,
AUSTRIA, MAY 2-13, 1977

FAST BREEDER REACTOR DEVELOPMENT IN JAPAN HAS BEEN CARRIED OUT AS A NATIONAL PROJECT. THE
EXPERIMENTAL FAST REACTOR, 'JOYO' HAS 50 MW THERMAL AS THE INITIAL OUTPUT AND WOULD BE CRITICAL
IN 1977. EVENTUALLY ITS OUTPUT WILL BE INCREASED TO 100 MW. THE PROTOTYPE FAST BREEDER REACTOR,
'MONJU' OF 300 MW ELECTRICITY HAS ALMOST BEEN COMPLETED IN ITS CONCEPTUAL DESIGN AND THE
MONITORING AND SURVEY HAVE STARTED AT THE PROPOSED SITE. THE ATOMIC ENERGY COMMISSION OF JAPAN
HAS RECENTLY RECONFIRMED THE HIGHEST PRIORITY FOR FAST BREEDER REACTOR DEVELOPMENT. THUS THE
FAST BREEDER REACTOR WOULD PLAY A MAJOR ROLE SOLVING THE ENERGY PROBLEM IN JAPAN.

AVAILABILITY - UNIPUB, INC., P.O. BOX 433, NEW YORK, N.Y. 10016

REACTOR, POWER + FUEL CYCLE + JAPAN + *R AND D PROGRAM + *REACTOR, FAST + *REACTOR, BREEDER + ENERGY

124494

BESSE G + ROZENHOLE M + SAITEEVSKY B + VENDRYES G
STATUS AND PROSPECTS OF THE FRENCH FAST BREEDER REACTOR PROGRAMME
COGEMA + NOVATOME + NERSA + CEA
IAEA-CN-36/219 +. 14 PPS, FROM INTERNATIONAL CONFERENCE ON NUCLEAR POWER AND ITS FUEL CYCLE; SALZBURG,
AUSTRIA, MAY 2-13, 1977

REVIEWS IN SUCCESSION THE MAIN PHASES OF THE FRENCH FAST BREEDER REACTOR PROGRAMME, WHILE
STRESSING THE RESULTS ACHIEVED, THE PROBLEMS ENCOUNTERED, AND PLANNED DEVELOPMENTS. REMAINS ON A
TECHNICAL LEVEL, WITH BRIEF ALLUSIONS TO ECONOMIC ASPECTS, INDUSTRIAL ORGANIZATION, AND
INTERNATIONAL COOPERATIVE AGREEMENTS.

AVAILABILITY - UNIPUB, INC., P.O. BOX 433, NEW YORK, N.Y. 10016

REACTOR, POWER + FUEL CYCLE + FRANCE + REACTOR, FAST + REACTOR, BREEDER + *OPERATING EXPERIENCE + PHENIX
(LMFBR) + SUPERPHENIX (LMFBR) + *REACTOR, LMFBR + REACTOR DESCRIPTION + RAPSODIE (LMCR)

124530

KAZACHKOVSKI OD + MESHKOV AG + MITENKOV FM + VASILENKO KT
THE USSR FAST REACTOR DEVELOPMENT PROGRAM AND ITS CURRENT STATE
USSR
IAEA-CN-36/356 +. 24 PPS, FROM INTERNATIONAL CONFERENCE ON NUCLEAR POWER AND ITS FUEL CYCLE; SALZBURG,
AUSTRIA, MAY 2-13, 1977

THE USSR FAST REACTOR DEVELOPMENT PROGRAM IS AIMED AT CREATION OF RELIABLE AND COMPETITIVE FAST
POWER REACTORS WHICH IN FUTURE WILL BE CAPABLE, TOGETHER WITH THERMAL REACTORS, TO PROVIDE THE
MOST EFFICIENT UTILIZATION OF EXISTING NATURAL RESOURCES OF NUCLEAR RAW MATERIALS. THE PROGRAM
INCLUDES: CONSTRUCTION OF FIRST POWER REACTORS TO GAIN EXPERIENCE IN DESIGNING, CONSTRUCTION AND
OPERATION; FURTHER DEVELOPMENT AND ADVANCEMENT OF REACTOR EQUIPMENT, IMPROVEMENT OF ITS
RELIABILITY AND INCREASE OF ITS SIZE; INVESTIGATION OF FUEL AND STRUCTURAL MATERIALS; IMPROVEMENT
OF FUEL CYCLE; SAFETY STUDIES.

AVAILABILITY - UNIPUB, INC., P.O. BOX 433, NEW YORK, N.Y. 10016

REACTOR, POWER + USSR + *R AND D PROGRAM + *REACTOR, FAST + CONSTRUCTION + OPERATION + EQUIPMENT DEVELOPMENT +
FUEL CYCLE + REACTOR, LMFBR + OPERATING EXPERIENCE

124565

VAUGHAN RD + CHERMANNE J
THE NEED FOR HIGH PERFORMANCE BREEDER REACTORS
EUROPEAN ASSOCIATION FOR THE GAS COOLED BREEDER REACTOR, BRUSSELS, BELGIUM
IAEA-CN-36/478 +. 8 PPS, FROM INTERNATIONAL CONFERENCE ON NUCLEAR POWER AND ITS FUEL CYCLE; SALZBURG,
AUSTRIA, MAY 2-13, 1977

THE RATE OF INSTALLATION OF BREEDER REACTORS, QUITE APART FROM THE DEVELOPMENT PROBLEMS WILL
DEPEND UPON SEVERAL THINGS: (1) THE AMOUNT OF PU AVAILABLE FROM THERMAL REACTORS; (2) THE
INCENTIVE AND POSSIBILITY TO START WITH U235; (3) THE QUANTITIES REQUIRED FOR THE FIRST CORES OF
THE BREEDERS; (4) THE PU PRODUCED BY THE FAST REACTORS, I.E., BREEDING GAIN; AND (5) THE PU HELD
UP OR LOST TO RESIDUES IN THE FUEL REPROCESSING CYCLE.

AVAILABILITY - UNIPUB, INC., P.O. BOX 433, NEW YORK, N.Y. 10016

*REACTOR, BREEDER + PERFORMANCE + *N-POWER FORECAST + ENERGY SOURCE + REACTOR, GCFR

124601

DENISE RP + SPEIS TP + KELBER CN + CURTIS RT
LICENSING DECISIONS AND SAFETY RESEARCH RELATED TO LMFBR ACCIDENTS
U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON
IAEA-CN-36/576 +. 8 PPS, FROM INTERNATIONAL CONFERENCE ON NUCLEAR POWER AND ITS FUEL CYCLE; SALZBURG,
AUSTRIA, MAY 2-13, 1977

THE LICENSING APPROACH WHICH ENSURES ADEQUATE PROTECTION OF THE PUBLIC HEALTH AND SAFETY AGAINST

124601 *CONTINUED*

SERIOUS ACCIDENTS IS DESCRIBED. THIS PAPER DESCRIBES THE ROLE OF CORE MELT AND CORE DISRUPTIVE ACCIDENTS IN THE DESIGN, SAFETY RESEARCH, AND LICENSING PROCESSES, USING THE CLINCH RIVER BREEDER REACTOR AS A FOCAL POINT. MAJOR DESIGN ATTENTION IS PLACED ON THE PREVENTION OF THESE ACCIDENTS SO THAT THE PROBABILITY OF CORE MELT ACCIDENTS IS REDUCED TO A SUFFICIENTLY LOW LEVEL THAT THEY ARE NOT TREATED AS DESIGN BASIS ACCIDENTS. ADDITIONAL REQUIREMENTS ARE PLACED UPON THE DESIGN TO FURTHER REDUCE RESIDUAL RISK.

AVAILABILITY - UNIPUB, INC., P.O. BOX 433, NEW YORK, NY 10016

REACTOR, LMFBR + ACCIDENT ANALYSIS + LICENSING PROCESS + ACCIDENT, CORE DISRUPTIVE + CORE MELTDOWN + *CLINCH RIVER (LMFBR) + *SAFETY ANALYSIS

124692

WENT JJ

STATUS AND PROSPECTS OF THERMAL BREEDERS

CENTRAL ORGANIZATION OF THE NETHERLANDS, ELECTRICITY SUPPLY UNDERTAKINGS

IAEA-NL-302 +. 15 PPS, FROM INTERNATIONAL CONFERENCE ON NUCLEAR POWER AND ITS FUEL CYCLE; SALZBURG, AUSTRIA, MAY 2-13, 1977

SIGNIFICANT CHANGES HAVE OCCURRED IN THE PAST FEW YEARS IN THE PROJECTIONS FOR THE WORLDWIDE IMPLEMENTATION OF NUCLEAR POWER AND OF DIFFERENT REACTOR SYSTEMS. TO CONSIDER IF THESE CHANGES HAVE INCREASED THE INCENTIVES FOR THERMAL BREEDER OR NEAR-BREEDER DEVELOPMENT TO IMPROVE NUCLEAR FUEL UTILIZATION IN THERMAL REACTORS, A GROUP OF EXPERTS REPRESENTING THE MAIN LINES OF THERMAL BREEDER REACTOR DEVELOPMENT WAS CONVENED BY THE INTERNATIONAL ATOMIC ENERGY AGENCY AT THE END OF 1975. IT WAS DECIDED TO PREPARE A REPORT ON THE STATUS AND PROSPECTS OF THERMAL BREEDERS FOR PUBLICATION BY THE IAEA. THIS PAPER PRESENTS THE PRELIMINARY REPORT.

AVAILABILITY - UNIPUB, INC., P.O. BOX 433, NEW YORK, N.Y. 10016

*REACTOR, BREEDER + *REACTOR, THERMAL + REVIEW + CANDU (HWR) + REACTOR, MOLTEN SALT + THORIUM

126453

RUBEL P

HUMAN FACTORS IN CRBRP DESIGN AND PLANNING FOR SAFETY

OAK RIDGE NATIONAL LAB., TENN.

ORNL/TM-5681 +. 35 PPS, 1 FIG, 29 REFS, MARCH 1977

HUMAN ENGINEERING SOURCE AND APPLICATIONS LITERATURE WAS REVIEWED TO OBTAIN GUIDANCE FOR FUTURE EFFORTS TO ENHANCE THE OPERABILITY AND MAINTAINABILITY OF THE CLINCH RIVER BREEDER REACTOR PLANT (CRBRP). SELECTED FINDINGS WERE INCORPORATED INTO RECOMMENDATIONS TO APPLY SPECIFIC HUMAN ENGINEERING METHODS AT APPROPRIATE STAGES OF THE CRBRP PROJECT. THIS STUDY ADDRESSES 2 MAIN OBJECTIVES: (1) REDUCED LIKELIHOOD OF OPERATING AND MAINTENANCE ERRORS IN ACTIVITIES ASSOCIATED WITH CRBRP OPERATION, AND (2) IMPROVED CONTROL FACILITIES AND PROCEDURES TO ENABLE OPERATORS TO COPE EFFECTIVELY WITH PLANT CONTINGENCY CONDITIONS.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

CLINCH RIVER (LMFBR) + REACTOR, LMFBR + CONTROL SYSTEM + OPERATOR ACTION + TRAINING + DESIGN STUDY + PROCEDURES AND MANUALS + MAINTENANCE AND REPAIR + OPERATION

126672

HANNAFORD J + FRYER DRH

SAFETY ISSUES IN LICENSING COMMERCIAL LMFBR'S

NUCLEAR INSTALLATIONS INSPECTORATE, LONDON, UK

CONF-761001(VOL. 1) +. 11 PPS, PP. 33-43 OF THE PROCEEDINGS OF THE INTERNATIONAL MEETING ON FAST REACTOR SAFETY AND RELATED PHYSICS; CHICAGO, ILL., OCT. 5-8, 1976

THE PAPER DESCRIBES BRIEFLY THE ROLE OF THE NUCLEAR INSTALLATIONS INSPECTORATE OF THE HEALTH AND SAFETY EXECUTIVE AS THE INDEPENDENT LICENSING BODY WITHIN THE UNITED KINGDOM AND EXPLAINS THE PART THEY PLAY IN THE PRE-LICENSING PHASES OF COMMERCIAL FAST REACTORS. THE WHOLE CORE ACCIDENT (WCA) IS EXAMINED IN SOME DETAIL AND FROM THIS EXAMINATION THE MAJOR SAFETY ISSUES ARE HIGHLIGHTED.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*REACTOR, LMFBR + *UNITED KINGDOM + *ACCIDENT ANALYSIS + ACCIDENT, CORE DISRUPTIVE + ACCIDENT, CONSEQUENCES + REACTOR, POWER + FUEL COOLANT INTERACTION + FLOW BLOCKAGE + CONTAINMENT INTEGRITY

126870

VENDRYES GA

SUPERPHENIX: A FULL SCALE BREEDER REACTOR

9 PPS, FIGS, SCIENTIFIC AMERICAN, 236(3), PP. 26-34 (MARCH 1977)

DISCUSSES THE DECISION BY A CONSORTIUM OF EUROPEAN ELECTRIC-UTILITY COMPANIES TO BUILD THE 1203 MW SUPER-PHENIX BREEDER AT CREYS-MALVILLE IN FRANCE. AFTER DISCUSSING THE NEED FOR BREEDER REACTORS AND THE NUCLEAR PHYSICS OF BREEDING, A DESCRIPTION OF THE SUPERPHENIX AND ITS PARAMETERS IS PRESENTED. A REVIEW OF THE OPERATING RECORD AND EXPERIENCE OF THE PHENIX REACTOR - A

126870 *CONTINUED*

DEMONSTRATION PLANT - IS PRESENTED. A SURVEY AND LISTING OF PROGRESS IN THE DEVELOPMENT OF LMFBR'S IN THE WORLD WITH A THERMAL OUTPUT GREATER THAN 1 MW IS GIVEN.

REACTOR, LMFBR + *REACTOR DESCRIPTION + REACTOR PHYSICS + PHENIX (LMFBR) + OPERATING EXPERIENCE SUMMARY + GROWTH/DEVELOPMENT + *SUPERPHENIX (LMFBR)

126907

COST OF 20-YEAR DELAY COULD BE \$3.5 TRILLION
1 PG, NUCLEAR NEWS, 20(8), PG. 40 (JUNE 1977)

AN OFFICIAL OF EPRI TOLD A SENATE SUBCOMMITTEE THAT A 20-YEAR DEFERAL OF THE LIQUID METAL FAST BREEDER REACTOR COULD COST THE UNITED STATES FROM \$105 BILLION TO \$3.5 TRILLION OVER THE NEXT 75 YEARS. RENE H. MALES SAID THAT THE LATTER FIGURE "WOULD AMOUNT OT A 5.7 PERCENT AVERAGE ANNUAL REDUCTION IN GROSS NATIONAL PRODUCT BETWEEN NOW AND THE YEAR 2050." MALES ADDRESSED HIMSELF TO THE RECENT FORD FOUNDATION/MITRE STUDY WHICH SAID THAT DOMESTIC URANIUM SUPPLIES ARE ABUNDANT ENOUGH TO MAKE BREEDERS UNNECESSARY. MALES RESPONDED THAT "EVEN WITH ADEQUATE AVAILABILITY OF OTHER RESOURCES, THE COST OF A 20-YEAR DELAY IN BREEDER DEVELOPMENT WOULD BE \$150 BILLION."

ECONOMICS + REACTOR, BREEDER + REACTOR, LMFBR

126908

STARR C
NUCLEAR POWER AND WEAPONS PROLIFERATION - THE THIN LINK
ELECTRIC POWER RESEARCH INST.
4 PPS, 2 TABS, NUCLEAR NEWS, 20(8), PP. 54-57 (JUNE 1977)

IT IS CERTAIN THAT NEITHER THE UNITED STATES NOR THE REST OF THE WORLD HAS THE CHOICE OF SEVERLY LIMITING NUCLEAR POWER, AND THAT THE REPROCESSING TECHNOLOGY AND BREEDER ISSUES HAVE ONLY A THIN AND CONTROLLABLE LINK TO PROLIFERATION. IT IS A DISSERVICE TO THE PEOPLE OF THE UNITED STATES-- AND TO THE PEOPLE OF THE WORLD--TO CREATE THE ILLUSION THAT BY PUTTING RESTRICTIONS ON CIVILIAN NUCLEAR POWER WE HAVE SOMEHOW SOLVED THE PROLIFERATION PROBLEM. ONE MAY ASK WHO WOULD BENEFIT FROM SUCH A POLICY? THE OIL-EXPORTING NATIONS, OF COURSE, AND THOSE NATIONS THAT ARE CONTINUING TO DEVELOP ALL THEIR NUCLEAR POWER OPTIONS WITHOUT RESTRICTION. THE SAFEST PLACE FOR PLUTONIUM IS TO BURN IT IN A POWER REACTOR.

PROLIFERATION + REACTOR, BREEDER + FUEL CYCLE + FUEL, FOSSIL + PLUTONIUM + POWER PLANT, NUCLEAR

127515

CLINCH RIVER BREEDER REACTOR PLANT TECHNICAL REVIEW, SUMMER 1977
CLINCH RIVER BREEDER REACTOR PLANT PROJECT OFFICE, JAK RIDGE, TENN.
CRBRP-PMC-77-03 +. 45 PPS, 1977

CONTAINS ARTICLES ON THE FOLLOWING TOPICS: RADIATION PROTECTION/SHIELD DESIGN - A NEED FOR A SYSTEMS APPROACH, MEETING U.S. ELECTRICAL NEEDS - IS THE BREEDER URGENT?, IRRADIATION EFFECTS AND DESIGN OF LMFBR PERMANENT REACTOR STRUCTURES, AND DETECTION OF LIQUID METAL LEAKS IN LMFBRs.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REACTOR, LMFBR + *CLINCH RIVER (LMFBR) + *DESIGN CRITERIA + SHIELDING + SUPPORT STRUCTURE + RADIATION EFFECT + LEAK DETECTION + JACOBS

128413

ROTELAT J
NUCLEAR REACTORS - TO BREED OR NOT TO BREED
123 PPS, A PUGWASH DEBATE ON FAST BREEDER REACTORS; ROYAL SOCIETY, LONDON, SEPT. 28, 1976. BOOK PUBLISHED BY TAYLOR & FRANCIS LTD., LONDON, 1977

A COMPENDIUM OF PAPERS PRESENTED AT THE PUGWASH DEBATE ON FAST BREEDER REACTORS HELD IN LONDON ON SEPT. 28, 1976. TOPICS COVERED INCLUDED THE FOLLOWING: NUCLEAR POWER AND THE ENVIRONMENT (THE FLOWER'S REPORT), THE ENERGY CASE FOR THE FAST BREEDER, THE SAFETY OF THE FAST BREEDER, PROCESSING AND REPROCESSING OF FUEL, RADIOACTIVE WASTE MANAGEMENT IN THE UK, DIVERSION OF PLUTONIUM, AND PROLIFERATION OF NUCLEAR WEAPONS.

REACTOR, LMFBR + *REACTOR, FAST + *N-POWER, SAFETY OF + UNITED KINGDOM + FUEL REPROCESSING + WASTE MANAGEMENT + PLUTONIUM + THEFT/DIVERSION + PROLIFERATION

128622

KAPLAN G
EUROPE: TILTING TOWARD FUSION - TODAY THE FRENCH PHENIX BREEDER SCORES WELL; TOMORROW, FUSION SEEMS THE BYWORD
5 PPS, IEEE SPECTRUM, 13(12), PP. 37-41 (DEC. 1976)

BOTH FRANCE AND THE UNITED KINGDOM HAVE CONTINUED TO PLAY AN ACTIVE ROLE IN DEVELOPING NUCLEAR TECHNOLOGY. THIS ARTICLE SUMMARIZES THE PRESENT STATUS OF SEVERAL KEY ASPECTS OF NUCLEAR POWER IN THESE COUNTRIES: WHAT ARE THE PRESENT TARGETS OF THESE PROGRAMS, AND THE GUIDING POLICIES, IF ANY, FOR SELECTING THE TYPES OF REACTORS INVOLVED? WHAT IS THE STATUS OF ADVANCED FISSION TECHNOLOGY--NAMELY, OF BREEDER REACTORS? WHAT IS BEING DONE IN THE AREA OF DEVELOPING TECHNOLOGY

128622 *CONTINUED*

FOR THE SAFE DISPOSAL OF HIGHLY RADIOACTIVE NUCLEAR WASTES? WHAT PROGRESS HAS BEEN MADE TOWARD THE GENERATION OF ELECTRICITY BY NUCLEAR FUSION (THERMONUCLEAR) REACTIONS?

UNITED KINGDOM + FRANCE + POWER PLANT, NUCLEAR + R AND D PROGRAM + REACTOR, BREEDER + PHENIX (LMFBR)

128881

FLOWER POWER--WILL A NUCLEAR POWER SLOWDOWN IN BRITAIN HELP ANYONE?
1 PG, ELECTRICAL REVIEW, 199(13), PG. 15 (OCT. 1, 1976)

THE FLOWERS REPORT ON "NUCLEAR POWER AND THE ENVIRONMENT," IS DISAPPOINTING IN THAT IT MIXES FACT AND OPINION; SOME EXPERT AND SOME NOT SO EXPERT. THE REPORT SAYS THAT OPERATION OF EXISTING THERMAL REACTORS AND THOSE THAT ARE BEING INSTALLED OR CONSIDERED ARE NOT AN UNACCEPTABLE HAZARD WHEN JUDGED AGAINST THE BENEFITS. THE COMMISSION IS OPPOSED TO THE NEXT STAGE OF FAST BREEDER REACTOR DEVELOPMENT BECAUSE IT IS SO EXPENSIVE AND COULD BRING IN THE "PLUTONIUM ECONOMY." A COUNTRY SITUATED AS BRITAIN CANNOT ESCAPE THE HAZARDS OF THE "PLUTONIUM ECONOMY" BY LONE ABSTENTION. HALTING THE DEVELOPMENT OF ATOMIC ENERGY WILL INCREASE THE RATE OF DEPLETION OF FOSSIL FUELS WHICH COULD LEAD TO A GREATER CATASTROPHE THAN ALL THE DIRE CONSEQUENCES PREDICTED BY THE ANTI-NUKES.

ENERGY + POWER PLANT, NUCLEAR + ECONOMICS + PLUTONIUM + REACTOR, FAST + REACTOR, BREEDER

129524

URANIUM INDUSTRY BALKS AT KICK FROM CARTER
2 PPS, ELECTRICAL REVIEW, 201(4), PP. 16-17 (JULY 22, 1977)

PRESIDENT CARTER'S POLICY WILL PREVENT REPROCESSING OF NUCLEAR FUEL IN THE U.S. AND DISCOURAGE IT ELSEWHERE. IF CARTER'S POLICY IS STRONGLY ENFORCED OVER FIVE TO TEN YEARS, THERE WILL BE TWO MAJOR CONSEQUENCES: THE DEVELOPMENT OF FAST BREEDER REACTORS WILL BE SLOWED DOWN AND USERS OF URANIUM AS FUEL WILL NOT BE ABLE TO EXTRACT THE MAXIMUM POSSIBLE ENERGY FROM EACH UNIT OF URANIUM SUPPLIED. THIS WILL TEND TO MAKE NUCLEAR ENERGY MORE EXPENSIVE. THE URANIUM PRODUCERS FEAR THAT THESE EXTRA COSTS WILL MAKE THE NUCLEAR OPTION EVEN LESS ATTRACTIVE THAN IT IS ALREADY.

URANIUM + INDUSTRY, NUCLEAR + RESOURCE, NATURAL + REACTOR, BREEDER

2. SITING OF NUCLEAR FACILITIES

126678

LEFEVRE JC + LIVOLANT M + LUCNET G
SEISMIC ANALYSIS FOR THE SUPER-PHENIX REACTOR
COMMISSARIAT A L'ENERGIE ATOMIQUE + ELECTRICITE DE FRANCE
CONF-761001(VOL. 1) +. 13 PPS, PP. 180-92 OF THE PROCEEDINGS OF THE INTERNATIONAL MEETING ON FAST REACTOR
SAFETY AND RELATED PHYSICS; CHICAGO, ILL., OCT. 5-8, 1976

THE SEISMIC ANALYSIS PERFORMED FOR SUPER-PHENIX IS PRESENTED IN THIS PAPER. THE ANALYSIS CONSISTS
ESSENTIALLY OF: SELECTING REFERENCE GROUND MOTIONS BASED ON THE SEISMIC RISKS AT THE SITE;
ESTABLISHING GENERAL EARTHQUAKE SAFETY CRITERIA; STUDYING THE RESPONSE OF BUILDINGS, SYSTEMS AND
COMPONENTS, USING THE MOST APPROPRIATE METHODS; AND ESTABLISHING DESIGN AND ACCEPTANCE CRITERIA
IN ORDER TO VERIFY THE VALIDITY OF THE CONCEPTION AND THE RELIABILITY OF THE EQUIPMENT.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*SUPERPHENIX (LMFBR) + REACTOR, LMFBR + *SEISMIC DESIGN + SEISMOLOGY + EARTHQUAKE ENGINEERING + SAFETY ANALYSIS

127604

REDDY DP
SEISMIC SOIL/STRUCTURE INTERACTION ANALYSIS GUIDELINES, VOLUME I - ANALYSIS TECHNIQUES
AGABIAN ASSOCIATES, EL SEGUNDO, CALIF.
SAN/1011-110 +. 152 PPS, 6 TABS, 38 FIGS, REFS, APRIL 16, 1976

THIS REPORT IS VOLUME I OF A THREE-VOLUME SERIES THAT PROVIDES GUIDELINES FOR PERFORMING DYNAMIC
SEISMIC SOIL/STRUCTURE INTERACTION ANALYSES OF LMFBR FACILITIES. THIS VOLUME SUMMARIZES THE
REQUIREMENTS FOR DYNAMIC SEISMIC ANALYSES. BASIC STATE-OF-THE-ART MATHEMATICAL MODELING
PROCEDURES ARE DISCUSSED, AND THE FUNDAMENTAL MATHEMATICAL AND MECHANICS RELATIONSHIPS USED IN
MAKING DYNAMIC ANALYSES WITH MODERN LARGE CAPACITY COMPUTER PROGRAMS ARE SUMMARIZED. PROCEDURES
FOR OBTAINING MASS, STIFFNESS, AND DAMPING MATRICES THAT APPEAR IN THE BASIC EQUATIONS OF MOTION
ARE REVIEWED AND SOLUTION METHODS BY MODAL ANALYSIS, DIRECT INTEGRATION, FOURIER TRANSFORMS, AND
FOSS' METHOD ARE DISCUSSED. A SUMMARY OF THE BASIC CONCEPTS USED IN FINITE ELEMENT SOLUTIONS BY
THE DISPLACEMENT METHOD IS PROVIDED, AND THE TYPES OF ELEMENTS AVAILABLE, MATERIAL
REPRESENTATIONS, AND THE TECHNIQUES OF PROVIDING ENERGY ABSORBING BOUNDARIES ARE DESCRIBED.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62,
OAK RIDGE, TENN. 37830

INTERACTION, SOIL AND STRUCTURE + REACTOR, LMFBR + SEISMIC DESIGN + *STRUCTURAL ANALYSIS, DYNAMIC + JACOBS

3. TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS

124041
FIELDS SR
SPENT FUEL SHIPPING CASK ACCIDENT EVALUATION
HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
HEDL-TME 75-138 +. 382 PPS, DEC. 1975

MATHEMATICAL MODELS HAVE BEEN DEVELOPED TO SIMULATE THE DYNAMIC BEHAVIOR, FOLLOWING A HYPOTHETICAL ACCIDENT AND FIRE, OF TYPICAL CASKS DESIGNED FOR THE RAIL SHIPMENT OF SPENT FUEL FROM NUCLEAR REACTORS, AND TO DETERMINE THE EXTENT OF RADIOACTIVE RELEASES UNDER POSTULATED CONDITIONS. THE CASKS MODELED WERE THE IF-300, DESIGNED BY GENERAL ELECTRIC FOR THE SHIPMENT OF SPENT LWR FUEL, AND A CASK DESIGNED BY THE AEROJET MANUFACTURING COMPANY FOR THE SHIPMENT OF SPENT LMFBR FUEL.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

JACOBS + *ANALYTICAL MODEL + *SHIPPING CONTAINER + ACCIDENT ANALYSIS + FIRE PROTECTION + RADIOACTIVITY RELEASE + FUEL, NUCLEAR + REACTOR, LWR + REACTOR, LMFBR + TRANSPORTATION AND HANDLING + *ACCIDENT, TRANSPORTATION + TRAIN

127612
DUPREE SA + SCHMIDT WH
LMFBR SPENT-FUEL CHARACTERIZATION FOR SHIPPING-CASK APPLICATION
SANDIA LABS., ALBUQUERQUE, N.M.
SAND-76-0602 +. 75 PPS, 20 TABS, 16 FIGS, 18 REFS, MAY 1977

THE RESULTS PRESENTED IN THIS REPORT DO NOT CONSTITUTE A COMPLETE DATA BASE FOR LMFBR SPENT-FUEL SHIPPING-CASK DESIGN. A REASONABLE SELECTION OF REACTOR DESIGNS HAS BEEN EXAMINED, HOWEVER, AND DECAY SOURCES HAVE BEEN CALCULATED BY USING ONE OF THE MAJOR GENERALLY AVAILABLE CALCULATIONAL TOOLS FOR ANALYZING REACTOR SPENT FUEL. THE COMPARISONS MADE WITH OTHER DATA INDICATE THAT THE RESULTS ARE CONSISTENT WITH OTHER PREDICTIONS FOR THE SAME OR SIMILAR REACTOR FUEL. THEREFORE, USE OF THESE DATA AS PRELIMINARY GUIDELINES FOR CASK ANALYSES WOULD SEEM TO BE JUSTIFIED.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

TRANSPORTATION AND HANDLING + *REACTOR, LMFBR + COMPUTER PROGRAM + *SHIPPING CONTAINER + *DESIGN CRITERIA + DECAY HEAT + JACOBS

5. HEAT TRANSFER AND THERMAL HYDRAULICS

120341

WILHELM D

CONTRIBUTION TO TRANSIENT ANALYSES OF GAS COOLED FAST BREEDER REACTORS WITH DIGITAL COMPUTER CODES (IN GERMAN)
KERNFORSCHUNGSZENTRUM KARLSRUHE, F.R. GERMANY
KFK-2299 +. 93 PPS, 34 FIGS, JUNE 1976

TWO COMPUTER CODES, PHAETON 1 AND PHAETON 2 ARE USED TO CALCULATE DEPRESSURIZATION AND FLOW
COASTDOWN IN TWO HELIUM COOLED FAST BREEDER REACTORS. ONE OF THE REACTORS HAS DIRECT COOLING
LOOPS WITH HELIUM TURBINES. THE OTHER SECONDARY STEAM LOOPS ATTACHED TO THE PRIMARY LOOPS. THE
FIRST PART OF THE REPORT DESCRIBES MODELS, CORRELATIONS AND METHODS OF BOTH CODES, WHILE THE
SECOND PART DISCUSSES THE RESULTS OF TRANSIENT ANALYSES.

AVAILABILITY - INIS SECTION, INTERNATIONAL ATOMIC ENERGY AGENCY, P.O. BOX 590, A-1011 VIENNA, AUSTRIA

*REACTOR, GCFR + REACTOR, BREEDER + COMPUTER PROGRAM + COMPUTER PROGRAM, DIGITAL + *ACCIDENT, LOSS OF PRESSURE
+ ACCIDENT, LOSS OF FLOW + TRANSIENT + PRESSURE TRANSIENT + TEMPERATURE GRADIENT

120349

FOUST OJ

SODIUM-NAK ENGINEERING HANDBOOK - VOLUME II - SODIUM FLOW, HEAT TRANSFER, INTERMEDIATE HEAT EXCHANGERS, AND
STEAM GENERATORS
LIQUID METAL ENGINEERING CENTER, CALIF.

390 PPS, BOOK PUBLISHED BY GORDON & BREACH SCIENCE PUBLISHERS INC., N.Y., 1976

THIS HANDBOOK, COMPRISED OF FIVE VOLUMES, IS INTENDED FOR USE BY PRESENT AND FUTURE DESIGNERS IN
THE LMFBR PROGRAM AND BY THE ENGINEERING AND SCIENTIFIC EXCHANGERS, AND STEAM GENERATORS HIGH-
TEMPERATURE SODIUM AND NAK TECHNOLOGY. THE ARRANGEMENT OF SUBJECT MATTER PROGRESSES FROM A
TECHNOLOGICAL DISCUSSION OF SODIUM AND SODIUM-POTASSIUM ALLOY (NAK) TO DISCUSSIONS OF VARIOUS
CATEGORIES AND USES OF HARDWARE IN SODIUM AND NAK SYSTEMS. EMPHASIS IS PLACED ON SODIUM AND NAK
AS HEAT-TRANSPORT MEDIA; OTHER APPLICATIONS OF THESE METALS ARE TREATED IN THE FINAL VOLUME.
SEVERAL THOUSAND DOCUMENTS WERE REVIEWED IN ACCUMULATING AND COMPILING INFORMATION; THOSE
BELIEVED TO BE MOST VALUABLE ARE CITED AS REFERENCES. SUFFICIENT DETAIL IS INCLUDED FOR BASIC
UNDERSTANDING OF SODIUM AND NAK TECHNOLOGY AND OF TECHNICAL ASPECTS OF SODIUM AND NAK COMPONENTS
AND INSTRUMENT SYSTEMS. THE 4 MAJOR CHAPTERS OF THIS VOLUME DISCUSS FLUID MECHANICS OF LIQUID
METALS, LIQUID METAL HEAT TRANSFER, INTERMEDIATE HEAT EXCHANGERS, AND STEAM GENERATORS

*REACTOR, LMFBR + SODIUM + *NAK + *DATA COLLECTION + DESIGN CRITERIA + HEAT TRANSFER + INSTRUMENT, FLUIDICS +
*METAL, LIQUID + HEAT EXCHANGERS + STEAM GENERATOR

120963

BAKER L + GABOR JD + SOWA ES + CHASANOV MG

POSTACCIDENT HEAT REMOVAL TECHNOLOGY

ARGONNE NATIONAL LAB., ILL.

ANL/RAS 77-2 +. 198 PPS, JAN. 1977

THIS IS THE FIFTH IN A SERIES OF REPORTS SUMMARIZING THE POSTACCIDENT HEAT REMOVAL (PAHR) PROGRAM
AT ARGONNE, WHICH CONCERNS THE BEHAVIOR OF THE HEAT-GENERATING CORE DEBRIS FOLLOWING HYPOTHETICAL
CORE-DISRUPTIVE ACCIDENTS (HCDA) FOR BOTH LIQUID METAL FAST BREEDER REACTORS (LMFBRs) AND GAS-
COOLED FAST BREEDER REACTORS (GCFRs). THE ANL PAHR PROGRAM HAS THREE PARTS: ANALYSES AND
PHENOMENOLOGICAL MODELING, OUT-OF-PILE EXPERIMENTS WITH REALISTIC MATERIALS, AND BASIC
EXPERIMENTS WITH SIMULANT MATERIALS TO TAKE ADVANTAGE OF EXPERIMENTAL SIMPLICITY AND ECONOMY SO
AS TO DEVELOP A FUNDAMENTAL UNDERSTANDING OF KEY PROCESSES.

REACTOR, LMFBR + REACTOR, GCFR + ACCIDENT, CORE DISRUPTIVE + OUT OF PILE EXPERIMENT + FLOW BLOCKAGE + FUEL
MELTDOWN + CONCRETE + ANL + JACOBS

121327

RELIABILITY PROGRAM FOR SHUTDOWN HEAT REMOVAL

GENERAL ELECTRIC CO., SUNNYVALE, CALIF.

GEAP-14045-5 +. 21 PPS, 8 TABS, 9 REFS, JUNE 1976

THE FIFTH QUARTERLY REPORT DESCRIBES LMFBR SHUTDOWN HEAT REMOVAL SYSTEMS RELIABILITY ACTIVITIES
FOR THE PERIOD BEGINNING IN MARCH 1976, AND ENDING IN MAY 1976. ACTIVITIES REPORTED INCLUDE
COMPLETION OF COMMON CAUSE FAILURE ANALYSIS FOR CLINCH RIVER BREEDER REACTOR PLANT SHUTDOWN HEAT
REMOVAL SYSTEMS, AND COMPLETION OF THE RELIABILITY ALLOCATION AND APPORTIONMENT FOR LMFBR
SHUTDOWN HEAT REMOVAL SYSTEMS. IN ADDITION, A SUPPLEMENT TO THE PRIMARY PIPE INTEGRITY STATUS
REPORT FOR CRBRP WAS PREPARED DURING THIS REPORT PERIOD.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62,
OAK RIDGE, TENN. 37830

*RELIABILITY, SYSTEM + REACTOR, LMFBR + CLINCH RIVER (LMFBR) + *SHUTDOWN COOLING SYSTEM + FAILURE, COMMON MODE
+ JACOBS + RELIABILITY ANALYSIS

121735

HORN HE

MEASUREMENT OF THE ENERGY DISTRIBUTION OF THE GAMMA FIELD IN A FAST REACTOR

KARLSRUHE NUCLEAR RESEARCH CENTER, F.R. GERMANY

121735 *CONTINUED*
EURFNR-1316 +. 45 PPS, 2 TABS, NOV. 1975 (TRANSLATION OF KFK-2211)

SI (LI) SEMICONDUCTOR DETECTORS WERE USED TO MEASURE THE ENERGY DISTRIBUTION OF THE GAMMA FIELD IN THE KARLSRUHE FAST ZERO-POWER FACILITY SNEAK WITH THE HELP OF COMPTON ELECTRON SPECTRUM REGISTERED WITH THE DETECTORS. THE METHOD WAS CHECKED BY COMPARING MEASURED GAMMA-ATTENUATION COEFFICIENTS OF DIFFERENT MATERIALS WITH THE VALUES KNOWN FROM LITERATURE. THE SPECTRA OF TWO ASSEMBLIES (ONE WITH URANIUM, THE OTHER WITH PLUTONIUM FUEL) WITH COMPOSITIONS SIMILAR TO FAST SODIUM COOLED BREEDER REACTORS WERE MEASURED IN THE CORE AND IN THE BLANKET. IN ADDITION THE GAMMA-SPECTRUM IN A LITHIUM SPHERE INDUCED BY 14 MEV NEUTRONS WAS DETERMINED.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

SPECTROMETRY, GAMMA + ANALYTICAL TECHNIQUE + JACOBS + REACTOR, BREEDER + REACTOR, LMFBR + SODIUM + URANIUM + PLUTONIUM + LITHIUM

122103
CASTLE J + CATTON, I. + SOMERTON C. + WU R
LMFBR FUEL ANALYSIS TASK B: POST-ACCIDENT HEAT REMOVAL. FINAL REPORT JULY 1, 1975-SEPTEMBER 30, 1976
UNIVERSITY OF CALIFORNIA, LOS ANGELES (PREPARED FOR NRC)
NUREG-0147 + UCLA-ENG-76115 +. 81 PPS, 7 TABS, 15 FIGS, JAN. 1977

THE SUBJECT OF THIS REPORT DEALS WITH THE BEHAVIOR OF MOLTEN CORE DEBRIS FOLLOWING A HYPOTHETICAL CORE DISRUPTIVE ACCIDENT IN THE PROPOSED CRBRP. HEAT DISSIPATING CHARACTERISTICS OF AN EX-VESSEL SACRIFICIAL BED HAVE BEEN ANALYZED. A NOVEL FORM OF HEAT TRANSFER, ANALOGOUS TO FILM BOILING, HAS BEEN PROPOSED TO DESCRIBE HEAT TRANSFER FROM A HEAT GENERATING POOL TO SURROUNDING STEEL WALLS. BOUNDING TYPE HEAT TRANSFER CALCULATIONS ARE ALSO MADE TO QUANTIFY SUCH HYPOTHETICAL ACCIDENT CHARACTERISTICS AS DEBRIS BED REMELTING, DEBRIS BED DRYOUT IN SODIUM AND FAILURE OF THE REACTOR CAVITY STEEL LINER.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

JACOBS + REACTOR, LMFBR + BEHAVIOR + MOLTEN FUEL + *CORE MELTDOWN + *ACCIDENT, CORE DISRUPTIVE + HEAT TRANSFER + *THERMODYNAMICS + THERMAL ANALYSIS + CLINCH RIVER (LMFBR) + HEAT TRANSFER ANALYSIS

122799
LORENZ JJ + GINSBERG T
COOLANT MIXING AND SUBCHANNEL VELOCITIES IN AN LMFBR FUEL ASSEMBLY
ARGONNE NATIONAL LAB., ILLINOIS + BROOKHAVEN NATIONAL LAB., UPTON, N.Y.
12 PPS, 13 FIGS, 10 REFS, NUCLEAR ENGINEERING & DESIGN, 40(2), PP. 315-26 (FEB. 1977)

EXPERIMENTAL MIXING STUDIES WERE CONDUCTED USING WATER WITH A 91-PIN WIRE-WRAPPED FUEL ASSEMBLY TO ESTABLISH A DATA BASE FOR CALIBRATING THERMAL-HYDRAULIC CODES AND TO SUPPLEMENT AND CLARIFY EXISTING MIXING DATA. AN ELECTROLYTIC TRACER WAS EMPLOYED IN CONJUNCTION WITH AN ISOKINETIC SAMPLING TECHNIQUE WHICH PERMITTED MIXED MEAN SUBCHANNEL CONCENTRATIONS AND FLOWRATES TO BE MEASURED WITHOUT INCURRING ERRORS RESULTING FROM LOCAL SUBCHANNEL GRADIENTS. EMPHASIS WAS PLACED UPON THE BEHAVIOR OF PERIPHERAL SUBCHANNELS. A COMPLETE SET OF MIXING DATA WAS OBTAINED WHICH CAN BE USED TO CALIBRATE THERMAL-HYDRAULIC CODES.

REACTOR, LMFBR + OUT OF PILE EXPERIMENT + FLOW THEORY AND EXPERIMENTS + SUBCHANNEL ANALYSIS + COMPUTER PROGRAM, DIGITAL + COMPARISON, THEORY AND EXPERIENCE + ANL + FLOW DISTRIBUTION + FLOW, CROSS

122810
FISCHER AK + LO RK + BARTS EW
FUEL DYNAMICS LOSS-OF-FLOW TEST L3 (FINAL REPORT)
ARGONNE NATIONAL LAB., ILLINOIS
ANL-76-79 +. 90 PPS, 10 TABS, 89 FIGS, JUNE 1976

THE BEHAVIOR OF FTR-TYPE, MIXED-OXIDE, PREIRRADIATED, 'INTERMEDIATE-POWER-STRUCTURE' FUEL DURING A SIMULATION OF AN FTR LOSS-OF-FLOW ACCIDENT WAS STUDIED IN THE MARK-IIA INTEGRAL TREAT LOOP. ANALYSIS OF THE DATA REPORTED HERE LEADS TO A POSTULATED SCENARIO (SEQUENCE AND TIMING) OF EVENTS IN THE TEST. THIS SCENARIO IS PRESENTED, TOGETHER WITH THE CALCULATED TIMING OF EVENTS OBTAINED BY USE OF THE SAS CODE.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REACTOR, LMFBR + IN PILE EXPERIMENT + ACCIDENT, CORE DISRUPTIVE + ACCIDENT, LOSS OF FLOW + FUEL MELTDOWN + REACTOR, TEST + ANL + COMPUTER PROGRAM, DIGITAL + COMPARISON, THEORY AND EXPERIENCE + JACOBS

124281
GASSER RD + KAZIMI MS
A STUDY OF POST-ACCIDENT MOLTEN FUEL DOWNWARD STREAMING THROUGH THE AXIAL SHIELD STRUCTURE IN THE LIQUID METAL FAST BREEDER REACTOR
BROOKHAVEN NATIONAL LAB., UPTON, N.Y.
12 PPS, 11 FIGS, 21 REFS, NUCLEAR TECHNOLOGY, 33(3), PP. 248-59 (MAY 1977)

A TWO-DIMENSIONAL TRANSIENT FREEZING MODEL IS DEVELOPED TO STUDY THE DYNAMICS OF SOLIDIFICATION OF A FLUID FLOWING IN A CYLINDRICAL CHANNEL, THE WALLS OF WHICH ARE COOLED BELOW THE FREEZING TEMPERATURE OF THE FLUID. THE MODEL IS APPLIED TO THE CASE OF MOLTEN FUEL FLOWING DOWNWARD

124281 *CONTINUED*

THROUGH THE COOLANT CHANNELS IN THE LOWER SHIELDING STRUCTURE OF CURRENT LIQUID-METAL FAST BREEDER REACTOR DESIGNS SUBSEQUENT TO A HYPOTHETICAL CORE MELTDOWN ACCIDENT. THE RESULTS INDICATE THAT UNDER POST-ACCIDENT CONDITIONS, A HIGH POTENTIAL EXISTS FOR RAPID RELOCATION OF SIGNIFICANT QUANTITIES OF CORE DEBRIS ACROSS THE SHIELD STRUCTURE.

REACTOR, LMFBR + ACCIDENT, CORE DISRUPTIVE + FUEL MELTDOWN + CORE MELTDOWN + ANALYTICAL MODEL + COMPARISON, THEORY AND EXPERIENCE

124787

LINZ DG + WANTLAND JL
TEMPERATURE DISTRIBUTION IN THE DUCT WALL OF 19-PIN SIMULATED LMFBR FUEL ASSEMBLIES
OAK RIDGE NATIONAL LAB., TENN.
ORNL/TM-5763 +. 43 PPS, 23 FIGS, 10 REFS, APRIL 1977

AN INVESTIGATION OF THE TEMPERATURE DISTRIBUTION IN THE DUCT WALL OF 19-PIN SIMULATED LIQUID-METAL FAST BREEDER REACTOR (LMFBR) FUEL ASSEMBLIES. THE TEST BUNDLES USED ARE ASSEMBLIES OF ELECTRIC FUEL PIN SIMULATORS HAVING THE SAME EXTERNAL CONFIGURATION, SPACER ARRANGEMENT, TEMPERATURE, AND HEAT FLUX AS TYPICAL LMFBR FUEL PINS. THE BUNDLES ARE CONTAINED IN A HEXAGONAL DUCT THAT IS INSTRUMENTED FOR TEMPERATURE MEASUREMENT AT SPECIFIC LOCATIONS. RESULTS SHOWED THAT THE SWIRL FLOW INDUCED BY THE WIRE-WRAP SPACERS IN THE DUCT PERIPHERY AND THE DISTANCE BETWEEN THE EDGE PINS AND THE DUCT WALL (WHICH CAN VARY DUE TO PIN BOWING) SIGNIFICANTLY INFLUENCED THE TEMPERATURE DISTRIBUTION IN THE DUCT WALL.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

REACTOR, LMFBR + THERMAL EXPERIMENT + HYDRAULIC EXPERIMENT + OUT OF PILE EXPERIMENT + FLOW, MIXING + SODIUM + ORNL + FLOW DISTRIBUTION + JACOBS + FLOW THEORY AND EXPERIMENTS

125258

KAZIMI MS + CARELLI MD
HEAT TRANSFER CORRELATION FOR ANALYSIS OF CRBRP ASSEMBLIES
WESTINGHOUSE ELECTRIC CORP., MADISON, PA.
CRBRP-ARD-0034 +. 21 PPS, NOV. 1976

AN INVESTIGATION WAS PERFORMED TO ASSESS THE ADEQUACY OF THE CORRELATIONS CURRENTLY USED TO DESCRIBE THE HEAT TRANSFER COEFFICIENT TO SODIUM FLOWING IN CRBRP ASSEMBLIES IN LIGHT OF THE EXPERIMENTAL DATA ACQUIRED AFTER 1969. THE AVAILABLE EXPERIMENTAL DATA FOR BUNDLES WITH P/D RATIOS OF 1.05 TO 1.3 AND THE RELEVANT HEAT TRANSFER CORRELATIONS ARE DESCRIBED. CORRELATIONS FOR CRBR FUEL, RADIAL BLANKET AND CONTROL ASSEMBLIES ARE RECOMMENDED.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

HEAT TRANSFER COEFFICIENT + HEAT TRANSFER, CONVECTION + REACTOR, LMFBR + CLINCH RIVER (LMFBR) + CORRELATION + JACOBS

126688

WEBER DP + GANAPOL BD
MULTI-FIELD HYDRODYNAMIC DISASSEMBLY CALCULATIONS WITH SPACE-TIME KINETICS: FX2/VENUS-III
ARGONNE NATIONAL LAB., ILL.
CONF-761001(VOL.III) +. 9 PPS, PP. 1244-52 OF THE PROCEEDINGS OF THE INTERNATIONAL MEETING ON FAST REACTOR SAFETY AND RELATED PHYSICS; CHICAGO, ILL., OCT. 5-8, 1976

THE DEVELOPMENT OF COMPUTER CODES WHICH ANALYZE THE HYDRODYNAMICS, NEUTRONICS, AND THERMODYNAMICS OF HYPOTHETICAL LMFBR DISASSEMBLY STARTING WITH THE LAGRANGIAN 2-D HYDRODYNAMICS CODE VENUS AND EXTENDING TO THE EULERIAN HYDRODYNAMICS CODE FX2/VENUS-III RM WHICH INCLUDES TREATMENT OF MULTI-FIELD MOTIONS AS WELL AS SPACE-TIME KINETICS ARE REVIEWED. THE PHYSICAL ASSUMPTIONS THAT FORM THEIR BASIS ARE INDICATED AND THE DIFFERENCES IN SOLUTION TECHNIQUE ARE ILLUSTRATED. PRIMARY EMPHASIS IS GIVEN TO THE DESCRIPTION OF THE EULERIAN CODE DEVELOPMENT WITH INDICATIONS OF THE CAPABILITIES OF IMPLICIT DIFFERENCING, THE NECESSITY OF TRACKING GENERIC FUEL TYPES, THE EFFECT OF RELATIVE MOTION, AND THE ROLE OF SPACE-TIME KINETICS. SEVERAL EXAMPLES AND COMPARISONS OF CODES ARE GIVEN FOR FTR AND 1000 MW(E) DESIGNS.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

HYDRODYNAMIC ANALYSIS + REACTOR, LMFBR + ACCIDENT, CORE DISRUPTIVE + ACCIDENT, HYPOTHETICAL

126864

SHIRE PF
SODIUM SPRAY RELEASE ACCIDENT ANALYSIS FOR FAST REACTOR SAFETY STUDIES
HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
HEDL-SA-1102-FP + CONF-761001-34 +. 17 PPS, FROM INTERNATIONAL MEETING ON FAST REACTOR SAFETY AND RELATED PHYSICS; CHICAGO, ILL., OCT. 5-8, 1976

A COMPUTER CODE HAS BEEN DEVELOPED TO MODEL THE EFFECTS OF POSTULATED SODIUM SPRAY RELEASE FROM LMFBR PIPING. THE CALCULATION METHOD UTILIZES GAS CONVECTION AND DROPLET COMBUSTION THEORY TO CALCULATE THE PRESSURE AND TEMPERATURE EFFECTS IN A RANGE OF 0-2% OXYGEN. DROPLET MOTION AND

126864 *CONTINUED*

LARGE AGGREGATE SODIUM SURFACE AREA RESULT IN RAPID RELEASE OF COMBUSTION AND SENSIBLE HEAT CAUSING A NEARLY ADIABATIC PRESSURE PULSE PEAKING IN A MATTER OF SECONDS. THIS ANALYTICAL TOOL HAS INDICATED GOOD AGREEMENT WITH PROTOTYPIC TEST DATA FOR A RANGE OF OXYGEN CONCENTRATION, CELL VOLUMES AND DROPLET SIZES.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

ACCIDENT ANALYSIS + ACCIDENT MODEL + REACTOR, LMFBR + SODIUM + FIRE + FAILURE, PIPE + COMPUTER PROGRAM, DIGITAL + COMPARISON, THEORY AND EXPERIENCE

127684

COFFIELD RD + PLANCHON HP
LMFBR NATURAL CIRCULATION VERIFICATION PROGRAM (NCVP)
WESTINGHOUSE ELECTRIC CORP., MADISON, PA
WARD-NC-3045-1 +. 125 PPS, 9 TABS, 15 FIGS, JULY 1977

THE OBJECTIVE OF THE LMFBR NATURAL CIRCULATION VERIFICATION PROGRAM (NCVP) IS TO ANALYTICALLY AND EXPERIMENTALLY VERIFY NUMERICAL MODELS FOR THE DESCRIPTION OF THE THERMAL-HYDRAULIC BEHAVIOR OF LMFBR PLANTS WHEN MAKING TRANSITION OR TO OPERATING IN NATURAL CIRCULATION MODE. AFTER VARIOUS WORKING SESSIONS, IT HAS BEEN CONCLUDED BY RDD AND ARD THAT THE CODES TO BE VERIFIED BY THE NCVP WILL BE DEMO, FORE-2M, AND COBRA-IV (WHOLE CORE DYNAMIC VERSION). THE BASIS OF THIS SELECTION IS A STATE-OF-THE-ART REVIEW OF VARIOUS COMPUTER CODES. IT WAS CONCLUDED THAT NO CODE CURRENTLY AVAILABLE HAS ALL THE FEATURES NEEDED TO MEET THE PROGRAM OBJECTIVE.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

WESTINGHOUSE + R AND D PROGRAM + REACTOR, LMFBR + *THERMAL HYDRAULIC ANALYSIS + *COMPUTER PROGRAM + *QUALIFICATION + JACOBS + CIRCULATION, NATURAL

128006

SHERRY RR + ATCHESON DB
USERS MANUAL FOR THE BEHAVE-SST (STEADY STATE AND TRANSIENT) FUEL ROD MECHANICS PROGRAM
GENERAL ELECTRIC CO., SUNNYVALE, CALIF.
GEFR-00001 +. 425 PPS, 7 TABS, 30 FIGS, FEB. 1977

BEHAVE-SST CALCULATES THE STEADY STATE AND OVERPOWER TRANSIENT BEHAVIOR OF CLADDING, FUEL AND VOIDAGE IN OXIDE LMFBR FUEL RODS PRIOR TO CLADDING FAILURE. THE CODE CALCULATES THE STRESS, STRAIN, DISPLACEMENT AND TEMPERATURE FIELDS IN THE FUEL AND CLADDING. PROCESSES SIMULATED INCLUDE CRACKING OF FUEL, DILATION OF FUEL AND CLADDING AS A RESULT OF IRRADIATION EFFECTS AND THERMAL EXPANSION AND FUEL DENSIFICATION CAUSED BY BOTH STRESS AND DIFFUSION CONTROLLED PROCESSES.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

COMPUTER PROGRAM + *FUEL ROD + TEMPERATURE + CLADDING + THERMAL MECHANICAL EFFECT + RADIATION DAMAGE + REACTOR, LMFBR + TRANSIENT + DISTRIBUTION

128452

HAN JT
BLOCKAGES IN LMFBR FUEL ASSEMBLIES - A REVIEW OF EXPERIMENTAL AND THEORETICAL STUDIES
OAK RIDGE NATIONAL LAB., TENN.
ORNL/SM-5839 +. 143 PPS, 14 TABS, 115 FIGS, 53 REFS, SEPT. 1977

THIS IS A STATE-OF-THE-ART REPORT ON THE THERMAL-HYDRAULIC EFFECTS OF FLOW-CHANNEL BLOCKAGES IN LIQUID-METAL FAST BREEDER REACTOR (LMFBR) PIN BUNDLES. MOST OF THE EXPERIMENTAL AND THEORETICAL STUDIES FOR SIMULATING BLOCKAGES IN VARIOUS PROTOTYPE LMFBR FUEL ASSEMBLIES DONE IN THE UNITED STATES AND ABROAD THROUGH 1976 ARE PRESENTED AND SUMMARIZED. A BRIEF SUMMARY ON BLOCKAGE DETECTION IS INCLUDED.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

FLOW BLOCKAGE + REACTOR, LMFBR + OUT OF PILE EXPERIMENT + FLOW DISTRIBUTION + ORNL + JACOBS

128456

CHANG LK
THE PREDICTION OF TEMPERATURE DISTRIBUTION OF A SUBASSEMBLY INCLUDING INTERSUBASSEMBLY HEAT TRANSFER
ARGONNE NATIONAL LAB., ILL.
8 PPS, 2 TABS, 4 FIGS, 7 REFS, NUCLEAR ENGINEERING & DESIGN, 42(2), PP. 223-31 (JULY 1977)

A THREE-DIMENSIONAL THERMAL HYDRAULIC CODE, CLUSTER, HAS BEEN DEVELOPED IN ORDER TO PREDICT THE TEMPERATURE PROFILE IN A CLUSTER OF SEVEN SUBASSEMBLIES DURING STEADY STATE CONDITIONS. THE SUBASSEMBLIES UNDER CONSIDERATION INCLUDE BOTH PIN BUNDLE AND REFLECTOR TYPES OF SUBASSEMBLIES. AN IMPLICIT FINITE DIFFERENCE REPRESENTATION OF THE GOVERNING ENERGY EQUATION IS EMPLOYED. GOOD AGREEMENT WAS OBTAINED BETWEEN THE ANALYTICAL RESULTS AND THE MEASURED DATA.

COMPUTER PROGRAM, DIGITAL + THERMAL HYDRAULIC ANALYSIS + SUBCHANNEL ANALYSIS + REACTOR, LMFBR + COMPARISON,

128456 *CONTINUED*
THEORY AND EXPERIENCE

129502

ROYL P + KUCZERA B
ANALYSIS OF HYPOTHETICAL OVERPOWER ACCIDENTS IN THE SNR-300 MARK IA CORE WITH MODELING OF FAILURE INCOHERENCE
GESELLSCHAFT FUR KERNFORSCHUNG, KARLSRUHE, F.R. GERMANY
10 PPS, 3 TABS, 8 FIGS, 14 REFS, NUCLEAR ENGINEERING & DESIGN, 43(2), PP. 239-48 (SEPT. 1977)

INCOHERENCY EFFECTS DUE TO THE STATISTICAL NATURE OF FUEL ROD FAILURE HAVE BEEN ASSESSED FOR TRANSIENT OVERPOWER (TOP) ACCIDENTS WITH DIFFERENT INITIATING RAMP RATES. CHARACTERISTIC SINGLE SUBASSEMBLY FEEDBACKS FROM SODIUM VOIDING, FUEL INJECTION, AND FUEL SWEEP-OUT AFTER FAILURE WERE CALCULATED AND SUPERIMPOSED INCOHERENTLY. IT IS CONCLUDED FOR THE MILD TRANSIENT NEGATIVE FUEL SWEEP-OUT REACTIVITY FROM EARLY FAILED SUBASSEMBLIES WILL PREVENT THE ACCIDENT FROM REACHING A PROMPT CRITICAL STAGE AND LEAD TO A GRADUAL SHUTDOWN IF THE ASSESSED FAILURE INCOHERENCIES CAN CONSIDERABLY REDUCE THE POTENTIAL TO ACCUMULATE HIGH RAMP RATES IN THE INITIATING PHASE OF TOP ACCIDENTS.

REACTOR, LMFBR + ACCIDENT, CORE DISRUPTIVE + COMPUTER PROGRAM, DIGITAL + STATISTICAL ANALYSIS + ACCIDENT, CONSEQUENCES + GERMANY

129504

STRUWE D + BOTTONI M + FRIES W
THEORETICAL INTERPRETATION OF SCARABEE SINGLE PIN IN-PILE BOILING EXPERIMENTS
GESELLSCHAFT FUR KERNFORSCHUNG, KARLSRUHE, F.R. GERMANY
13 PPS, 2 TABS, 15 FIGS, 13 REFS, NUCLEAR ENGINEERING & DESIGN, 43(2), PP. 259-71 (SEPT. 1977)

IN THE FRAMEWORK OF LMFBR SAFETY ANALYSIS A THEORETICAL INTERPRETATION OF SOME OF THE MOST REPRESENTATIVE OF THE SINGLE PIN EXPERIMENTS OF THE IN-PILE SCARABEE PROJECT HAS BEEN PERFORMED FROM BOTH VIEWPOINTS OF THERMOHYDRAULIC AND FUEL BEHAVIOR USING THE COMPUTER CODES CAPRI-2 AND SATURN-1. THE ANALYSIS AIMED AT INVESTIGATING THE PIN BEHAVIOR FROM THE PREIRRADIATION HISTORY, THROUGH THE OBSERVED SEQUENCE OF EVENTS FOLLOWING A COOLANT MASS FLOW REDUCTION FROM BOILING INCEPTION UP TO PIN BREAKDOWN. A COMPARISON OF THEORETICAL RESULTS WITH EXPERIMENTALLY RECORDED DATA HAS ALLOWED A DEEPER INSIGHT INTO THE PECULIAR FEATURES OF THE EXPERIMENTS AND ENABLED A VALUABLE CODE VERIFICATION.

REACTOR, LMFBR + SODIUM + BOILING + COMPUTER PROGRAM, DIGITAL + COMPARISON, THEORY AND EXPERIENCE + IN PILE EXPERIMENT + THERMAL HYDRAULIC ANALYSIS + GERMANY + ACCIDENT, LOSS OF FLOW + FLOW, TWO PHASE

129506

KAISER A + PEPPLER W
SODIUM BOILING EXPERIMENTS IN A SEVEN-PIN BUNDLE: FLOW PATTERNS AND TWO PHASE PRESSURE DROP
GESELLSCHAFT FUR KERNFORSCHUNG, KARLSRUHE, F.R. GERMANY
8 PPS, 2 TABS, 4 FIGS, 10 REFS, NUCLEAR ENGINEERING & DESIGN, 43(2), PP. 285-93 (SEPT. 1977)

TWO SERIES OF QUASI-STEADY STATE SODIUM BOILING EXPERIMENTS HAVE BEEN CARRIED OUT IN AN ELECTRICALLY HEATED SEVEN-PIN BUNDLE. THE TEST PROCEDURE INVOLVED THE GRADUAL REDUCTION OF MASS FLOW RATE THROUGH THE BUNDLE IN A SIMULATION OF THE CONSEQUENCES OF A SLOWLY GROWING BLOCKAGE IN THE LOWER PART OF A REACTOR SUBASSEMBLY. THE RESULTS OBTAINED PROVIDE INFORMATION ON FLOW REGIMES IN THE TWO-PHASE REGION, VAPOR QUALITIES AND FLOW RATES AT WHICH COOLING OF THE BUNDLE CAN BE EFFECTIVELY MAINTAINED, AND THE ULTIMATE INCIDENCE OF DRYOUT. A RELATION FOR THE TWO-PHASE PRESSURE DROP MULTIPLIER OBTAINED FROM ADIABATIC PRESSURE DROP MEASUREMENTS IN THIS GEOMETRY IS GIVEN.

REACTOR, LMFBR + SODIUM + BOILING + FLOW, TWO PHASE + FLOW BLOCKAGE + OUT OF PILE EXPERIMENT + PRESSURE DROP + GERMANY

129518

MILLBURG ML + HASSBERGER JA + BOASSO CJ
NATURAL CIRCULATION HEAT TRANSFER TESTING WITH A SIMULATED FULL-SCALE LMFBR 217-PIN ELECTRICALLY HEATED FUEL ASSEMBLY
HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
HEDL-TME 77-3 +. 163 PPS, JUNE 1977

THE HEAT TRANSFER CHARACTERISTICS OF A CLINCH RIVER BREEDER REACTOR (CRBR) NEARLY PROTOTYPIC FUEL ASSEMBLY IN A LIQUID SODIUM ENVIRONMENT UNDER LOW FLOW CONDITIONS CHARACTERISTIC OF NATURAL CIRCULATION ARE INVESTIGATED. EMPHASIS IS UPON THE PRESENTATION OF TEST DATA DEVELOPED TO SUPPLEMENT ANALYTICAL PREDICTIONS OF HEAT TRANSFER AND FLOW REDISTRIBUTION WITHIN THE NATURAL CIRCULATION RANGE OF REACTOR OPERATION. A DETAILED DESCRIPTION OF THE TEST ASSEMBLY IS PRESENTED, WITH ATTENTION FOCUSED ON THE 217-PIN ELECTRICALLY HEATED ROD BUNDLE THROUGH WHICH AN UPWARD SODIUM FLOW IS DIRECTED. TEST VARIABLES, INCLUDING ASSEMBLY POWER, POWER SKEW, AND AXIAL SODIUM FLOW RATE ARE INTRODUCED, AND TESTING PROCEDURES ARE DISCUSSED.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

REACTOR, LMFBR + CLINCH RIVER (LMFBR) + OUT OF PILE EXPERIMENT + CIRCULATION, NATURAL + JACOBS

129901
ABRAMSON PH
THE IMPORTANCE OF HEAT TRANSFER IN HYPOTHETICAL CORE DISRUPTIVE ACCIDENTS
ARGONNE NATIONAL LAB., ILL.
10 PPS, 16 TABS, 16 FIGS, NUCLEAR TECHNOLOGY, 35(1), PP. 87-96 (MID-AUG, 1977)

IN THE EVENT OF A LOCA BEING ACCOMPANIED BY AN LMFBR FAILURE TO SCRAM, THE REACTOR COULD GO PROMPT CRITICAL, GENERATING A LARGE AMOUNT OF NEUTRONIC HEAT ON A MILLISECOND TIME SCALE. IT WAS FOUND THAT FUEL-TO-STEEL HEAT TRANSFER HAS A MINIMAL INFLUENCE UPON THE NEUTRONIC ENERGY DEPOSITION DURING THE PROMPT BURST BUT THAT IT CAN PLAY AN IMPORTANT ROLE IN MATERIAL BEHAVIOR IN LATER STAGES OF THE MCDA. FURTHERMORE, RESULTS OBTAINED INDICATE THAT CALCULATIONS OF THERMODYNAMIC POTENTIAL ENERGY THROUGH ADIABATIC EXPANSION TO ONE ATMOSPHERE ARE CONSERVATIVE IF PERFORMED AT THE END OF THE PROMPT BURST AND THAT FUEL-TO-STEEL HEAT TRANSFER MAY SIGNIFICANTLY REDUCE THE AVAILABLE WORK ENERGY WITHIN THE NEXT 20 MS.

REACTOR, LMFBR + ACCIDENT, CORE DISRUPTIVE + HEAT CONDUCTANCE, FUEL TO CLAD + CORE MELTDOWN + COMPUTER PROGRAM, DIGITAL + THERMAL TRANSIENT + ANL + ACCIDENT, CONSEQUENCES

130874
PROTOTYPE LARGE BREEDER REACTOR. PHASE II: CONCEPTUAL DESIGN. VOLUME III: TRADEOFF STUDIES. PART 1: SODIUM TEMPERATURE AND STEAM CYCLE CONDITIONS
GENERAL ELECTRIC CO. + BECHTEL CORP.
TID-27,745/6 + GEFR-00099 +. APPROX. 160 PPS, TABS, FIGS, JUNE 1977

BECAUSE OF THE INCREASED CONCERN ABOUT TECHNOLOGICAL PROBLEMS ARISING FROM HIGH TEMPERATURES, AND IN THE LIGHT OF THE INCREASED AWARENESS OF THE PRIMARY SOURCE OF THE BREEDER BENEFITS, A MAJOR EFFORT WAS INITIATED IN 1975 TO REEXAMINE THE LMFBR OPERATING TEMPERATURES AND STEAM CONDITIONS. THIS WORK WAS DONE AS A PART OF THE PLBR PROJECT SPONSORED BY ERDA AND EPRI. THE RESULTING ANALYSIS IS THE MOST COMPLETE ASSESSMENT EVER MADE FOR THE LMFBR WITH REGARD TO OPTIMIZING THE CHOICE OF OPERATING TEMPERATURES AND STEAM CONDITIONS. THE RESULTS OF THAT ASSESSMENT ARE REPORTED IN THIS DOCUMENT, AND IN THE COMPLEMENTARY VOLUME, VOLUME III, PART 3, PREPARED BY BECHTEL CORPORATION.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION: SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

*DESIGN STUDY + REACTOR, LMFBR + *REACTOR COOLANT + TEMPERATURE + HEAT TRANSFER ANALYSIS + PLBR (LMFBR) + SYSTEM DESCRIPTION + THERMAL TRANSIENT + COOLANT CHEMISTRY + DNB + SODIUM

6. REACTOR TRANSIENTS, KINETICS, AND STABILITY

120171

KIRK WL
PHOEBUS/UHTREX: A PRELIMINARY STUDY OF A LOW-COST FACILITY FOR TRANSIENT TESTS OF LMFBR FUEL
LOS ALAMOS SCIENTIFIC LABORATORY, NEW MEXICO
LA-NUREG-6501-MS +. 78 PPS, 22 TABS, 44 FIGS, 14 REFS, OCT. 1976

THE RESULTS OF A BRIEF PRELIMINARY DESIGN STUDY OF A FACILITY FOR TRANSIENT NUCLEAR TESTS OF FAST BREEDER REACTOR FUEL ARE DESCRIBED. THE STUDY IS BASED ON THE USE OF A REACTOR BUILDING ORIGINALLY BUILT FOR THE UHTREX REACTOR, AND THE USE OF SOME REACTOR HARDWARE AND REACTOR DESIGN AND FABRICATION TECHNOLOGY REMAINING FROM THE PHOEBUS-2 REACTOR. FACILITY PERFORMANCE IN CONJUNCTION WITH A REFERENCE 127-FUEL PIN EXPERIMENT IS DESCRIBED.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REACTOR, LMFBR + REACTOR TRANSIENT + REACTOR, BREEDER + UHTREX (GCR) + PERFORMANCE + FUEL ELEMENTS + HJCK + NRC-7 + FUEL ROD + JACOBS

121481

WEISBIN CR + MARABLE JH + LUCIUS JL + OBLON EM + MYNATT FR + PEELE RW + PEREY FG
APPLICATION OF FORSS SENSITIVITY AND UNCERTAINTY METHODOLOGY TO FAST REACTOR BENCHMARK ANALYSIS
OAK RIDGE NATIONAL LABORATORY, TENNESSEE
ORNL/TM-5563 + ENDF-236 +. 117 PPS, 16 TABS, 40 FIGS, 47 REFS, DEC. 1976

***FORSS IS A CODE SYSTEM USED TO STUDY RELATIONSHIPS BETWEEN NUCLEAR REACTION CROSS SECTIONS, INTEGRAL EXPERIMENTS, REACTOR PERFORMANCE PARAMETER PREDICTIONS, AND ASSOCIATED UNCERTAINTIES. THEORY, CODE DESCRIPTION, AND RESULTS OF APPLYING FORSS TO FAST REACTOR BENCHMARKS ARE PRESENTED. FOR VARIOUS ASSEMBLIES AND REACTOR PERFORMANCE PARAMETERS, NUCLEAR DATA SENSITIVITIES WERE COMPUTED. COMPREHENSIVE LIBRARIES OF ENERGY-DEPENDENT COEFFICIENTS HAVE BEEN DEVELOPED IN A RETRIEVABLE FORMAT. UNCERTAINTIES INDUCED BY NUCLEAR DATA WERE QUANTIFIED. NUCLEAR DATA ACCURACY REQUIREMENTS TO MEET SPECIFIED PERFORMANCE CRITERIA AT MINIMUM EXPERIMENTAL COST WERE DETERMINED.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*COMPUTER PROGRAM, DIGITAL + REACTOR PHYSICS + SENSITIVITY ANALYSIS + CROSS SECTION + PARAMETER + *REACTOR, FAST + REACTOR, LMFBR + *MATHEMATICAL TREATMENT + JACOBS

122579

BELL CR + BLEIWEIS PB + BOUDREAU JE
SIMMER-I: AN (SUB N), IMPLICIT, MULTIFIELD, MULTICOMPONENT, EULERIAN, RECRITICALITY CODE FOR LMFBR DISRUPTED CORE ANALYSIS
LOS ALAMOS SCIENTIFIC LABORATORY, NEW MEXICO
LA-NUREG-6467-MS +. 331 PPS, 33 TABS, 50 FIGS, JAN. 1977

PHYSICAL MODELS, NUMERICAL MODELS, AND PROGRAM DESCRIPTION ARE PRESENTED IN SIMMER-I, A COMPUTER PROGRAM WHICH PREDICTS THE NEUTRONIC AND FLUID DYNAMIC BEHAVIOR OF AN LMFBR DURING A HYPOTHETICAL CORE DISRUPTIVE ACCIDENT.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*COMPUTER PROGRAM + *ACCIDENT, CORE DISRUPTIVE + REACTOR, LMFBR + DIFFUSION + TRANSPORT + REACTOR PHYSICS + CORE MELTDOWN + HYDRAULIC ANALYSIS + EQUATION OF STATE + HJCK + NRC-7 + JACOBS

123197

MATHER DJ
ENERGY RELEASE FROM SEVERE TRANSIENTS IN SODIUM COOLED FAST REACTORS
UKAEA SAFETY & RELIABILITY DIRECTORATE, WARRINGTON
SRD-R-568+. 15 PPS, 6 FIGS, 4 REFS, DEC. 1976

CALCULATIONS USING THE COMPUTER PROGRAM SARAZE-2 ARE DESCRIBED WHICH ANALYSE SOME MECHANICAL EFFECTS OF SODIUM REMAINING IN THE OUTER CORE REGIONS DURING THE FINAL STAGES OF POSTULATED TRANSIENTS IN FAST REACTORS. IT IS SHOWN THAT THE OVERALL EFFECT OF THE PRESSURE OF SODIUM IS TO REDUCE THE TOTAL ENERGY YIELD, EVEN WHEN THE CENTRE REGION OF THE CORE ARE VOIDED.

AVAILABILITY - THE EDITOR, UKAEA, SAFETY & RELIABILITY DIRECTORATE, CULCHETH, WARRINGTON WA3 4NE UK

ACCIDENT, HYPOTHETICAL + REACTOR TRANSIENT + DOPPLER COEFFICIENT + REACTOR, FAST + REACTOR, LMFBR + SODIUM + VOID FRACTION + JACOBS

123318

SCHMIDT TR
LMFBR PROMPT BURST EXCURSION (PBF) EXPERIMENTS IN THE ANNULAR CORE PULSE REACTOR (ACPR)
SANDIA LABS., ALBUQUERQUE, N.M.
SAND-76-5386 + CONF-761001-1 +. 10 PPS, FROM INTERNATIONAL MEETING ON FAST REACTOR SAFETY & RELATED PHYSICS; CHICAGO, ILL., OCT. 1976

NINE IN-PILE EXPERIMENTS INVOLVING PULSE HEATING OF FUEL PINS TO PARTIAL VAPORIZATION, PROVIDE LMFBR CORE ENERGETICS DATA. IN THREE EXPERIMENTS CONDUCTED WITHOUT SODIUM, OBSERVED ENERGY

123318 *CONTINUED*

DEPOSITIONS UP TO 3200 J PER GM RESULTED IN LOW PRESSURE HISTORIES, NEGLIGIBLE ENERGY CONVERSION RATIOS, AND LARGE UPWARD AXIAL FUEL MOTIONS WITHIN THE CLADDING. WITH SODIUM, SIMILAR OBSERVED ENERGY DEPOSITIONS RESULTED IN LARGE SHARP PRESSURE EVENTS, VERY LOW ENERGY CONVERSION RATIOS, AND WITHIN-CLADDING AXIAL FUEL MOTIONS COMPARABLE TO THE DRY CAPSULE EXPERIMENTS.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*REACTOR, LMFBR + *IN PILE EXPERIMENT + *PROMPT CRITICALITY + *EXCURSION, LARGE + *ACCIDENT, CORE DISRUPTIVE

124107

LUDEWIG H

A PRELIMINARY ANALYSIS OF THE ANL PROPOSED SAFETY RELATED CRITICAL EXPERIMENTS

BROOKHAVEN NATIONAL LAB., UPTON, N.Y.

BNL-NUREG-22223 +. 28 PPS, TABS, FIGS, REFS, JAN. 1977

RESULTS ARE REPORTED OF EXPERIMENTS USING SMALL, SIMPLE ASSEMBLIES. NO SIMULATION OF LMFBR DESIGN IS INTENDED, BUT MOST NUCLIDES INCLUDED MAY APPEAR IN AN LMFBR. RESULTS INDICATE THAT DIFFUSION THEORY UNDERESTIMATES REACTIVITY VALUES BY 1-1.5 PER CENT COMPARED TO TRANSPORT THEORY. USE OF A DEPLETED URANIUM REFLECTOR TO ISOLATE THE ASSEMBLY FROM NEUTRON IN-LEAKAGE FROM THE ROOM IS TREATED.***A SEQUENCE IS DISCUSSED IN WHICH A CENTRALLY LOCATED CONTROL ROD REMAINS IN PLACE WHILE FUEL IS COMPACTED AWAY FROM IT.

AVAILABILITY - H. LUDEWIG, FAST REACTOR SAFETY DIV., DEPT. OF APPLIED SCIENCE, BROOKHAVEN NATIONAL LAB., UPTON, N.Y. 11973

*JACOBS + *CRITICALITY EXPERIMENT + REACTOR, SAFETY RESEARCH + REACTOR, LMFBR + *MATHEMATICAL STUDY + MONTE CARLO + TRANSPORT THEORY + COMPARISON, THEORY AND EXPERIENCE + *REACTOR PHYSICS + HJCK + NRC-7

125632

MAJUMCAR D + PYUN J J

REVIEW OF THE TRANSITION PHASE OF CORE-DISRUPTIVE ACCIDENTS IN LMFBRs

BROOKHAVEN NATIONAL LAB., UPTON, N.Y.

BNL-NUREG-21797 +. 104 PPS, 4 TABS, FIGS, 112 REFS, AUG. 15, 1976

THE PRESENT STATUS OF THE CORE-DISRUPTIVE PHASE OF AN ACCIDENT IN AN LMFBR IS REVIEWED. ALSO, A CRITICAL SURVEY OF METHODS USED IN ANALYZING THIS PHASE IS PRESENTED AND CONCLUSIONS ARE GIVEN.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*REACTOR, LMFBR + *ACCIDENT, CORE DISRUPTIVE + *ACCIDENT ANALYSIS + SURVEY + COMPARISON + *ACCIDENT, HYPOTHETICAL + HJCK + NRC-7

125644

ERDMAN CA + JOHNSON MB

SOME ASPECTS OF SUBASSEMBLY VOIDING IN THE UNPROTECTED TRANSIENT OVERPOWER ACCIDENT IN LMFBR'S

UNIV. OF VA., CHARLOTTESVILLE

NUREG-0277 +. 27 PPS, JUNE 1977

ASPECTS OF SUBASSEMBLY VOIDING ARE PRESENTED. THE DEGREE TO WHICH TOP RELATED EXPERIMENTS ARE CONSISTENT WITH CURRENT MODELING OF VOIDING IN TOP SITUATIONS IS ASSESSED. SEVERAL CODES CAN REPRODUCE EXPERIMENTAL RESULTS BUT NO AVAILABLE CODE ACCURATELY PREDICTS RESULTS IN ADVANCE.***RESULTS OF ATTEMPTS TO MODEL A TREAT EXPERIMENT ARE PRESENTED AND DISCUSSED.***POSSIBILITIES FOR RAPID SODIUM VOIDING WITH LITTLE COMPENSATING FUEL MOTION IN LOF-D-TOP WERE REVIEWED. MAJOR PHENOMENA ARE GAS AVAILABILITY AT FAILURE, CHARACTERIZATION OF FAILURE, AND FUEL/SODIUM ENERGY AND MOMENTUM COUPLING. RESULTS OF ADDITIONAL VOIDING CALCULATIONS BASED ON A SMALL SCALE FCI POINTED TO LIMITS OF 40 DOLLARS/SEC ON POTENTIAL VOIDING RAMP RATES FOR CRBR.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*JACOBS + *REACTOR, LMFBR + *ACCIDENT ANALYSIS + *ACCIDENT, HYPOTHETICAL + *ACCIDENT, LOSS OF FLOW + SODIUM + *REACTIVITY EFFECT, VOID + *VOID + *ACCIDENT MODEL

126176

TZANOS CP + BARTHOLOMEW WP + BOWERS CH

DESIGN-RELATED INHERENT SAFETY CHARACTERISTICS IN LARGE LMFBR POWER PLANTS

ARGONNE NATIONAL LAB., ILL.

CONF-761001-43 +. 18 PPS, FROM INTERNATIONAL MEETING ON FAST REACTOR SAFETY & RELATED PHYSICS; CHICAGO, ILL., OCT. 1976

DESIGN-RELATED SAFETY-ENHANCING FEATURES SUCH AS (1) EXTENDED PUMP COASTDOWN, (2) INCREASED NEGATIVE REACTIVITY FEEDBACKS, (3) REDUCED SODIUM VOID REACTIVITY, AND (4) SELF-ACTUATED SHUTDOWN SYSTEMS ARE EVALUATED. PRIMARY EMPHASIS IS PLACED ON PREVENTING OR LIMITING CORE DAMAGE. ATTENTION IS ALSO GIVEN TO FEATURES AIMED AT MITIGATION OF THE ENERGETICS POTENTIAL OF HYPOTHETICAL CORE-DISRUPTIVE ACCIDENTS.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*REACTOR, LMFBR + *SAFETY ANALYSIS + PUMPS + TRANSIENT + REACTIVITY, NEGATIVE + REACTIVITY EFFECT, VOID +

126176 *CONTINUED*
SHUTDOWN MECHANISM, SELF + ACCIDENT, CORE DISRUPTIVE

126673
CLAUZON PP + COULON P + PENET F
SAFETY CONCLUSIONS FROM START-UP TESTS AND FROM THE ANALYSIS OF THE CORE BEHAVIOUR OF PHENIX
CENTRE D'ETUDES NUCLEAIRES DE CADARACHE, FRANCE
CONF-761001(VOL. 1) +. 15 PPS, PP. 61-75 OF THE PROCEEDINGS OF THE INTERNATIONAL MEETING ON FAST REACTOR
SAFETY AND RELATED PHYSICS; CHICAGO, ILL., OCT. 5-8, 1976

PHENIX HAS BEEN IN OPERATION FOR OVER 2 YEARS AND THE INFORMATION FOR CORE SAFETY ANALYSIS DERIVED
FROM ITS OPERATION CAN BE DIVIDED IN 2 AREAS. FIRST, AT NOMINAL STATE OF THE CORE, THE
COMPARISON BETWEEN OBSERVED PHYSICAL PROPERTIES AT START-UP AND DURING ITS LIFE AND THE
CORRESPONDING CALCULATIONS GIVES SUPPORT TO THE SAFETY EVALUATION. FURTHER, THE CORE BEHAVIOR OF
PHENIX HAS BEEN ANALYZED ON 2 ASPECTS: ITS NEUTRONIC FEEDBACKS TO THE MAIN POSSIBLE
PERTURBATIONS OF ITS PHYSICAL STATE, AND ITS CAPABILITY OF NATURAL SODIUM CONVECTION IN CASE OF
PUMP COAST DOWN.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

PHENIX (LMFBR) + REACTOR, LMFBR + REACTOR STARTUP EXPERIENCE + PROPERTY, PHYSICAL + COMPARISON, THEORY AND
EXPERIENCE + PERTURBATION METHOD + REACTOR PHYSICS + HEAT TRANSFER, CONVECTION

126713
FRANKE E
CALCULATION OF FAST BREEDER SPECTRA
5 PPS, 30 REFS, KERNENERGIE, 19(6), PP. 173-77 (JUNE 1976)

A GOOD APPROXIMATION IN CALCULATING FAST BREEDER SPECTRA IS GIVEN BY THE ASYMPTOTIC REACTOR
CONCEPT. THE APPROXIMATIONS MOST FREQUENTLY USED ARE THE B1 EQUATION, THE P1 EQUATION, THE
DIFFUSION EQUATION, AND THE EQUATION FOR THE INFINITE MEDIUM. WITH RESPECT TO LETHARGY VARIABLE,
THE MULTIGROUP AND THE CONTINUOUSLY SLOWING DOWN (CSD) METHOD REPRESENT ALTERNATIVE CONCEPTS FOR
CALCULATING FAST BREEDER SPECTRA. AS THE CSD THEORY DOES NOT INVOLVE VOLUMINOUS SCATTERING
MATRICES, THIS TECHNIQUE IS MORE ECONOMICAL IN NUMERICAL REGARD AS COMPARED WITH MULTIGROUP
CALCULATIONS.

REACTOR, FAST + REACTOR, BREEDER + *ENERGY SPECTRUM + *REACTOR PHYSICS + REACTOR KINETICS + DIFFUSION +
EQUATION

129508
MUNNO FJ + SHEAKS OJ
A STUDY OF THE REACTIVITY EFFECT OF BUBBLE COLLAPSE IN MOLTEN LIQUID METAL COOLED REACTORS
UNIV. OF MARYLAND, COLLEGE PARK
NUREG-0286 +. 62 PPS, REFS, AUG. 1977

THE REACTIVITY EFFECT OF VOID COLLAPSE ON A CORE DISRUPTIVE ACCIDENT IN A SODIUM FREE FAST REACTOR
CORE WAS STUDIED. A TWO-DIMENSIONAL TRANSPORT THEORY COMPUTER CODE WAS EMPLOYED TO OBTAIN A
REACTIVITY MODEL WHICH INCORPORATED RANDOM DISTRIBUTIONS OF VOIDS IN SPATIAL LOCATION AND BUBBLE
SIZE. THIS MODEL WAS IMPLEMENTED INTO VENUS-II AND SEVERAL EXCURSIONS WERE INVESTIGATED FOR THE
PURPOSE OF ASSESSING THE EFFECT OF BUBBLE COLLAPSE REACTIVITY ON EXCURSION ENERGY. THE RESULTS
INDICATE THAT EXCURSION ENERGY IS SENSITIVE TO THE SHAPE OF THE REACTIVITY VERSUS VOID FRACTION
FUNCTION AND THAT REACTIVITY MODELS BASED STRICTLY ON LEAKAGE EFFECTS ARE PROBABLY CONSERVATIVE
COMPARED TO MODELS WHICH INCLUDE BOTH SELF-MULTIPLICATION AND LEAKAGE.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REACTOR, LMFBR + ACCIDENT, CORE DISRUPTIVE + BUBBLE + REACTIVITY EFFECT + COMPUTER PROGRAM, DIGITAL + JACOBS

130829
A COMPENDIUM OF COMPUTER CODES FOR THE SAFETY ANALYSIS OF FAST BREEDER REACTORS
U.S. DEPT. OF ENERGY, WASHINGTON
DOE/ET-0009 +. 431 PPS, TABS, FIGS, REFS, OCT. 1977

FOR OVER 100 CODES THE FOLLOWING QUESTIONS ARE ANSWERED: (1) WHAT DOES THE CODE DO? (2) TO WHAT
SAFETY PROBLEMS HAS IT BEEN APPLIED? (3) WHAT ARE THE CODES LIMITATIONS? (4) WHAT IS BEING DONE
TO REMOVE THESE LIMITATIONS? (5) HOW DOES THE CODE COMPARE WITH EXPERIMENTAL OBSERVATIONS AND
OTHER CODE PREDICTIONS? AND (6) WHAT REFERENCE DOCUMENTS ARE AVAILABLE? THE CODES ARE ALSO
CATEGORIZED AS FOLLOWS: (1) STEADY STATE FUEL PIN CHARACTERIZATION, (2) WHOLE CORE ANALYSIS, (3)
SUBASSEMBLY ANALYSIS, (4) HEAT TRANSPORT SYSTEM ANALYSIS, (5) POST ACCIDENT HEAT REMOVAL, (6)
SODIUM FIRES, (7) AEROSOL BEHAVIOR, (8) ENVIRONMENTAL RELEASE ANALYSIS, (9) PROBABILISTIC
ANALYSIS, (10) CODES FOR ANALYTICAL SUPPORT OF SAFETY EXPERIMENTS, AND (11) MISCELLANEOUS CODES.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*COMPUTER PROGRAM + REACTOR, LMFBR + ACCIDENT, CORE DISRUPTIVE + ACCIDENT, FUEL SLUMP + FLOW BLOCKAGE +
THERMAL HYDRAULIC ANALYSIS + TRANSIENT + AEROSOL + PROBABILITY + SODIUM + FIRE + CORE MELTDOWN + DECAY HEAT +
ACCIDENT, HYPOTHETICAL + *SAFETY ANALYSIS + DOSE + ENVIRONMENT + HEAT TRANSFER ANALYSIS + JACOBS

7. FISSION PRODUCT RELEASE, TRANSPORT, AND REMOVAL

119193
MCPHEETERS CC + RAUE D
CONTROL OF TRITIUM IN LMFBR SODIUM BY COLD TRAPPING
ARGONNE NATIONAL LABORATORY, ILLINOIS
CONF-760503-3 +. 7 PPS, FROM INTERNATIONAL CONFERENCE ON LIQUIFIED METAL TECHNOLOGY IN ENERGY PRODUCTION;
CHAMPION, PA, MAY 3, 1976

CONTROL OF TRITIUM IN THE SODIUM COOLANT OF LMFBRs IS IMPORTANT FOR ACHIEVING AS LOW AS PRACTICABLE RELEASE OF RADIOACTIVITY. COLD-TRAPPING HAS BEEN SHOWN TO BE AN EFFECTIVE METHOD FOR CONTROLLING HYDROGEN IN SODIUM AND SHOULD BE EFFECTIVE FOR CONTROLLING TRITIUM AS WELL. TWO MECHANISMS FOR REMOVAL OF TRITIUM FROM SODIUM HAVE BEEN STUDIED: (1) COPRECIPITATION OF HYDROGEN AND TRITIUM FROM SOLUTION IN SODIUM IN A COLD TRAP AND (2) ISOTOPIC EXCHANGE OF TRITIUM IN SODIUM WITH HYDROGEN IN SOLID NaH IN A COLD TRAP. THE ISOTOPIC EXCHANGE MECHANISM BY ITSELF CANNOT BE EXPECTED TO ADEQUATELY CONTROL TRITIUM IN LMFBRs. HYDROGEN SOURCES SUCH AS CORROSION IN THE STEAM GENERATORS WILL BE IMPORTANT FACTORS IN CONTROLLING THE TRITIUM LEVEL.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

FILTER, TRAP + DECONTAMINATION + REACTOR, LMFBR + TRITIUM + SODIUM + HYDROGEN

120340
FEE GG
DECEMBER 1976 MONTHLY HIGHLIGHTS FOR OFFICE OF NUCLEAR REGULATORY RESEARCH PROGRAMS AT OAK RIDGE NATIONAL LABORATORY
OAK RIDGE NATIONAL LABORATORY, TENNESSEE
ORNL/NUREG/TM-83 +. 21 PPS, JAN. 1977

THIS PROGRESS REPORT CONTAINS SHORT (1 TO 4 PAGE) SUMMARIES OF THE ACCOMPLISHMENT DURING THE MONTH ON THE FOLLOWING ORNL PROJECTS: HEAVY SECTION STEEL TECHNOLOGY PROGRAM, FISSION PRODUCT BETA AND GAMMA ENERGY RELEASE, LOCA RELEASE FROM LWR FUEL, MULTIROD BURST TESTS, NUCLEAR SAFETY INFORMATION CENTER, PWR BLOWDOWN HEAT TRANSFER-SEPARATE EFFECTS, ZIRCALOY FUEL CLADDING COLLAPSE STUDIES, ZIRCONIUM METAL WATER OXIDATION KINETICS, AEROSOL RELEASE AND TRANSPORT FROM LMFBR FUEL, HTGR SAFETY ANALYSIS AND RESEARCH, AND DESIGN CRITERIA FOR PIPING AND NOZZLES.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REACTOR, LWR + HSST + ENERGY LEVEL + FISSION PRODUCT RELEASE + GROSS BETA + GROSS GAMMA + FAILURE, FUEL ELEMENT + NSIC + BLOWDOWN + HEAT TRANSFER + ZIRCALOY + FAILURE, CLADDING + METAL WATER REACTION + ZIRCONIUM + OXIDATION + REACTOR, LMFBR + AEROSOL + FISSION PRODUCT TRANSPORT + REACTOR, HTGR + ACCIDENT ANALYSIS + DESIGN CRITERIA + PIPES AND PIPE FITTINGS + R AND D PROGRAM + SAFETY PROGRAM + HJCK + NRC-2 + NRC-3 + NRC-5 + NRC-7 + NRC-8

121014
HILLIARD RK + MCCORMACK JD + POSTMA AK
EVALUATION OF AIR CLEANING SYSTEM CONCEPTS FOR EMERGENCY USE IN LMFBR PLANTS
HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
HEDL-TME 76-41 +. 267 PPS, 51 TABS, 50 FIGS, DEC. 1976

NINETEEN DIFFERENT AIR CLEANING CONCEPTS ARE ARRANGED INTO TWENTY-FOUR SYSTEMS AND EVALUATED FOR USE AS ACCIDENT MITIGATING SYSTEMS IN LMFBR PLANTS. BOTH SINGLE, LOW-LEAKAGE CONTAINMENT PLANTS AND ONCE-THROUGH OPERATION, APPLICABLE TO CONTAINMENT/CONFINEMENT PLANTS ARE CONSIDERED. PLANT CHARACTERISTICS AFFECTING AIR CLEANING REQUIREMENTS ARE DEFINED FOR 1000 MWE PLANTS AND A SODIUM AND RADIOLOGICAL RELEASE TERM IS POSTULATED. THE ACCIDENT CONDITIONS UNDER WHICH THE EMERGENCY AIR CLEANING SYSTEM (EACS) MUST FUNCTION IS ESTABLISHED BY USE OF SOFIRE-II AND HAA-3B COMPUTER CODES. CRITERIA ARE DEVELOPED FOR EVALUATING THE VARIOUS SYSTEMS AND FOR ASSIGNING COMPARATIVE RATINGS.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

AIR CLEANING + FISSION PRODUCT RELEASE + AEROSOL + CONTAINMENT + DESIGN CRITERIA + FILTER, BED + REACTOR, LMFBR + SODIUM + CHARCOAL + SCRUBBER + FILTER, SAND + FILTERS + JACOBS

127835
SHEPPARD JD + LEAVELL WH + SHAHROKHI F + WYNN MC
QUARTERLY PROGRESS REPORT ON THE ADVANCED TWO-PHASE INSTRUMENTATION PROGRAM FOR JANUARY-MARCH 1977
OAK RIDGE NATIONAL LAB., TENN.
ORNL/NUREG/TM-119 +. 13 PPS, 3 FIGS, 6 REFS, JULY 1977

AN INSTRUMENTED PIPING SPOOL PIECE HAS BEEN DESIGNED TO IMPROVE THE ACCURACY AND PRECISION OF TWO-PHASE FLOW MEASUREMENTS. THE ALGORITHM FOR CALCULATING NONSTATIONARY VELOCITIES BY INSTRUMENT SIGNAL CORRELATION WAS MODIFIED TO USE THE NORMALIZED CROSS-COVARIANCE FUNCTION RATHER THAN THE CROSS-CORRELATION FUNCTION TO DETERMINE TRANSIT TIME. A PRELIMINARY FEASIBILITY STUDY OF INNOVATIVE TWO-PHASE FLOW INSTRUMENTS HAS BEEN CONDUCTED.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

FLOW, TWO PHASE + *INSTRUMENT, FLOW + MEASUREMENT + FLOW + *EQUIPMENT DEVELOPMENT + HJCK + NRC-2

123859

JORDAN H + BAYBUTT P + GIESEKE JA + DENNING RS
FISSION PRODUCT TRANSPORT ANALYSIS. QUARTERLY PROGRESS REPORT JULY THROUGH SEPTEMBER 1976
BATTELLE COLUMBUS LABS., OHIO
BNI-NUREG-1965 +. 22 PPS, 2 REFS, DEC. 30, 1976

FISSION PRODUCTS THAT ESCAPE TO THE ENVIRONMENT DURING A HYPOTHETICAL CONTROLLED LOSS-OF-COOLANT ACCIDENT (LOCA) IN A LIGHT WATER REACTOR (LWR) MUST SUCCESSIVELY PENETRATE FOUR DISTINCT BARRIERS: (1) THE FUEL MATRIX, (2) THE FUEL ROD CLADDING, (3) THE PRIMARY SYSTEM ENVELOPE, AND (4) THE CONTAINMENT SYSTEM BOUNDARY. A REALISTIC ASSESSMENT OF THE ENVIRONMENTAL DOSE DUE TO A LOCA, THEREFORE, REQUIRES A REALISTIC ASSESSMENT OF EACH OF THESE PENETRATIONS. IT IS THE TASK OF THIS PROJECT TO PROVIDE SUCH AN ASSESSMENT OF THE PENETRATION OF THE PRIMARY SYSTEM ENVELOPE OF A PRESSURIZED WATER REACTOR (PWR) AND A BOILING WATER REACTOR (BWR) AND TO ASSESS THE RELATED FISSION PRODUCT PENETRATION OF A FAILED SPENT FUEL SHIPPING CASK. IN DOING SO, RELIANCE IS PLACED ON THE DEVELOPMENT OF A SOURCE TERM (I.E., THE FISSION PRODUCT PENETRATION RATE OF THE FUEL CLADDING BARRIER) UNDER A SEPARATE PROJECT AT ORNL AND INDEED THESE TWO PROJECTS ARE CLOSELY COORDINATED.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

CONTAINMENT + FISSION PRODUCT RELEASE + COMPUTER PROGRAM + ANALYTICAL MODEL + CLADDING + FISSION PRODUCT TRANSPORT + REACTOR, PWR + REACTOR, BWR + STEAM + WATER VAPOR + HJCK + NRC-3 + NRC-4 + JACOBS

123864

COMAR CL + SEEFELDT WB + COHEN BL + HOWELLS G + MECHAM WJ + STEINDLER MJ + STANNARD JN
PLUTONIUM: FACTS AND INFERENCES
ELECTRIC POWER RESEARCH INST., PALO ALTO, CALIF.
EPRI-EA-43-SR +. 137 PPS, FIGS, REFS, AUG. 1976

SUMMARIZES WHAT IS KNOWN ABOUT PLUTONIUM AND THE REASONABLE INFERENCES THAT CAN BE DRAWN FROM THAT KNOWLEDGE; DETAILS AND SUPPORTING DATA ARE PRESENTED IN THE MAIN BODY OF THE REPORT. SUCH INFORMATION WILL NOT ENTIRELY DISPEL SOCIAL CONCERN OR EVEN ANSWER THE SPECIFIC QUESTIONS OF RISK IN AN UNEQUIVOCAL WAY. BUT AT LEAST IT SHOULD HELP PLACE THE PLUTONIUM ISSUE IN CLEARER PERSPECTIVE AND SEPARATE IT FROM THE MANY OTHER ISSUES THAT MAY ULTIMATELY BE MORE IMPORTANT IN MAKING DECISIONS ABOUT THE FUTURE USE OF NUCLEAR POWER.

AVAILABILITY - RECORDS & REPORTS CENTER, ELECTRIC POWER RESEARCH INST., P.O. BOX 10412, PALO ALTO, CALIF. 94303

FUEL CYCLE + FUEL REPROCESSING + EXPLOSION + REACTOR, LMFBR + PLUTONIUM + FIRE + ZIRCONIUM + JACOBS + FILTERS

124541

YARBRO OO + MAILEN JC + STEPHENSON MJ
RETENTION OF GASEOUS ISOTOPES
OAK RIDGE NATIONAL LAB. + OAK RIDGE GASEOUS DIFFUSION PLANT, TENN.
IAEA-CN-36/408 +. 12 PPS, FROM INTERNATIONAL CONFERENCE ON NUCLEAR POWER AND ITS FUEL CYCLE; SALZBURG, AUSTRIA, MAY 2-13, 1977

THE RETENTION OF GASEOUS FISSION PRODUCTS AT COMMERCIAL REACTOR FUEL REPROCESSING PLANTS IS PRESENTLY LIMITED TO A MODEST RETENTION OF IODINE WHERE REPROCESSING COOLING TIMES ARE IN THE RANGE OF 180 DAYS OR LESS. RECENT REGULATORY TRENDS HAVE BEEN DIRECTED TOWARD FURTHER REDUCTION REQUIREMENTS OF THE ALREADY SMALL ENVIRONMENTAL EFFECTS OF EFFLUENTS FROM NUCLEAR FUEL REPROCESSING PLANTS. IN ADDITION TO THE DESIRE TO REDUCE THE ENVIRONMENTAL EFFECTS OF FUEL REPROCESSING, THE HIGHER BURNUP AND SPECIFIC POWER LEVELS OF LMFBR FUELS AND THE ECONOMIC INCENTIVE TO REDUCE REPROCESSING COOLING TIMES WILL PLACE MORE STRINGENT DEMANDS ON SYSTEMS FOR THE CONTROL OF EFFLUENTS FROM THE LMFBR FUEL REPROCESSING PLANT.

AVAILABILITY - UNIPUB, INC., P.O. BOX 433, NEW YORK, N.Y. 10016

FISSION PRODUCT, AIRBORNE + AIRBORNE RELEASE + FUEL REPROCESSING + REACTOR, LMFBR + *RETENTION + GAS + *RADIOLYTIC GAS + IODINE

125653

HAYNS MR + WOOD MH
MODELS OF FISSION GAS BEHAVIOR IN FAST REACTOR FUELS UNDER STEADY STATE AND TRANSIENT CONDITIONS
UKAEA RESEARCH GROUP, HARWELL
AERE-TP-676 +. 43 PPS, OCT. 1976

THE RATE THEORY IS USED TO DESCRIBE THE NUCLEATION AND EVOLUTION OF THE FISSION GAS BUBBLE POPULATION. AT LOWER TEMPERATURES THE MODEL IS BASED UPON THE NOTION OF THE RANDOM MOTION OF SINGLE GAS ATOMS AND GAS BUBBLES AND INCLUDES THE EFFECTS OF RESOLUTION AND COALESCENCE WITHIN THE BUBBLE POPULATION WHILST AT HIGHER TEMPERATURES THE DIRECTED MOTION OF BUBBLES IN A TEMPERATURE GRADIENT, AGAIN INCLUDING RESOLUTION AND COALESCENCE, IS SHOWN TO BE THE MOST IMPORTANT MECHANISM. THERE ARE FURTHER DIFFICULTIES WITHIN EACH OF THESE OVERALL SCHEMES AND THIS REPORT HIGHLIGHTS IN PARTICULAR THE SENSITIVITY OF THE RESULTS OF THE RANDOM MOTION MODEL TO THE RESOLUTION RATE AND BUBBLE MOBILITY.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

125653 *CONTINUED*
ANALYTICAL MODEL + FISSION GAS RELEASE + EXPANSION + FUEL ROD + REACTOR, LMFBR + JACOBS

127992
WRIGHT AL + SMITH AM + KRESS TS
FUEL AEROSOL SIMULANT TEST (FAST) PLAN
OAK RIDGE NATIONAL LAB., TENN.
ORNL/NUREG/TM-129 +. 19 PPS, 4 TABS, 5 FIGS, 10 REFS, SEPT. 1977

THIS REPORT PRESENTS THE WORK PLAN FOR THE FUEL AEROSOL SIMULATION TEST (FAST), WHICH CONSTITUTES TASK 5 OF THE AEROSOL RELEASE AND TRANSPORT (ART) PROGRAM, SPONSORED BY THE DIVISION OF REACTOR SAFETY RESEARCH OF THE NUCLEAR REGULATORY COMMISSION. THESE TESTS INVOLVE THE STUDY OF THE FORMATION, RISE, AND CONDENSATION OF A SURROGATE LMFBR FUEL (UO₂) VAPOR BUBBLE PRODUCED IN LIQUID SODIUM TO SIMULATE PHENOMENA ASSOCIATED WITH HYPOTHETICAL CORE-DISRUPTIVE ACCIDENTS (HCDAS). UO₂ BUBBLES WILL BE PRODUCED BY THE CAPACITOR DISCHARGE VAPORIZATION (CDV) TECHNIQUE. TESTS THROUGH FY 1979 WILL BE DONE IN ARGON, WATER, AND IN SODIUM; RESULTS WILL BE ANALYZED USING MODELS DEVELOPED IN THE ART PROGRAM.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

AEROSOL + SODIUM + REACTOR, LMFBR + BUBBLE + ACCIDENT, HYPOTHETICAL + ACCIDENT, CORE DISRUPTIVE + URANIUM DIOXIDE + ELECTRIC ARC + TRANSIENT + R AND D PROGRAM + FISSION PRODUCT RELEASE + PLUTONIUM + ARGON + HJCK + NRC-7 + JACOBS

129276
SCRIPSICK RC + GRAY DC + TILLERY MI
AEROSOL SAMPLING AND CHARACTERIZATION FOR HAZARD EVALUATION
LOS ALAMOS SCIENTIFIC LAB., N.M.
LA-6777-PR +. 23 PPS, 7 TABS, 14 FIGS, 14 REFS, APRIL 1977

A SYSTEM FOR ESTIMATING DISSOLUTION RATES OF PLUTONIUM AEROSOLS WAS DEVELOPED. STUDIES INDICATE THAT PLUTONIUM AEROSOLS FOUND IN THE FIELD HAVE A RAPID INITIAL DISSOLUTION PHASE FOLLOWED BY A SLOWER SECONDARY PHASE. THREE METHODS OF PARTICLE SIZING AIR SAMPLES COLLECTED ON MEMBRANE FILTERS WERE INVESTIGATED. THE MOST PROMISING WAS A SCANNING ELECTRON MICROSCOPE ELECTRON MICROPROBE (SEM-EMP) METHOD. AIRBORNE CONTAMINATION RECORDS WERE STUDIED. THE PHYSICOCHEMICAL PROPERTIES OF A PLUTONIUM AEROSOL EXISTING IN THE FACILITY WERE INVESTIGATED IN RELATION TO PLUTONIUM HANDLING OPERATIONS. THE TECHNIQUES DEVELOPED HAVE INDICATED SOME AREAS OF THE AEROSOL SURVEILLANCE SYSTEM THAT NEED IMPROVEMENT.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

AEROSOL + CODES AND STANDARDS + GUIDE + SAMPLING + REACTOR, LMFBR + PLUTONIUM + GLOVE BOX + HAZARDS ANALYSIS

129277
GIESEKE JA + REED LD + JORDAN H + LEE KW
CHARACTERISTICS OF AGGLOMERATES OF SODIUM OXIDE AEROSOL PARTICLES
BATTELLE COLUMBUS LABS., OHIO
BML-NUREG-1977 +. 32 PPS, 1 TAB, 10 FIGS, 15 REFS, AUG. 1, 1977

ACCURATE MACROSCOPIC PREDICTIONS OF AEROSOL POPULATION BEHAVIOR WITHIN ENCLOSED CONTAINMENTS ARE KNOWN TO DEPEND STRONGLY UPON THE MICROSCOPIC CHARACTERISTICS OF THE INDIVIDUAL PARTICLES COMPRISING THE POPULATION. FOR EXAMPLE, PARTICLE SHAPES AND DENSITIES HAVE PRONOUNCED EFFECTS ON THE SETTLING VELOCITIES OF INDIVIDUAL AEROSOLS. ALSO, COAGULATION RATES DUE TO MECHANISMS WHICH PRODUCE RELATIVE MOTIONS BETWEEN PARTICLES WITHIN THE SUSPENDED AEROSOL ARE KNOWN TO DEPEND UPON THE CROSS SECTIONAL AREAS OF THE INDIVIDUAL PARTICLES. HENCE, IT HAS BEEN THE PRIMARY CONCERN OF THIS STUDY TO EXAMINE EXPERIMENTALLY THE MICROSCOPIC CHARACTERISTICS OF SODIUM OXIDE AEROSOLS PRODUCED IN AIR. THE RESULTS OF THESE MEASUREMENTS CAN NOW BE INCORPORATED INTO THE VARIOUS MACROSCOPIC AEROSOL BEHAVIOR PREDICTION MODELS.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

AEROSOL + SAMPLING + AGGLOMERATE + THERMOPHORESIS + ANALYTICAL MODEL + REACTOR, LMFBR + OXIDE + SODIUM + HJCK + NRC-7 + JACOBS

8. SOURCES OF ENERGY RELEASE UNDER ACCIDENT CONDITIONS

121639

MEYER RA + MAGEE PM + DURAND RE + DEBEAR WS
U.S. PROGRAM FOR TESTING LARGE SODIUM-WATER REACTION EFFECTS
GENERAL ELECTRIC CO. + ATOMICS INTERNATIONAL
ERDA-76/147/1 +. 30 PPS, PAPER NO. 13, PP. 417-46, PRESENTED AT US/USSR SEMINAR ON PROBLEMS OF RELIABILITY &
SAFE OPERATION OF LMFBR STEAM GENERATORS; DIMITROVGRAD, USSR, JULY 26-30, 1976

THE EXPERIMENTAL PROGRAM FOR INVESTIGATING THE EFFECTS OF LARGE SODIUM-WATER REACTIONS (SWR) IN AN LMFBR STEAM GENERATOR IS DISCUSSED. THE STATUS OF THE MAJOR SWR TEST FACILITY, THE LARGE LEAK TEST RIG (LLTR) AND THE ASSOCIATED TEST PROGRAM IS DESCRIBED. ANALYTICAL PREDICTIONS FOR THE INITIAL TEST ARE PRESENTED AND THE RESULTS OF BENCH-TYPE EXPERIMENTS TO SUPPORT THE LARGE LEAK TEST PROGRAM ARE DISCUSSED. THE FACILITY MODIFICATIONS AND TEST ARTICLE DESIGNS FOR THE LARGE PROTOTYPICAL TESTS WHICH WILL FOLLOW THE INITIAL TESTS ARE DESCRIBED ALONG WITH THE PLANNED TESTING PROGRAM.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

JACOBS + REACTOR, LMFBR + STEAM GENERATOR + *TESTING + *METAL WATER REACTION + COMPARISON, THEORY AND EXPERIENCE + TEST, LEAK

121642

LANCET RT + MILLS JC + MEYER RA + SANE J + VALENTIN RA
ANALYSIS OF LARGE SODIUM-WATER REACTIONS IN THE UNITED STATES
ATOMICS INTERNATIONAL + GENERAL ELECTRIC CO. + ARGONNE NATIONAL LAB.
ERDA-76/147/1 +. 25 PPS, PAPER NO. 16, PP. 495-520, PRESENTED AT US/USSR SEMINAR ON PROBLEMS OF RELIABILITY &
SAFE OPERATION OF LMFBR STEAM GENERATORS; DIMITROVGRAD, USSR, JULY 26-30, 1976

RECENT ADVANCES AND APPLICATIONS OF LARGE SODIUM-WATER REACTION ANALYSIS METHODS ARE PRESENTED. SPECIFIC FEATURES OF THE INTERIM TRANSWRAP-II CODE ARE DISCUSSED AND ILLUSTRATED WITH THE RESULTS OF PARAMETRIC ANALYSES. A DISCUSSION IS PROVIDED COVERING THE SWAM SERIES OF COMPUTER PROGRAMS, WHICH EMPHASIZE TWO-DIMENSIONAL FLUID AND STRUCTURAL EFFECTS. RESULTS OF COMPUTER ANALYSES OF LARGE SODIUM-WATER REACTIONS IN A STEAM GENERATOR OF THE CLINCH RIVER BREEDER REACTOR PLANT (CRBRP) ARE PRESENTED. RESULTS INCLUDE PREDICTED PRESSURE AND THRUST LOADS THROUGHOUT A STEAM GENERATOR LOOP AND AN ASSOCIATED SODIUM-WATER REACTION PRESSURE RELIEF SUBSYSTEM (SWRPRS) FOR THE DESIGN BASIS LEAK (DBL).

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

JACOBS + REACTOR, LMFBR + STEAM GENERATOR + SODIUM + *METAL WATER REACTION + COMPUTER PROGRAM + CLINCH RIVER (LMFBR) + *THERMAL ANALYSIS + ACCIDENT ANALYSIS

123728

CHAN CK + MIN TK + OKRENT D
A LOOK AT ALTERNATIVE CORE DISRUPTION ACCIDENTS IN LMFBR'S
UNIV. OF CALIF., LOS ANGELES
UCLA-ENG-7720 +. 70 PPS, FEB. 1977

THIS REPORT EXPLORES IN PRELIMINARY FASHION THE COURSE OF A POSTULATED ACCIDENT SCENARIO IN AN LMFBR INVOLVING RUPTURE OF ALL PIPING CONNECTED TO THE REACTOR VESSEL IN THE EVENT OF AN EARTHQUAKE (OR AN EQUIVALENT SCENARIO INVOLVING BOTH LOSS OF HEAT REMOVAL AND SYSTEM RUPTURE). THE CORE IS SUCCESSFULLY SHUT DOWN BUT DECAY HEAT IMPOSES A THREAT TO CORE INTEGRITY. THE ENSUING CALCULATED SEQUENCE OF EVENTS UP TO FUEL MELT, RELOCATION AND POSSIBLE RECRITICALITY IS DESCRIBED.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REACTOR, LMFBR + ACCIDENT, CORE DISRUPTIVE + FUEL MELTDOWN + CORE MELTDOWN + ANALYTICAL MODEL + JACOBS + HJCK + NRC-7

126085

CHAN CK + MIN TK + OKRENT D + CATTON I + KASTENBERG WE
A LOOK AT ALTERNATE CORE DISRUPTION ACCIDENTS IN LMFBR'S
UNIV. OF CALIF., LOS ANGELES
NUREG-0259 +. 65 PPS, 5 TABS, 14 FIGS, 10 REFS, MAY 1977

THIS REPORT EXPLORES IN PRELIMINARY FASHION THE COURSE OF A POSTULATED ACCIDENT SCENARIO IN AN LMFBR INVOLVING RUPTURE OF ALL PIPING CONNECTED TO A REACTOR VESSEL IN THE EVENT OF AN EARTHQUAKE (OR AN EQUIVALENT SCENARIO INVOLVING BOTH LOSS OF HEAT REMOVAL AND SYSTEM RUPTURE). THE CORE IS SUCCESSFULLY SHUT DOWN BUT DECAY HEAT IMPOSES A THREAT TO CORE INTEGRITY. A POSSIBLE ACCIDENT SCENARIO WITH THESE INITIAL CONDITIONS IS PRESENTED, INCLUDING SODIUM VOIDING, CLAD AND FUEL MELTDOWN, AND POSSIBLE RECRITICALITY.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

ACCIDENT, CORE DISRUPTIVE + REACTOR, LMFBR + ACCIDENT, LOSS OF COOLANT + DECAY HEAT + FUEL MELTDOWN + CORE MELTDOWN + ACCIDENT ANALYSIS + JACOBS + HJCK + NRC-7

127823

127823 *CONTINUED*
ABRAHAMSON GR + CAGLIOSTRO DJ + FLORENCE AL
TESTS IN SUPPORT OF LMFBR
STANFORD RESEARCH INST., MENLO PARK, CALIF.
15 PPS, 17 FIGS, NUCLEAR ENGINEERING & DESIGN, 42(1), PP. 89-104 (JUNE 1977)

TESTS IN SUPPORT OF LMFBR PROJECTS FOR POTENTIAL INCIDENTS INVOLVING A HYPOTHETICAL CORE
DISRUPTIVE ACCIDENT OR SODIUM-WATER INTERACTIONS IN STEAM GENERATORS HAVE TWO POSSIBLE GOALS:
(1) TO EVALUATE THE INTEGRITY OF THE PRIMARY CONTAINMENT AFTER THE DESIGN IS FROZEN OR (2) TO
INVESTIGATE DESIGN OPTIONS IN SUPPORT OF PRIMARY CONTAINMENT DESIGN. THE FFTF TESTS HAD THE
FIRST GOAL. THE CURRENT CRBR TESTS HAVE THE SECOND GOAL. THIS PAPER DISCUSSES TEST PLANNING,
SOURCES FOR SIMULATING LOADS, MODELING, AND INSTRUMENTATION. THE MAIN SOURCE DESCRIBED INVOLVES
CONTROLLED VENTING OF EXPLOSIVE GASES.

ACCIDENT, CORE DISRUPTIVE + SODIUM + METAL WATER REACTION + *CONTAINMENT INTEGRITY + *CONTAINMENT DESIGN +
TESTING + FFTF (TR) + REACTOR, TEST + CLINCH RIVER (LMFBR) + *REACTOR, LMFBR

128320
THEOFANOUS TG + SPEIS TP + DENISE RP
LMFBR ACCIDENT ENERGETICS AND THEIR ROLE IN LICENSING
PURDUE UNIV., LAFAYETTE, INDIANA + U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON
CONF-761001(VOL. II) +. 19 PPS, PP. 369-87, FROM PROCEEDINGS OF THE INTERNATIONAL MEETING ON FAST REACTOR
SAFETY & RELATED PHYSICS; CHICAGO, ILL., OCT. 5-8, 1976

THE ROLE OF CORE DISRUPTIVE ACCIDENTS IN THE LICENSING OF LMFBR'S IS ADDRESSED, IN PARTICULAR AS
IT RELATES TO THE CRBR. THE EVOLUTION OF THE NRC'S CONTAINMENT DESIGN REQUIREMENTS IS DISCUSSED
AND THE TECHNICAL BASIS FOR ITS PRESENT POSITION REVIEWED. THE INITIATORS CONSIDERED FOR
ENERGETIC CORE DISRUPTION ARE LOSS-OF-FLOW (LOF) AND TRANSIENT OVERPOWER (TOP) BOTH WITHOUT
SCRAM. IN ADDITION TO CONSIDERING THE IMMEDIATE MECHANICAL DISASSEMBLY POTENTIAL FROM THESE
INITIATORS, THE POTENTIAL FOR RECRITICALITY DURING MELTDOWN PHASES IS ALSO ASSESSED. THE LOSS-OF-
FLOW CASES ARE GIVEN PARTICULAR ATTENTION BECAUSE OF THE APPARENT POTENTIAL FOR SIGNIFICANT
ENERGETICS.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*REACTOR, LMFBR + CLINCH RIVER (LMFBR) + *ACCIDENT, CORE DISRUPTIVE + *LICENSING PROCESS + ACCIDENT, LOSS OF
FLOW + ACCIDENT, CRITICALITY + CORE MELTDOWN

128656
FAUSKE HK
ASSESSMENT OF ACCIDENT ENERGETICS IN LMFBR CORE-DISRUPTIVE ACCIDENTS
ARGONNE NATIONAL LAB., ILL.
11 PPS, 1 TAB, 9 FIGS, 33 REFS, NUCLEAR ENGINEERING & DESIGN, 42(1), PP. 19-29 (JUNE 1977) (FROM SEMINAR HELD
IN CONJUNCTION WITH 4TH SMIRT CONF.)

AN ASSESSMENT OF ACCIDENT ENERGETICS IN LMFBR CORE-DISRUPTIVE ACCIDENTS IS GIVEN WITH EMPHASIS ON
THE GENERIC ISSUES OF ENERGETIC RECRITICALITY AND ENERGETIC FUEL-COOLANT INTERACTION EVENTS.
APPLICATION OF A FEW GENERAL BEHAVIOR PRINCIPLES TO THE OXIDE-FUELED SYSTEMS SUGGEST THAT SUCH
EVENTS ARE HIGHLY UNLIKELY FOLLOWING A POSTULATED CORE MELTDOWN EVENT. THESE GENERAL PRINCIPLES
ARE: (1) A SELF-HEATED LIQUID BECOMES DISPERSIVE AND (2) FINE MIXING OF A COLD AND HOT FLUID, A
NECESSARY CONDITION FOR DEVELOPING SUSTAINED PRESSURE AND LARGE DAMAGE POTENTIAL FROM THERMAL
INTERACTIONS, REQUIRES SPONTANEOUS NUCLEATION ON CONTACT.

REACTOR, LMFBR + ACCIDENT, CORE DISRUPTIVE + ACCIDENT, CRITICALITY + FUEL COOLANT INTERACTION + ACCIDENT
ANALYSIS + SODIUM + URANIUM DIOXIDE

130653
GARDNER PL + ERDMAN CA + REYNOLDS AB
CONDENSATION OF FUEL ONTO THE ABOVE-CORE STRUCTURE DURING AN LMFBR CORE-DISRUPTIVE ACCIDENT
UNIV. OF VA., CHARLOTTESVILLE
NUREG-0344 +. 141 PPS, 8 TABS, 16 FIGS, 51 REFS, OCT. 1977

CONDENSATION OF A PURE, SATURATED VAPOR ONTO A VERTICAL, MELTING SUBSTRATE IS ANALYZED FOR BOTH
ONE- AND TWO-MATERIAL SITUATIONS. THE RESULTS OF THIS ANALYSIS HAVE APPLICATIONS IN THE AREA OF
LMFBR ACCIDENT ANALYSIS. CONDENSATION OF THE FUEL (A MIXTURE OF URANIUM DIOXIDE AND PLUTONIUM
DIOXIDE) ONTO THE ABOVE-CORE STRUCTURE (STEEL) IS A MECHANISM FOR REDUCING THE ENERGY AVAILABLE
TO MECHANICALLY DAMAGE THE PRIMARY SYSTEM BOUNDARY. CONDENSATION WILL ALSO ALTER THE RADIOACTIVE
AEROSOL SOURCE TERM AVAILABLE FOR POTENTIAL RELEASE FROM THE PRIMARY SYSTEM.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REACTOR, LMFBR + ACCIDENT ANALYSIS + *ACCIDENT, CORE DISRUPTIVE + *CONDENSATION + *VAPOR EXCHANGE +
*CONTAINMENT INTEGRITY + MAIN COOLING SYSTEM + FUEL ROD + AEROSOL, RADIOACTIVE + FISSION PRODUCT TRANSPORT +
JACOBS + HJCK + NRC-7

9. NUCLEAR INSTRUMENTATION, CONTROL, AND SAFETY SYSTEMS

118919

VAN TILBORG PJ + STINS T
APPARATUS FOR THERMAL TRANSIENT TUBE BURST TESTS ON LMFBR CLADDING MATERIAL
STICHTING REACTOR CENTRUM NEDERLAND, PETTEN, THE NETHERLANDS
RCN-237 +. 27 PPS, 1 TAB, 13 FIGS, 3 REFS, OCT, 1975

A DESCRIPTION IS GIVEN OF INSTRUMENTATION FOR STRESS-RUPTURE TESTING OF TUBES UNDER INTERNAL GAS-PRESSURE LOADING IN A VACUUM ENVIRONMENT. DURING A TEST A TUBE IS HEATED BY AN ELECTRIC CURRENT THROUGH ITS WALL. THIS METHOD ALLOWS VERY HIGH TEST TEMPERATURES AS WELL AS RAPID TEMPERATURE VARIATIONS DURING TESTS. WHEN RAPIDLY CHANGING TEMPERATURES ARE REQUIRED THE TEMPERATURE IS CONTROLLED USING A CHROMEL AND ALUMEL THREAD SPOTWELDED TOGETHER ON THE OUTER SURFACE OF THE TUBE WALL.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REACTOR, LMFBR + FUEL ROD + STRESS RUPTURE + STEEL, STAINLESS + MEASUREMENT, TEMPERATURE + CLADDING

120154

WHITTINGHAM AC
AN EQUILIBRIUM AND KINETIC STUDY OF THE LIQUID SODIUM-HYDROGEN REACTION AND ITS RELEVANCE TO SODIUM-WATER LEAK DETECTION IN LMFBR SYSTEMS
CENTRAL ELECTRICITY GENERATING BOARD, EERKELY, UK
12 PPS, 9 FIGS, 23 REFS, J. NUCLEAR MATERIALS, 60(2), PP. 119-31 (MAY 1976)

A DETAILED STUDY OF THE THERMODYNAMIC AND KINETIC PROPERTIES OF THE LIQUID SODIUM-HYDROGEN SYSTEM HAS BEEN MADE. THE TECHNIQUE EMPLOYED WAS TO MEASURE THE RATE OF ABSORPTION TO EQUILIBRIUM OF SUCCESSIVE HYDROGEN ADDITIONS BY A VIGOROUSLY STIRRED EXCESS OF LIQUID SODIUM (<10 PPM DISSOLVED OXYGEN) IN AN ISOTHERMAL, CONSTANT VOLUME, STAINLESS STEEL (316) REACTION VESSEL IN THE TEMPERATURE RANGE 610-677 K. THE RESULTS HAVE BEEN USED TO ESTIMATE THE VARIATION OF HYDROGEN PRESSURE WITH TIME FOR A GIVEN, STEADY, WATER LEAK RATE INTO THE ARGON GAS BLANKET ABOVE THE LIQUID SODIUM LEVEL IN A SECONDARY HEAT EXCHANGER OF AN LMFBR, AND ALSO TO CALCULATE SOLUTION RATES OF HYDROGEN BUBBLES (FORMED FROM A SODIUM-WATER REACTION UNDER THE LIQUID SODIUM SURFACE) AS A FUNCTION OF INITIAL BUBBLE RADIUS.

REACTOR, LMFBR + LIQUID + SODIUM + WATER + HYDROGEN + LEAK DETECTION + HEAT EXCHANGERS

121630

GREENE DA + SANDUSKY DW
RESULTS OF SMALL LEAK BEHAVIOR AND DAMAGE PROPAGATION TESTS IN THE U.S.
GENERAL ELECTRIC COMPANY
ERDA-76/147/1 +. 27 PPS, PAPER NO. 4, PP. 135-62, PRESENTED AT US/USSR SEMINAR ON PROBLEMS OF RELIABILITY & SAFE OPERATION OF LMFBR STEAM GENERATORS; DIMITROVGRAD, USSR, JULY 26-30, 1976

WHEN A SMALL LEAK OCCURS AND IS DETECTED, THE STEAM GENERATOR SHUTDOWN SEQUENCE MUST BE OPTIMIZED TO PREVENT INTRUSION OF SODIUM INTO THE STEAM SYSTEM OR PLUGGING OF THE LEAK. TESTS WERE PERFORMED USING VARIOUS SHUTDOWN PROCEDURES TO IDENTIFY OPTIMUM CONDITIONS FOR LEAK LOCATION. METHODS TO REOPEN PLUGGED LEAKS WERE ALSO TESTED. SOME OF THE SHUTDOWN PROCEDURES REPEATEDLY PRODUCED OPEN LEAKS WHICH WERE SUBSEQUENTLY LOCATED WITH A HELIUM MASS SPECTROMETER. WASHING WITH CHEMICAL SOLUTIONS SUCCESSFULLY OPENED PLUGGED LEAKS. IT WAS FOUND THAT PULSED EDDY CURRENT AND ULTRASONIC INSPECTION APPEAR PROMISING FOR LEAK LOCATION TECHNIQUES. MORE WORK IS REQUIRED TO TRANSFER SUCH TECHNIQUES FROM THE LABORATORY TO THE OPERATING STEAM GENERATOR.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

JACOBS + REACTOR, LMFBR + STEAM GENERATOR + LEAK + BEHAVIOR + DAMAGE + *LEAK DETECTION + ULTRASONICS + FLOW THEORY AND EXPERIMENTS + TESTING

121634

KOSLOV FA + KUZNETSOV EK + YEGOROV VA
HYDROGEN DETECTOR IN SODIUM
ERDA-76/147/1 +. 23 PPS, PAPER NO. 6, PP. 265-88, PRESENTED AT US/USSR SEMINAR ON PROBLEMS OF RELIABILITY & SAFE OPERATION OF LMFBR STEAM GENERATORS; DIMITROVGRAD, USSR, JULY 26-30, 1976

THE HYDROGEN IN SODIUM DETECTOR DESCRIPTION, THE FUNCTION OF WHICH IS BASED ON USING THE SITUATED IN SODIUM FLOW DIFFUSIONAL MEMBRANE IS GIVEN IN THIS REPORT. THE HYDROGEN WHICH DIFFUSED THROUGH THE MEMBRANE, EVACUATED CONTINUOUSLY BY MEANS OF THE MAGNETIC DISCHARGE TYPE PUMP, THE CONCENTRATION OF HYDROGEN IN SODIUM IS DETERMINED ON THE BASE OF THE DISCHARGE CURRENT. THE HYDROGEN IN SODIUM DETECTOR SENSITIVITY IS ABOUT $5 \times 10^{(-6)}$ % BY WEIGHT AND THE TIME RESPONSE IS ABOUT 30 SEC.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

JACOBS + REACTOR, LMFBR + STEAM GENERATOR + *HYDROGEN + *LEAK DETECTION + SODIUM

121635

SIMMONS WR + EPSTEIN LF + GERRELS EE + ROY P + BERKEY E + GRUNDY B
HYDROGEN AND OXYGEN LEAK DETECTOR SYSTEM DEVELOPMENTS IN THE U.S.
ARGONNE NATIONAL LAB., II. + GENERAL ELECTRIC CO. + WESTINGHOUSE ELECTRIC CORP.

121635 *CONTINUED*
ERDA-76/147/1 +. 31 PPS, PAPER NO. 9, PP. 289-320, PRESENTED AT US/USSR SEMINAR IN PROBLEMS OF RELIABILITY & SAFE OPERATION OF LMFBR STEAM GENERATORS; DIMITROVGRAD, USSR, JULY 26-20, 1976

THE U.S. EFFORT ON THE DETECTION OF SMALL WATER LEAKS INTO SODIUM-HEATED STEAM GENERATORS HAS CONCENTRATED ON TECHNIQUES FOR OBSERVATION AND MEASUREMENT OF THE REACTOR PRODUCTS IN LIQUID METAL. HYDROGEN METERS CAPABLE OF DETECTING AS LITTLE AS 2 OR 3 PARTS PER BILLION IN SODIUM HAVE BEEN DEVELOPED USING NICKEL MEMBRANES THROUGH WHICH THE H₂ CAN PERMEATE. SINCE HYDROGEN IN SODIUM CAN ARISE FROM SOURCES OTHER THAN A WATER LEAK, METERS WHICH CAN DETECT OXYGEN IN SODIUM HAVE ALSO BEEN DEVELOPED. THE EXPERIENCE WITH THESE THREE METER TYPES IS DESCRIBED, AS WELL AS CURRENT LEAK DETECTION STUDIES IN PROGRESS. THE LIMITATIONS AND DEFICIENCIES OF THESE INSTRUMENTS ARE ALSO DISCUSSED.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

JACOBS + REACTOR, LMFBR + STEAM GENERATOR + HYDROGEN + OXYGEN + *LEAK DETECTION + *EQUIPMENT DEVELOPMENT

121738
BOGENSBERGER HG
VAPOUR PRESSURE MEASUREMENTS TO 7000 K AND EQUATION OF STATE OF OXIDE FUELS FOR FAST REACTOR SAFETY ANALYSIS
GESELLSCHAFT FUR KERNFORSCHUNG, KARLSRUHE, F.R. GERMANY
EURFNR-1361 +. 52 PPS, 5 TABS, 3 FIGS, 26 REFS, MAY 1976

A NEW HIGH-ENERGY LASER TECHNIQUE, INCLUDING FAST TEMPERATURE RECORDING IN THE MICROSECOND RANGE, WAS DEVELOPED FOR MEASURING THE VAPOUR PRESSURE OF FAST BREEDER URANIUM-PLUTONIUM OXIDE FUELS UP TO 7000 K. IN THE TERNARY SYSTEM, THE PRESSURE OF URANIUM-PLUTONIUM OXIDE ABOVE ITS MELTING POINT WAS DETERMINED TO BE $\log P \text{ (ATM)} = 7.966 - (28137/T)$, YIELDING A HIGH-TEMPERATURE HEAT OF EVAPORATION OF $\Delta H \text{ (SUB EVAP)} = 128.7 \text{ KCAL/MOL}$. MEASUREMENT OF THE UO₂ PARTIAL PRESSURE OVER THE SOLID GAVE $\log P \text{ (ATM)} = 9.365 - (32436/T)$, RESULTING IN A HEAT OF SUBLIMATION OF $\Delta H \text{ (SUB SUB)} = 148.4 \text{ KCAL/MOL}$. THE DIFFERENCE OF THESE HEATS YIELDS THE HEAT OF FUSION $\Delta H \text{ (SUB F)} = 19.7 \text{ KCAL/MOL}$, WHICH IS IN GOOD AGREEMENT WITH THE LITERATURE VALUE OF 19.4 KCAL/MOL .

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

SAFETY ANALYSIS + EQUATION OF STATE + ANALYTICAL TECHNIQUE + LASER + HIGH TEMPERATURE + REACTOR, BREEDER + REACTOR, LMFBR + VAPOR PRESSURE + OXIDE + URANIUM + JACOBS

122559
RUBEL P
HUMAN FACTORS IN CRBRP DESIGN AND PLANNING FOR SAFETY
OAK RIDGE NATIONAL LABORATORY, TENNESSEE
ORNL/TM-5681 +. 35 PPS, 1 FIG, 29 REFS, MARCH 1977

HUMAN ENGINEERING SOURCE AND APPLICATIONS LITERATURE WAS REVIEWED CRITICALLY TO OBTAIN GUIDANCE FOR FUTURE EFFORTS TO ENHANCE THE OPERABILITY AND MAINTAINABILITY OF THE CLINCH RIVER BREEDER REACTOR PLANT (CRBRP). SELECTED FINDINGS WERE INCORPORATED INTO RECOMMENDATIONS TO APPLY SPECIFIC HUMAN ENGINEERING METHODS AT APPROPRIATE STAGES OF THE CRBRP PROJECT.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

RELIABILITY ANALYSIS + *RELIABILITY, COMPONENT + *OPERATOR ACTION + CLINCH RIVER (LMFBR) + REACTOR, LMFBR + FAILURE, DESIGN ERROR + FAILURE, OPERATOR ERROR + THEORETICAL INVESTIGATION + JACOBS

123867
CANNON CP
TEMPERATURE AND VOLTAGE TESTS ON MGO INSULATED COAXIAL CABLES
HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
HEDL-TME 76-66 +. 39 PPS, FEB. 1977

MGO INSULATED NUCLEAR INSTRUMENTATION CABLES, DESIGNED FOR USE IN IN-VESSEL LMFBR ENVIRONMENTS, WERE PROCURED USING SPECIAL HEDL/VENDOR DEVELOPED SPECIFICATIONS AND TESTED. THE ULTIMATE GOAL IS OPERATION AT 650 DEG C, 800 VOLTS DIRECT CURRENT (VDC); A KEY INTERMEDIATE GOAL FOR SPECIFIC APPLICATIONS IS OPERATION AT 450 DEG C, 800 VDC. THE CABLES SATISFIED ALL TEST REQUIREMENTS, INCLUDING ABSENCE OF BREAKDOWN PULSE NOISE (BPN), DURING LONG-TERM TESTS (600 HOURS) AT 450 DEG C, 1000 VDC CONTINUOUS.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

JACOBS + *CABLES AND CONNECTORS + INSTRUMENT, NUCLEAR + REACTOR, LMFBR + *TESTING + PERFORMANCE + THERMAL CONSIDERATION + TEST, PROOF + HIGH TEMPERATURE + ELECTRICAL CONDUCTION + INSULATION

124927
DE LORENZO JT + BURNS RS + VALENTINE KH
REMOTE SIGNAL TRANSMISSION FOR LIQUID METAL FAST BREEDER REACTORS
OAK RIDGE NATIONAL LAB., TENN.
ORNL/TM-5629 +. 58 PPS, MAY 1977

124927 *CONTINUED*

REMOTE SIGNAL TRANSMISSION OF IN-CORE VARIABLES OF A LIQUID-METAL FAST BREEDER REACTOR IS FEASIBLE WITH PULSE-ECHO (SONAR) TECHNIQUES, FLUIDIC OSCILLATORS, AND IN-CORE ELECTRONIC DEVICES. SOME OF THE MAJOR PROBLEMS ARE THE ACHIEVEMENT OF LINE-OF-SIGHT ACCESS TO THE CORE, DEVELOPMENT OF SODIUM-IMMERSIBLE TRANSDUCERS FOR OPERATION AT HIGH TEMPERATURES (GREATER THAN 1000 DEG F) AND IN A FAST-NEUTRON FLUENCE (GREATER THAN 1×10^{18} NVT), DEVELOPMENT OF SPATIAL MULTIPLEXING TO OFFSET A LIMITED NUMBER OF OPERATING FREQUENCIES, AND LOWERING OF THE DEVELOPMENTAL COSTS.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION: SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

*REACTOR, LMFBR + *CORE + *INSTRUMENT, SURVEILLANCE + HIGH TEMPERATURE + INSTRUMENT, FLUIDICS + OSCILLATION + ELECTRONIC FUNCTION UNITS + JACOBS

126416

ANDERSON TT + GAVIN AP + BOBIS JP
IRRADIATION OF MICROPHONES IN THE EBR-II CORE
ARGONNE NATIONAL LAB., ILL.

ANL-CT-76-20 +. 109 PPS, 6 TABS, 30 FIGS, 5 REFS, JUNE 1976

SIX ANL DEVELOPED HIGH TEMPERATURE MICROPHONE (ACOUSTIC DETECTORS) HAVE BEEN EXPOSED IN FLOWING SODIUM IN THE IN-CORE INSTRUMENT TEST FACILITY (INCOT) IN EBR-II FOR 7 MONTHS WITHOUT ANY INDICATIONS OF SERIOUS DEGRADATION OF SIGNAL OUTPUT DUE TO THE EXPOSURE. THE YG05 EXPERIMENT (EBR-II INCOT EXPERIMENT DESIGNATION) WAS PERFORMED TO OBTAIN DATA WHICH WOULD BE USEFUL IN EVALUATING THE ABILITY OF THE MICROPHONES WHOSE ACTIVE ELEMENTS ARE LITHIUM NIOBATE TO SERVE AS SENSORS FOR ACOUSTIC SURVEILLANCE OF FAST BREEDER REACTORS.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

ANL + R AND D PROGRAM + *NOISE ANALYSIS + ACOUSTICS + REACTOR, LMFBR + *EBR 1 AND 2 (RE) + REACTOR, TEST + IRRADIATION TESTING

127647

RUPPERT E + VINZENS K + STEHLE H
UNDER SODIUM RELIABILITY TESTS ON CORE COMPONENTS AND IN-CORE INSTRUMENTATION
INTERATOM, BENSBERG, F.R. GERMANY
7 PPS, 17 FIGS, 7 REFS, ATOMKERNENERGIE, 29(3), PP. 176-82 (MARCH 1977)

A SODIUM TEST FACILITY FOR FAST BREEDER CORE COMPONENTS (AKB), BUILT BY INTERATOM AT BENSBERG, HAS BEEN OPERATING SINCE 1971 TO TEST FUEL DUMMIES AND BLANKET ELEMENTS AS WELL AS ABSORBER ELEMENTS UNDER SIMULATED NORMAL AND EXTREME REACTOR CONDITIONS. INDIVIDUAL FULL-SCALE FUEL OR BLANKET ELEMENTS AND ARRAYS OF SEVEN ELEMENTS, MODELLING A SECTION OF THE SNR-300 REACTOR CORE, HAVE BEEN TESTED UNDER A WIDE RANGE OF SODIUM MASS FLOW AND ISOTHERMAL TEST CONDITIONS UP TO 925 K AS WELL AS UNDER CYCLIC CHANGED TEMPERATURE TRANSIENTS. BESIDES ENDURANCE TESTING OF THE CORE COMPONENTS A SPECIAL SODIUM AND HIGH-TEMPERATURE INSTRUMENTATION IS PROVIDED TO INVESTIGATE THERMOHYDRAULIC AND VIBRATIONAL BEHAVIOUR OF THE TEST OBJECTS. DURING ALL TEST PERIODS THE MAIN SUBASSEMBLY CHARACTERISTICS COULD BE REPRODUCED AND THE RELIABILITY OF THE INSTRUMENTATION COULD BE PROVEN.

SODIUM + TESTING + REACTOR, LMFBR + GERMANY + REACTOR TEST FACILITY + VIBRATION + *CORE COMPONENTS + MEASUREMENT + *INSTRUMENT, IN CORE

128334

SPECHT ER + PASCHALL RK + MARQUETTE M
HYDRAULICALLY SUPPORTED ABSORBER BALLS SHUTDOWN SYSTEM FOR INHERENTLY SAFE LMFBR'S
ATOMICS INTERNATIONAL, CANOGA PARK, CALIF.
CONF-761001(VOL. II) +. 13 PPS, PP. 683-95, FROM PROCEEDINGS OF THE INTERNATIONAL MEETING ON FAST REACTOR SAFETY & RELATED PHYSICS; CHICAGO, ILL., OCT. 5-8, 1976

A DIVERSE, INHERENTLY-ACTUATED CONTROL SYSTEM WOULD BE VERY VALUABLE FOR ADVANCED LMFBR'S SINCE ITS USE MAY PRECLUDE THE CONSIDERATION OF A "HYPOTHETICAL CORE DISRUPTIVE ACCIDENT" AS A DESIGN BASIS. AN INHERENT SHUTDOWN SYSTEM WHICH USES A NUMBER OF SUBASSEMBLIES, EACH CONTAINING A COLUMN OF HYDRAULICALLY SUPPORTED TANTALUM BALLS, IS BEING STUDIED. THIS SYSTEM APPEARS TO BE CAPABLE OF SUCCESSFULLY PROTECTING THE PUBLIC (AND THE REACTOR) FROM LOW-PROBABILITY HIGH-CONSEQUENCE EVENTS, SUCH AS A LOSS-OF-FLOW OR TRANSIENT-OVER-POWER INCIDENT WITH FAILURE OF THE NORMAL CONTROL SYSTEM (OR SYSTEMS) TO SCRAM.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REACTOR, LMFBR + SHUTDOWN MECHANISM, SELF + PROTECTION SYSTEM + *SHUTDOWN SYSTEM, SECONDARY

128969

SOWA ES + BARTHOLD WP + EGGEN DT
LMFBR SELF-ACTIVATED SHUTDOWN SYSTEMS
ARGONNE NATIONAL LAB., ILL.
CONF-761001-45 +. 11 PPS, FROM INTERNATIONAL MEETING ON FAST REACTOR SAFETY AND RELATED PHYSICS; CHICAGO, ILL., OCT. 1976

SELF-ACTUATED SHUTDOWN SYSTEMS, FULLY CONTAINED WITHIN THE DIMENSIONS OF A FUEL SUBASSEMBLY AND INSTALLED IN THE CORE IN JUDICIOUSLY CHOSEN LOCATIONS, CAN PROVIDE AN IMPORTANT ADDITIONAL SAFETY

128969 *CONTINUED*

FEATURE FOR LMFBRs. IF ACTUATED BY PHENOMENA INHERENT TO THE SYSTEM AND ITS IMMEDIATE ENVIRONMENT, THESE SYSTEMS CAN CONTRIBUTE CONSIDERABLY TO THE TOTAL RELIABILITY OF THE OVERALL PLANT PROTECTION SYSTEM, IN PARTICULAR AS REGARDS PROTECTIN AGAINST HUMAN ERROR. THIS TYPE OF SHUTDOWN SYSTEM IS CAPABLE OF INSERTING A SUBSTANTIAL AMOUNT OF NEGATIVE REACTIVITY INTO THE CORE WITH A RELATIVELY SMALL IMPACT ON PLANT PERFORMANCE.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REACTOR, LMFBR + PROTECTION SYSTEM + *SHUTDOWN MECHANISM, SELF + SHUTDOWN SYSTEM, SECONDARY + INSTRUMENT, IN CORE

129239

HUTTER E + TUMA LA

TUBULAR GAGE FOR A LIQUID-METAL-COOLED FAST BREEDER REACTOR

U.S. PATENT 4,023,811 +. JUNE 14, 1977

THIS PATENT RELATES TO SPRING-LOADED PLUNGERS WHICH ARE ARRANGED ABOUT A HOUSING FOR INSERTION INTO A POLYGONAL TUBE, ONE PLUNGER FOR EACH SIDE OF THE TUBE. EACH PLUNGER HAS A LOCKING CAM AND SLIDING WEDGE MECHANISM WHICH CAN OVERCOME THE SPRING FORCE ASSOCIATED WITH THE PLUNGER AND LOCK IT IN ANY POSITION. THE WEDGES ARE OPERATED BY A ROD MOVABLE AXIALLY IN THE HOUSING.

AVAILABILITY - THE U.S. PATENT OFFICE, DEPT. OF COMMERCE, WASHINGTON, D.C.

UNITED STATES + PATENT + REACTOR, LMFBR + MEASUREMENT + *INSTRUMENT, LIQUID LEVEL

10. ELECTRICAL POWER SYSTEMS

122043
ECKER JEB
FFTF ELECTRICAL SYSTEM RELIABILITY STUDY
HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
HEDL-TME 76-50 +, 226 PPS, 14 TABS, 11 FIGS, AUG. 1976

SIX FAILURE EVENTS WERE SPECIFICALLY STUDIED -- THESE INCLUDED AN ASSESSMENT OF THE EXPECTED NUMBER OF TIMES THE FFTF WOULD BE UNAVAILABLE FOR OPERATION DUE TO FAILURES IN THE ELECTRICAL SYSTEM, AS WELL AS EVALUATIONS OF THE EXPECTED NUMBER OF OCCURRENCES OF A LOSS OF ELECTRICAL POWER TO VARIOUS GROUPS OF CRITICAL COMPONENTS IN THE FFTF. THE GROUPS OF CRITICAL COMPONENTS IN THE EVALUATION ARE THE EMERGENCY POWER SYSTEM, THE ZTO SYSTEM, THE MAIN CHILLER COMPONENTS, THE PRIMARY AND SECONDARY CRDM MG SETS AND THE PRIMARY SODIUM PUMPS IN THE HEAT TRANSPORT SYSTEM. IN THE COURSE OF EVALUATING THE SYSTEM RELIABILITY, SEVERAL COMPONENTS THAT DO CONTRIBUTE SIGNIFICANTLY TO THE PROBABILITY OF SYSTEM FAILURE WERE IDENTIFIED.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

JACOBS + RELIABILITY ANALYSIS + *RELIABILITY, SYSTEM + FAULT TREE ANALYSIS + ELECTRIC POWER + ELECTRIC POWER, ALTERNATE + ELECTRIC POWER, AUXILIARY + ELECTRIC POWER, NORMAL + ELECTRIC POWER, SHUTDOWN + ELECTRIC POWER, UNINTERRUPTED + ELECTRIC POWER, VITAL + EMERGENCY POWER, ELECTRIC + FAILURE, EQUIPMENT + PROBABILITY + *FFTF (TR) + REACTOR, LMFBR

124318
AITKEN A
ASSESSMENT OF A HIGH-INTEGRITY PROTECTIVE SYSTEM FOR LOSS OF ELECTRIC POWER
UKAEA SAFETY & RELIABILITY DIRECTORATE, UK
6 PPS, 4 FIGS, 1 REF, NUCLEAR SAFETY, 18(2), PP. 168-73 (MARCH-APRIL 1977)

THIS ARTICLE OUTLINES THE PROBLEM AND THE PROBLEM AREAS AS OBSERVED IN A RECENT ASSESSMENT OF A HIGH-INTEGRITY PROTECTIVE SYSTEM FOR THE PROTOTYPE FAST REACTOR, A LIQUID-METAL-COOLED FAST BREEDER REACTOR AT DOUNREAY. TARGETS FOR RELIABILITY IN INDIVIDUAL MEASUREMENTS, SAFETY CIRCUITS, AND SHUTDOWN DEVICES ARE DETERMINED BY RELIABILITY APPORTIONMENT WITHIN THE DIVERSE SYSTEM THAT WAS DESIGNED TO MEET WELL-RECOGNIZED BASIC PRECEPTS. SOME COMMENTS ARE MADE ON OPERATING EXPERIENCE IN RELATION TO THE HIGH REQUIREMENTS.

REACTOR, LMFBR + UNITED KINGDOM + *PFR (LMFR) + *REACTOR PROTECTION SYSTEM + RELIABILITY ANALYSIS + *RELIABILITY, SYSTEM + ACCIDENT, LOSS OF POWER

11. CONTAINMENT OF NUCLEAR FACILITIES

120000
BRINKMAN CR + SIKKA VK + KING RT
MECHANICAL PROPERTIES OF LMFBR PRIMARY PIPING MATERIALS
OAK RIDGE NATIONAL LABORATORY, TENNESSEE
ORNL-5199 +. 48 PPS, 15 FIGS, 84 REFS, NOV. 1976

A REVIEW IS PRESENTED OF THE AVAILABLE TENSILE, CREEP-RUPTURE, FATIGUE, CREEP-FATIGUE, AND TOUGHNESS PROPERTIES OF RELEVANT PRODUCT FORMS OF TYPES 316 AND 304 STAINLESS STEEL AND ASSOCIATED AS-DEPOSITED WELD METALS TYPES 308, 16-8-2 AND 316. SINCE TYPE 316 STAINLESS STEEL AND ITS WELDS IN HOT-LEG PIPING APPLICATIONS MUST OPERATE AT TEMPERATURES WITHIN THE CREEP RANGE, A DESCRIPTION OF BOTH TIME-DEPENDENT AND TIME-INDEPENDENT BEHAVIOR IS EMPHASIZED FOR THIS MATERIAL. TENSILE YIELDS AND ULTIMATE STRENGTHS, AS WELL AS CREEP-RUPTURE STRENGTHS OF TUBE, PIPE, AND PLATE PRODUCT FORMS IN THE AS-RECEIVED OR MILL-ANNEALED CONDITION, WERE GENERALLY ABOVE ASME CODE OR NUCLEAR SYSTEMS MATERIALS (NSM) HANDBOOK MINIMUM TREND CURVES.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

PROPERTY, MECHANICAL + REACTOR, LMFBR + STEEL, STAINLESS + WELDING + PIPES AND PIPE FITTINGS + TENSILE PROPERTY + FATIGUE + CREEP + FRACTURE TOUGHNESS + JACOBS

120378
KAWAGUCHI O + ANDO Y + MATSUMURA M + TAKEI A
STRUCTURAL SHOCK TESTS OF PROTOTYPE EBR 'MONJU' SCALE MODELS
POWER REACTOR & NUCLEAR FUEL DEVELOPMENT CORP., TOKYO, JAPAN + UNIV. OF TOKYO, JAPAN
21 PPS, 7 TABS, 12 FIGS, 3 REFS, NUCLEAR ENGINEERING & DESIGN, 38(1), PP. 109-29 (JULY 1976)

PRESENTS SOME RESULTS OF EXPERIMENTS WHICH SIMULATE THE STRUCTURAL DYNAMIC RESPONSE OF A LMFBR PRIMARY COOLANT BOUNDARY TO A HYPOTHETICAL CORE DISRUPTIVE ACCIDENT (HCDA) BASED ON SCALE MODELS AND HIGH EXPLOSIVES. IT WAS NOTED THAT HIGH EXPLOSIVES ARE NO LONGER A GOOD SIMULANT OF THE HCDA. HOWEVER, THE MAIN PURPOSE OF THE PROGRAM, WHICH INCLUDED THIS EXPERIMENT, IS NOT TO EXPERIMENTALLY PREDICT THE DYNAMIC RESPONSE OF THE REACTOR STRUCTURE AT THE HCDA, BUT TO VALIDATE COMPUTER CODES, WHICH DESCRIBE THE PRESSURE WAVE PROPAGATION AND DAMAGE PROCESS IN THE REACTOR STRUCTURES, USING THE DATA OBTAINED FROM THESE MODEL EXPERIMENTS.

REACTOR, LMFBR + ACCIDENT, HYPOTHETICAL + ACCIDENT, CORE DISRUPTIVE + EXPLOSIVE, CONVENTIONAL + COMPUTER PROGRAM + MODEL TESTING + CONTAINMENT + PRESSURE PULSE + SHOCK WAVE + PRESSURE VESSELS

120625
FISTEDIS SH
STRUCTURAL RESPONSE OF FAST BREEDER REACTORS TO HYPOTHETICAL CORE DISRUPTIVE ACCIDENTS
AGRONNE NATIONAL LABORATORY, ILLINOIS
13 PPS, 8 FIGS, 32 REFS, NUCLEAR ENGINEERING & DESIGN, 38(1), PP. 43-54 (JULY 1976)

SINCE THE BEGINNING OF LIQUID METAL-COOLED FAST BREEDER REACTOR (LMFBR) DEVELOPMENT, EFFORTS HAVE BEEN MADE TO GAGE THE STRUCTURAL RESPONSE OF THE CORE COMPONENTS, THE PRIMARY AND SECONDARY SYSTEM COMPONENTS, AND THE CONTAINMENT TO THE EFFECTS OF HYPOTHETICAL CORE DISRUPTIVE ACCIDENTS (HCDAS). THE EFFORT RESULTED IN THE SYSTEMATIC DEVELOPMENT OF ANALYSES AND CODES, AND THE PERFORMANCE OF CONFIRMATORY EXPERIMENTS. GRADUALLY, AN ORGANIZED BODY OF KNOWLEDGE DEVELOPED IN THIS SECTOR OF TECHNOLOGY. THIS PAPER BRIEFLY DESCRIBES (1) THE PROBLEMS INVOLVED IN THE EVALUATION OF THE RESPONSE OF THE LMFBR TO HCDAS; (2) THE CURRENTLY AVAILABLE ANALYTICAL TOOLS AND EXTENT OF THEIR CONFIRMATION; AND (3) THE REMAINING AREAS OF FURTHER DEVELOPMENT NEEDED.

REACTOR, LMFBR + ACCIDENT, CORE DISRUPTIVE + COMPONENTS + ANALYTICAL MODEL + RESPONSE TIME + COMPUTER PROGRAM

121641
KRUGER GB + MURDOCK TB + SANE JO + RODWELL E
DESIGN OF THE US-CRBRP SODIUM-WATER REACTION PRESSURE RELIEF SYSTEM
GENERAL ELECTRIC CO. + WESTINGHOUSE ELECTRIC CORP.
ERDA-76/147/1 +. 24 PPS, PAPER NO. 15, PP. 471-94, PRESENTED AT US/USSR SEMINAR ON PROBLEMS OF RELIABILITY & SAFE OPERATION OF LMFBR STEAM GENERATORS; DIMITROVGRAD, USSR, JULY 26-30, 1976

PROTECTION AGAINST INTERMEDIATE SODIUM SYSTEM OVERPRESSURE FROM THE SODIUM/WATER REACTION ASSOCIATED WITH LARGE LEAKS WITHIN THE CRBRP STEAM GENERATORS IS PROVIDED BY THE SODIUM/WATER REACTION PRESSURE RELIEF SYSTEM (SWRPRS). THIS SYSTEM CONSISTS OF RUPTURE DISKS CONNECTED TO THE INTERMEDIATE SODIUM PIPING ADJACENT TO THE INLET TO THE SUPERHEATER AND OUTLET FROM THE EVAPORATOR MODULES. THE RUPTURE DISKS RELIEVE INTO PIPING THAT LEADS TO REACTION PRODUCT SEPARATOR TANKS, WHICH IN TURN ARE VENTED TO A CENTRIFUGAL SEPARATOR AND FLARE STACK ARRANGED TO BURN HYDROGEN GAS EXHAUSTING INTO THE ATMOSPHERE. ANALYSES HAVE BEEN CONDUCTED USING THE TRANSWRAP COMPUTER CODE TO PREDICT THE SYSTEM PRESSURES AND FLOW RATES DURING THE LARGE LEAK EVENT.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

JACOBS + REACTOR, LMFBR + STEAM GENERATOR + *METAL WATER REACTION + *PRESSURE RELIEF + SODIUM + CLINCH RIVER (LMFBR) + COMPUTER PROGRAM + *THERMAL ANALYSIS

121729

121729 *CONTINUED*

GLUEKLER EL
EX-VESSEL CORE RETENTION CONCEPT FOR EARLY SIZED LMFBRs
GENERAL ELECTRIC CO., SUNNYVALE, CALIF.
GEAP-14121 +. 53 PPS, 8 TABS, 27 FIGS, 19 REFS, AUG. 1976

THE SELECTION OF AN EXVESSEL POST-ACCIDENT HEAT REMOVAL AND CORE RETENTION CONCEPT IS DESCRIBED.
A CRUCIBLE SYSTEM WITH ACTIVE HEAT REMOVAL SYSTEM SEEMED THE MOST PROMISING. THE CRUCIBLE
CONCEPT IS DESCRIBED IN DETAIL AND SCOPING ANALYSES ADDRESSING THE THERMAL AND STRUCTURAL
PERFORMANCE OF THE SYSTEM ARE PRESENTED.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62,
OAK RIDGE, TENN. 37830

*CORE CATCHER + REACTOR, LMFBR + ACCIDENT, CORE DISRUPTIVE + CORE MELTDOWN + THERMAL ANALYSIS + PERFORMANCE +
JACOBS + SODIUM + ACCIDENT, HYPOTHETICAL

121754

CALRK AF + NOBLES RG + BUSCHMAN HW
OPERATING EXPERIENCE WITH THE EBR-II ROTATING-PLUG FREEZE SEALS - 1969-1975
ARGONNE NATIONAL LABORATORY, ILLINOIS
ANL-75-10 +. 66 PPS, 7 TABS, 37 FIGS, MARCH 1976

THE EBR-II ROTATING-PLUG FREEZE SEALS HAVE CONTINUED TO FULFILL THE DESIGN REQUIREMENTS OF ACTING
AS A BLANKET-GAS SEAL WHILE PROVIDING A SOLID MECHANICAL SEAL DURING REACTOR POWER RUNS AND A
MOVABLE LIQUID SEAL DURING FUEL HANDLING. OPERATION OF THE SEALS HAS NOT BEEN TROUBLE-FREE, AND
MODIFICATIONS WERE MADE TO IMPROVE OPERATION AND MAINTENANCE. SINCE 1969, EXTENSIVE CHANGES WERE
MADE IN THE TEMPERATURE CONTROL OF THE SEALS IN ORDER TO REDUCE THE MAINTENANCE EFFORT AND
IMPROVE THE OPERATIONAL CHARACTERISTICS OF THE SYSTEM.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62,
OAK RIDGE, TENN. 37830

JACOBS + *OPERATING EXPERIENCE SUMMARY + *SEAL + EBR 1 AND 2 (RE) + REACTOR, LMFBR + MODIFICATION +
MAINTENANCE AND REPAIR + ANL

122592

GROSBERG AJ
LMFBR FUEL PIN BEHAVIOR: A LIMITED PARAMETER SURVEY USING THE CODE FRUMP
IMPERIAL COLLEGE, LONDON, ENGLAND
3 PPS, 6 FIGS, J. INST. NUCL. ENGRS., 17(5), PP. 120-22 (OCT. 1976)

FUEL TO CLADDING GAP, FUEL CENTER TEMPERATURE, AND HOOP STRESS ARE CALCULATED FOR FOUR POWER
RATINGS (350, 250, 150 AND 50 W/G) AND THREE OUTER CLAD TEMPERATURES (673, 923 AND 973K). GAP
CLOSURE IS DUE PRIMARILY TO FUEL SWELLING. FUEL CENTER TEMPERATURE DEPENDS ON GAP CONDUCTANCE
AND THE THERMAL RESISTANCE OF THE FUEL. HOOP STRESS IN THE CLAD EXHIBITS THREE WELL DEFINED
VARIATIONS.

REACTOR, LMFBR + *FUEL ROD + COMPUTER PROGRAM + TEMPERATURE + CLADDING + FUEL SWELLING + HEAT CONDUCTANCE,
FUEL TO CLAD + STRESS + THERMAL MECHANICAL EFFECT

123913

DIERCKS DR + RASKE DT
ELEVATED-TEMPERATURE, STRAIN-CONTROLLED FATIGUE DATA ON TYPE 304 STAINLESS STEEL: A COMPILATION, MULTIPLE
LINEAR REGRESSION MODEL, AND STATISTICAL ANALYSIS
ARGONNE NATIONAL LAB., ILL.
ANL-76-95 +. 63 PPS, DEC. 1976

IN THE PAST DECADE, A CONSIDERABLE QUANTITY OF ELEVATED-TEMPERATURE (430 DEG C (806 DEG F) AND
ABOVE) LOW-CYCLE FATIGUE DATA HAVE BEEN OBTAINED ON AISI TYPE 304 STAINLESS STEEL. MOST OF THESE
DATA WERE OBTAINED IN SUPPORT OF THE STRUCTURAL DESIGN OF THE LIQUID-METAL FAST-BREEDER REACTOR.
THE PRESENT REPORT DESCRIBES THE RESULTS OF AN EXTENSIVE EFFORT TO COLLECT THE APPROPRIATE DATA,
ANALYTICALLY DESCRIBES THE OBSERVED EFFORT TO COLLECT THE LIFE AS A FUNCTION OF THE PRINCIPAL
TEST VARIABLES, AND MAKES STATISTICAL INFERENCES CONCERNING THE SIGNIFICANCE OF TEST VARIABLES
NOT INCLUDED IN THE REGRESSION MODEL.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62,
OAK RIDGE, TENN. 37830

JACOBS + ANALYTICAL MODEL + HIGH TEMPERATURE + STEEL, STAINLESS + FATIGUE + REACTOR, LMFBR + STATISTICAL
ANALYSIS

124597

KESSLER G + PAPP R + MUBEL D
SAFETY OF THE LIQUID METAL COOLED FAST BREEDER REACTOR AND ASPECTS OF ITS FUEL CYCLE
KERNFORSCHUNGSZENTRUM KARLSRUHE + INTERATOM, BENSBERG, F.R. GERMANY
IAEA-CN-36/572 +. 12 PPS, FROM INTERNATIONAL CONFERENCE ON NUCLEAR POWER AND ITS FUEL CYCLE; SALZBURG,
AUSTRIA, MAY 2-13, 1977

124597 *CONTINUED*

THE STATUS AND THE WHOLE SPECTRUM OF SAFETY DESIGN FEATURES FOR KNK-II AND SNR-300 WERE ALREADY DESCRIBED IN EARLIER PAPERS. THIS PAPER THEREFORE CONCENTRATES ON THE MAIN IMPORTANT AREAS OF THE SAFETY CHARACTERISTICS OF SNR-300 AND PUTS THEM INTO PERSPECTIVE WITH GENERAL SAFETY DESIGN CRITERIA FOR COMMERCIAL POWER REACTORS IN THE FRG. THE FOLLOWING MAIN AREAS WILL BE DISCUSSED: (1) PROTECTION AGAINST EXTERNAL EVENTS; (2) RELIABILITY OF DECAY HEAT REMOVAL; AND (3) PROTECTION AGAINST INTERNAL EVENTS: THE HYPOTHETICAL CORE DISASSEMBLY ACCIDENT AND THE CONTAINMENT CONCEPT.

AVAILABILITY - UNIPUB, INC., P.O. BOX 433, NEW YORK, N.Y. 10016

*REACTOR, LMFBR + *FUEL CYCLE + GERMANY + *SAFETY EVALUATION + ACCIDENT, HYPOTHETICAL + ACCIDENT, CORE DISRUPTIVE + DECAY HEAT

124743

SHIRE PR

SPRAY CODE USER'S REPORT

HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.

HEDL-TME 76-94 +. 126 PPS, 8 TABS, 21 FIGS, 42 REFS, MARCH 1977

THE SPRAY COMPUTER CODE WAS DEVELOPED TO MODEL THE EFFECTS OF POSTULATED SODIUM SPRAY RELEASE FROM LMFBR PIPING WITHIN CONTAINMENT CHAMBERS. THE CALCULATION METHOD UTILIZES GAS CONVECTION, HEAT TRANSFER AND DROPLET COMBUSTION THEORY TO CALCULATE THE PRESSURE AND TEMPERATURE EFFECTS WITHIN THE ENCLOSURE. THE APPLICABLE RANGE IS 0-21 MOL % OXYGEN AND .02-.30 INCH DROPLETS WITH OR WITHOUT HUMIDITY. DROPLET MOTION AND LARGE SODIUM SURFACE AREA COMBINE TO PRODUCE RAPID HEAT RELEASE AND PRESSURE RISE WITHIN THE ENCLOSED VOLUME.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*SPRAY + COMPARTMENT + SODIUM + REACTOR, LMFBR + DROPLET + PIPES AND PIPE FITTINGS + LEAK + COMPUTER PROGRAM + PRESSURE TRANSIENT

125285

SLAUGHTER GM + EDMONDS DP + GOODWIN GM

WELDING DEVELOPMENT FOR LMFBR APPLICATIONS

OAK RIDGE NATIONAL LAB., TENN.

CONF-761026-2 +. 18 PPS, FROM MEETING OF IMOG SUBGROUP ON GAGING; LIVERMORE, CALIF., OCT. 5, 1976

AUSTENITIC STAINLESS STEELS ARE THE MATERIALS OF CONSTRUCTION FOR VESSELS, PIPING, AND OTHER COMPONENTS FOR LMFBRs. MANY OF THESE COMPONENTS ARE OF WELDED CONSTRUCTION AND ARE, OR WILL BE, USED IN SERVICE AT ELEVATED TEMPERATURES. VERY LITTLE DATA HAVE BEEN GENERATED CONCERNING THE HIGH-TEMPERATURE CREEP PROPERTIES; ALSO THE LIMITED DATA AVAILABLE SHOW A HIGH DEGREE OF SCATTER, ESPECIALLY IN CREEP DUCTILITY. AS A RESULT OF THE LOW CREEP DUCTILITY AND THE OBVIOUS NEEDS FOR IMPROVED FILLER METALS AND DATA FOR HIGH-TEMPERATURE DESIGN, AN EXTENSIVE STAINLESS STEEL WELDING STUDY IS BEING CONDUCTED. SEVERAL PROGRAMS ARE ACTIVELY UNDERWAY AT ORNL AND SELECTED PORTIONS OF THREE OF THESE PROGRAMS ARE DISCUSSED BRIEFLY IN THIS PAPER.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REACTOR, LMFBR + STEEL, STAINLESS + WELDING + HIGH TEMPERATURE + CREEP

126529

WRONA BJ + ROBERTS JA + HIGGINS GT

MECHANICAL RESPONSE OF UO2 SUBJECTED TO TRANSIENT HEATING

ARGONNE NATIONAL LAB., ILL. + ILL. INST. OF TECHNOLOGY, CHICAGO

14 PPS, 2 TABS, 25 FIGS, 21 REFS, NUCLEAR TECHNOLOGY, 32(3), PP. 276-89 (MARCH 1977)

A DIRECT-ELECTRICAL-HEATING APPARATUS WAS UTILIZED TO PERFORM FUNDAMENTAL EXPERIMENTS ON SHORT, UNIRRADIATED, UNCLAD UO2 PELLET STACKS TO INVESTIGATE THE EFFECT OF VARYING THE ENERGY-DEPOSITION RATE AND ENERGY LEVEL ON THE MECHANICAL RESPONSE OF THE FUEL TO TRANSIENT HEATING. RESULTS SHOW THAT AS THE RATE OF ENERGY INPUT TO THE UO2 PELLET STACKS INCREASES, (A) THE ENERGY FAILURE THRESHOLD DECREASES AND (B) THE AREAL MELT FRACTION AND FAILURE DECREASES. TWO SIGNIFICANTLY DIFFERENT REGIMES OF FUEL-MOTION BEHAVIOR WERE OBSERVED ABOVE AND BELOW A THRESHOLD DESIGNATED AS THE THRESHOLD OF GROSS FUEL MOTION. ABOVE THE THRESHOLD, THIS MOTION OCCURS BY MOLTED FUEL RELEASE. BELOW THE THRESHOLD, FUEL DEFORMS PLASTICALLY BY A CREEP MECHANISM.

REACTOR, LMFBR + URANIUM DIOXIDE + THERMAL TRANSIENT + FUEL MELTDOWN + CORE MELTDOWN + OUT OF PILE EXPERIMENT + PROPERTY, MECHANICAL + THERMAL PROPERTY + ANL + TREAT (PRR)

127472

MACFEE WJ + RICHARDSON M + SARTORY WK

CREEP DEFORMATION AND RUPTURE BEHAVIOR IN TYPE 304/308 STAINLESS STEEL STRUCTURAL WELDMENTS

OAK RIDGE NATIONAL LAB., TENN.

ORNL-5265 +. 152 PPS, REFS, JUNE 1977

THE CREEP DEFORMATION AND RUPTURE OF TYPE 304/308 STAINLESS STEEL STRUCTURAL WELDMENTS AT 593 C WAS EXPERIMENTALLY INVESTIGATED TO STUDY THE COMPARATIVE BEHAVIOR OF THE BASE METAL AND WELD METAL CONSTITUENTS. THE TESTS WERE CONDUCTED IN SUPPORT OF ORNL'S PROGRAM TO DEVELOP HIGH-TEMPERATURE STRUCTURAL DESIGN METHODS APPLICABLE TO LMFBR SYSTEM COMPONENTS THAT OPERATE IN THE CREEP RANGE. RESULTS ARE PRESENTED IN THE COMPARATIVE DEFORMATION AND RUPTURE BEHAVIOR OF

127472 *CONTINUED*

SELECTED POINTS IN THE BASE METAL AND WELDMENT REGIONS OF THE DIFFERENT SPECIMENS AND ON THE OVERALL SURFACE STRAINS FOR SELECTED SPECIMENS.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

ORNL + R AND D PROGRAM + *CREEP + *DEFORMATION + CREEP BEHAVIOR + *STEEL, STAINLESS + *WELDS + HIGH TEMPERATURE + STRUCTURAL INTEGRITY + REACTOR, LMFBR + STRUCTURAL ANALYSIS, DYNAMIC + JACOBS

127484

A COMPARISON OF METHODS USED TO DETERMINE REPORTED STRESS RUPTURE MINIMUM VALUES FOR ANNEALED 2.25 CR-1MO STEEL GENERAL ELECTRIC CO., SUNNYVALE, CALIF.
GEFR-00059 +. 80 PPS, 8 TABS, 22 FIGS, DEC. 1976

WITHIN DOCUMENTS PERTINENT TO THE DESIGN OF CRBR, THERE EXIST 2 DISTINCT TABULATIONS OF DATA WHICH REPORTEDLY DEFINE THE LOWER LIMIT OF THE STRESS REQUIRED FOR CREEP RUPTURE OF ANNEALED 2.25 CR-1MO STEEL ALLOY. THESE TABULATIONS ARE FOUND WITHIN TABLE 1-14, AD OF CODE CASE 1592 AND TABLE 3 OF PROPERTY CODE 2202 OF THE NUCLEAR SYSTEMS MATERIALS HANDBOOK (NSMH). THESE TABULATIONS ARE BASED ON THE SAME RUPTURE CRITERION, AND YET THEY ARE NOT EQUIVALENT. METHODS USED TO DETERMINE THE VALUES OF STRESS RUPTURE MINIMUM REPORTED IN CODE CASE 1592 AND NSMH ARE COMPARED. THIS REPORT ADDRESSES THE DIFFERENCE IN THE VALUES AND WHICH TABULATION TO BE USED IN THE CRBR DESIGN.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

*COMPARISON + CODES AND STANDARDS + NUMERICAL METHOD + *STRESS RUPTURE + HEAT TREATMENT + *STEEL + ALLOY + CLINCH RIVER (LMFBR) + REACTOR, LMFBR + GENERAL ELECTRIC + R AND D PROGRAM + JACOBS

127504

EXECUTIVE SUMMARY - NEEDS FOR ENERGY-RELATED MATERIALS RESEARCH AND DEVELOPMENT. VOLUME 1 - NEAR-TERM ENERGY PROGRAM
FEDERAL COORDINATING COUNCIL FOR SCIENCE, ENGINEERING & TECHNOLOGY
NP-21665 +. 8 PPS, 1 TAB, 1977

IN THIS REPORT, THE PRIORITIES FOR MATERIALS R & D NEEDED TO MEET THE OBJECTIVES OF THE NATIONAL ENERGY PLAN ARE PRESENTED. THE PRINCIPAL NEAR-TERM OBJECTIVE IN LWR TECHNOLOGY IS TO ASSIST INDUSTRY IN ACHIEVING HIGH LEVELS OF RELIABILITY, AVAILABILITY, AND CAPACITY. IMPORTANT R & D NEEDS IN LWR TECHNOLOGY ARE TO REDUCE THE SUSCEPTIBILITY TO STRESS CORROSION CRACKING IN COMPONENTS AND SUPPRESS THE FUEL-CLADDING INTERFACE REACTION. IN BREEDER REACTORS, R & D TO IMPROVE FUEL ELEMENTS AND HEAT-EXCHANGER MATERIALS IS NEEDED.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REVIEW + *MATERIAL + REACTOR, LWR + REACTOR, LMFBR + STRESS CORROSION + COMPONENTS + *R AND D PROGRAM + JACOBS + CRACK

127583

CHANG ALJ + BARON IM + BLEISBERG ML
CHARACTERIZATION AND AGING KINETICS STUDY OF GAMMA PRIME ALLOYS FOR BREEDER REACTORS
WESTINGHOUSE ELECTRIC CORP., MADISON, PA.
WARD-AD-3045-5 +. 77 PPS, 10 TABS, 38 FIGS, JULY 1977

A SERIES OF FE-CR-NI BASED GAMMA PRIME STRENGTHENED AUSTENITIC ALLOYS WERE CHARACTERIZED OPTICALLY AND BY TRANSMISSION ELECTRON MICROSCOPY. A UNIFORM DISPERSION OF SPHERICAL GAMMA PRIME PARTICLES WAS OBSERVED TO BE THE MAJOR PRECIPITATED PHASE THROUGHOUT THE MATRIX. LONG TERM AGING EXPERIMENTS SHOWED PHASE STABILITY IN THESE ALLOYS. THE GAMMA PRIME AGING KINETIC DATA OF AVERAGE PARTICLE RADIUS, GAMMA PRIME VOLUME FRACTION AND GAMMA PRIME PARTICLE CONCENTRATION WERE ANALYZED IN TERMS OF A NEW PARTICLE COARSENING THEORY WHICH ACCOUNTS FOR INCREASING VOLUME FRACTION AND REDUCES TO THE LIFSHITZ-SLYOZOV-WAGNER (L-S-W) RESULT IN THE ASYMPTOTIC LIMIT.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

WESTINGHOUSE + R AND D PROGRAM + *REACTOR, BREEDER + *CYCLING + IRON + CHROMIUM + NICKEL + GAMMA + *ALLOY + ELECTRON MICROSCOPY + PRECIPITATION + JACOBS

127586

BEGLEY JA + SHEINKER AA + WILSON WK
CRACK PROPAGATION TESTING FOR LMFBR PIPING - PHASE II FINAL REPORT
WESTINGHOUSE ELECTRIC CORP., MADISON, PA.
WARD-HT-3045-25 +. 69 PPS, REFS, APRIL 1977

RESULTS ARE REPORTED FOR PHASE II OF A COMBINED EXPERIMENTAL AND ANALYTIC PROGRAM TO EVALUATE LEAK-BEFORE-BREAK CONDITIONS IN LMFBR PIPING SYSTEMS. EMPHASIS IS PLACED ON PIPING ELBOWS. PARTICULARLY THE FFTF LOWER INLET DOWNCOMER ELBOW. THE BURST MODE OF RELATIVELY THIN WALL 304 STAINLESS STEEL PIPING ELBOWS CONTAINING THROUGH WALL FLAWS IS ONE OF PLASTIC INSTABILITY. BURST TEST RESULTS OF FLAWED SCALE MODEL ELBOWS AS WELL AS A FULL SCALE 16 INCH DIAMETER FFTF ELBOW AGREE WELL WITH SEVERAL THEORIES OF BURSTING OF STRAIGHT CYLINDRICAL PIPES WITH THROUGH WALL FLAWS. THESE TESTS DEMONSTRATE THAT CRITICAL CRACK SIZES CAN BE RELIABLY COMPUTED FOR LMFBR

127586 *CONTINUED*
PIPING SYSTEMS.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

WESTINGHOUSE + R AND D PROGRAM + *PIPES AND PIPE FITTINGS + *CRACK + *REACTOR, LMFBR + TESTING + FLAW + LEAK + JACOBS

127686
KAPLAN S + PUNCHES JR
THE RESPONSE OF VARIOUS WIRE-WRAP ASSEMBLIES TO BUNDLE-TO-DUCT INTERACTION
GENERAL ELECTRIC CO., SUNNYVALE, CALIF.
GEFR-00056 +. 120 PPS, 67 FIGS, REFS, FEB. 1977

SINCE THE INITIAL OBSERVATION OF IRRADIATION-INDUCED MATERIAL SWELLING, GE HAS BEEN CONCERNED ABOUT THE ABILITY OF THE WIRE-WRAP FUEL ASSEMBLY TO SUCCESSFULLY ACCOMMODATE THESE SWELLING EFFECTS AT TARGET FLUENCE LEVELS. IN 1973 GE INVESTIGATED THE QUESTION OF WIRE-WRAP ASSEMBLY OPERATION AND INITIATED THE DEVELOPMENT OF ADVANCED WIRE-WRAP DESIGNS CAPABLE OF MEETING TARGET LMFBR OPERATING CONDITIONS. THROUGH FY-76 A SERIES OF DETAILED ANALYTICAL AND THEORETICAL INVESTIGATIONS WERE COMPLETED AS WELL AS A SERIES OF DETAILED MECHANICAL TESTS DIRECTED TOWARD ASCERTAINING THE COMPRESSION AND DISPLACEMENT CHARACTERISTICS OF VARIOUS WIRE-WRAP DESIGNS. THIS REPORT DOCUMENTS THE HIGHLIGHTS OF THE MECHANICAL TESTS OF VARIOUS HIGH PRIORITY WIRE-WRAP ASSEMBLY DESIGNS.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

GENERAL ELECTRIC + R AND D PROGRAM + RADIATION DAMAGE + *MATERIAL + *SWELLING + *FUEL ELEMENTS + REACTOR, LMFBR + PROPERTY, MECHANICAL + JACOBS

127820
CHANG YW
APPLICATION OF CONTAINMENT CODES TO LMFBRs IN THE UNITED STATES
ARGONNE NATIONAL LAB., ILL.
15 PPS, 2 TABS, 16 FIGS, 32 REFS, NUCLEAR ENGINEERING & DESIGN, 42(1), PP. 53-67 (JUNE 1977)

THIS PAPER DESCRIBES THE APPLICATION OF CONTAINMENT CODES TO PREDICT THE RESPONSE OF THE FAST REACTOR CONTAINMENT AND THE PRIMARY PIPING LOOPS TO HCDAS. FIVE SAMPLE PROBLEMS ARE GIVEN TO ILLUSTRATE THEIR APPLICATIONS. THE FIRST PROBLEM DEALS WITH THE RESPONSE OF THE PRIMARY CONTAINMENT TO AN HCOA. THE SECOND PROBLEM DEALS WITH THE COOLANT FLOW IN THE REACTOR LOWER PLENUM. THE THIRD PROBLEM CONCERNS SODIUM SPILLAGE AND SLUG IMPACT. THE FOURTH PROBLEM DEALS WITH THE RESPONSE OF A PIPING LOOP. THE FIFTH PROBLEM ANALYZES THE RESPONSE OF A REACTOR HEAD CLOSURE. APPLICATION OF CODES IN PARAMETRIC STUDIES AND COMPARISON OF CODE PREDICTIONS WITH EXPERIMENTS ARE ALSO DISCUSSED.

JACOBS + ACCIDENT, HYPOTHETICAL + ACCIDENT, CORE DISRUPTIVE + REACTOR, LMFBR + CONTAINMENT + CONTAINMENT VESSEL LOADING + CONTAINMENT ANALYSIS

127832
AGGARWAL SK + HUSAIN M + MAXWELL JA
ENVIRONMENTAL TESTING OF CLASS 1E AC MOTOR CONTROL CENTER FOR NUCLEAR POWER PLANTS
BECHTEL POWER CORP., GAITHERSBURG, MARYLAND + GA. POWER CO., ATLANTA
5 PPS, 2 TABS, 6 FIGS, IEEE TRANS. POWER APPARATUS & SYSTEMS, PAS-96(1), PP. 9-13 (JAN. 1977)

REPORTS THE TESTING OF A CLASS 1E AC MOTOR CONTROL CENTER, WHICH WAS SUBJECTED TO HIGH TEMPERATURE/HUMIDITY ENVIRONMENT AND PRESSURE PULSES. THE TEST PROGRAMS, SIMULATING THE EFFECTS OF A HIGH-ENERGY STEAM LINE BREAK IN A BWR MARK I CONTAINMENT NUCLEAR POWER PLANT, ARE DESCRIBED. THE MOTOR CONTROL CENTER FUNCTIONED SATISFACTORILY DURING AND AFTER THE TEST.

*TESTING + ENVIRONMENT + *MOTORS + *CONTROL SYSTEM + INSTRUMENT, CONTROL + QUALIFICATION + REACTOR, BWR + HATCH 1 (BWR)

128000
COATED FUEL PARTICLES - FABRICATION
36 PPS, TABS, FIGS, REFS, NUCLEAR TECHNOLOGY, 35(2), PP. 217-253 (SEPT. 1977)

THIS SECTION HAS FOUR PAPERS AS FOLLOWS: PROCESSING AND COMPOSITION CONTROL OF WEAK-ACID-RESIN-DERIVED FUEL MICROSPHERES / G.W. WEBER, R.L. BEATTY, V.J. TENNERY; IMPROVED GAS DISTRIBUTOR FOR COATING HIGH-TEMPERATURE GAS-COOLED REACTOR FUEL PARTICLES / W.J. LACKEY, D.P. STINTON, J.D. SEASE; COATED FUEL PARTICLES: REQUIREMENTS AND STATUS OF FABRICATION TECHNOLOGY / H. HUSCHKA, P. VYGEN; AND NUCLEAR FUEL COATED PARTICLE DEVELOPMENT IN THE REACTOR FUEL ELEMENT LABORATORIES OF THE U.K. ATOMIC ENERGY AUTHORITY / P.O. ALLEN, L.H. FORD, J.V. SHENNAN.

COATED PARTICLE + FABRICATION + COMPOSITION + REACTOR, HTGR + UNITED KINGDOM

128326

128326 *CONTINUED*

DEYNHAUSEN H + MORGENSTERN FI + SCHOLLE U
DESIGN REQUIREMENTS FOR THE SNR-300 CONTAINMENT SYSTEM
INTERATOM, BENSBERG, W. GERMANY
CONF-761001 (VOL. II) +. 8 PPS, PP. 452-60, FROM PROCEEDINGS OF THE INTERNATIONAL MEETING ON FAST REACTOR
SAFETY & RELATED PHYSICS; CHICAGO, ILL., OCT. 5-8, 1976

THE ESSENTIAL DESIGN DATA OF THE SNR-300 CONTAINMENT SYSTEM WERE DERIVED FROM THE RESULTS OF
ANALYSES OF A HYPOTHETICAL CORE DISRUPTION ACCIDENT (HCDA). THE THERMODYNAMIC LOADS TO BE
EXPECTED AFTER AN HCDA ARE CARRIED BY THE INNER CONTAINMENT. THE CONFINEMENT OF THE ACTIVITY
RELEASED FOLLOWING AN HCDA IS ACHIEVED BY USE OF A REVENTING SYSTEM IN THE OUTER CONTAINMENT.
THE ESSENTIAL RESULTS OF THE THERMODYNAMIC ANALYSIS ARE GIVEN AS WELL AS THE DESIGN DATA OF THE
SYSTEM. THE RESULTS OF THE AEROSOL-PHYSICAL ANALYSIS ARE DISCUSSED WITH REGARD TO THEIR
IMPORTANCE FOR THE SAFETY OF THE AUXILIARY EQUIPMENT.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

GERMANY + *REACTOR, LMFBR + *ACCIDENT, CORE DISRUPTIVE + *CONTAINMENT, PRESSURE VENTING + THERMODYNAMICS +
CONTAINMENT VESSEL LOADING + AEROSOL, RADIOACTIVE + CONTAINMENT + SYSTEM DESCRIPTION + CONTAINMENT DESIGN

128659

KAWAGUCHI O + ANDO Y + YOSHIZAWA H + SASANUMA K
EXPERIMENTAL STUDY ON DYNAMIC RESPONSE OF REACTOR VESSEL TO AN HCDA
POWER REACTOR & NUCLEAR FUEL DEVELOPMENT CORP., TOKYO + UNIV. OF TOKYO, JAPAN
9 PPS, 7 FIGS, 4 REFS, NUCLEAR ENGINEERING & DESIGN, 42(1), PP. 105-13 (JUNE 1977) (FROM SEMINAR HELD IN
CONJUNCTION WITH 4TH SMIRTH CONF.)

THIS PAPER PRESENTS A DISCUSSION OF EXPERIMENTAL RESULTS FOR REACTOR STRUCTURE DYNAMIC RESPONSE
DURING AN FBR HYPOTHETICAL CORE DISRUPTIVE ACCIDENT (HCDA) AND THE RESULTS OF ANALYSIS USING A
DYNAMIC RESPONSE ANALYSIS CODE UNDER EXPERIMENTAL CONDITIONS. THE PURPOSE OF THIS STUDY IS TO
CLARIFY EXPERIMENTALLY THE DYNAMIC RESPONSE BY USE OF SCALE MODELS, AS WELL AS TO ATTEMPT TO
CONFIRM AND IMPROVE THE DYNAMIC RESPONSE ANALYSIS CODE ON THE BASIS OF EXPERIMENTAL DATA.
OBTAINED VALUES WERE COMPARED WITH EXPERIMENTAL VALUES, SHOWING THAT THIS METHOD WAS FAIRLY
CAPABLE OF EVALUATING RADIAL DEFORMATION BEHAVIOR IN LOWER CYLINDRICAL PARTS OF THE VESSEL.

REACTOR, LMFBR + ACCIDENT, CORE DISRUPTIVE + STRUCTURAL ANALYSIS, DYNAMIC + FAILURE, PRESSURE VESSEL + JAPAN +
COMPARISON, THEORY AND EXPERIENCE

129405

SWINDERMAN RW + BHARGAVA RK + SIKKA VK + MOTEFF J
SUBSTRUCTURES DEVELOPED DURING CREEP AND CYCLIC TESTS OF TYPE 304 STAINLESS STEEL (HEAT 9T2796)
OAK RIDGE NATIONAL LAB., TENN.
ORNL-5293 +. 36 PPS, REFS, SEPT. 1977

DATA INCLUDE DISLOCATION DENSITIES, CELL AND SUBGRAIN SIZES, AND CARBIDE PRECIPITATION SIZES.
TESTING CONDITIONS RANGE FOR TEMPERATURES FROM 482 TO 649 DEG C, FOR STRESSES FROM 28 TO 241 MPA,
AND FOR TIMES FROM 4 TO 15,000 HR. AS EXPECTED, IT IS OBSERVED THAT TEMPERATURE, STRESS, AND
TIME HAVE STRONG INFLUENCES ON SUBSTRUCTURES. AT STRESSES RANGING FROM 59 TO 172 MPA AND AT
TEMPERATURES RANGING FROM 482 TO 593 DEG C, THE DISLOCATION DENSITY INCREASES WITH INCREASING
STRESS AND IT IS GENERALLY HIGHER THAN EXPECTED FROM STUDIES MADE AT HIGHER TEMPERATURES.
DISLOCATIONS ARE ARRANGED IN FINE NETWORKS STABILIZED BY CARBIDES. AT STRESSES ABOVE 172 MPA AND
TEMPERATURES TO 649 DEG C, THE DISLOCATION DENSITY IS TOO GREAT TO MEASURE.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

JACOBS + REACTOR, LMFBR + CREEP + STEEL, STAINLESS

129931

DICKERMAN CE
SUMMARY AND EVALUATION OF TRANSIENT TEST DATA ON EXTENDED FUEL MOTION RESULTING FROM UNPROTECTED LOSS OF FLOW
ARGONNE NATIONAL LAB., ILL.
ANL-77-40 +. 37 PPS, 5 TABS, 2 FIGS, 34 REFS, JUNE 1977

EXPERIMENTAL DATA ON FUEL FAILURE AND ITS CONSEQUENCES ARE USED TO PROVIDE PREDICTIONS OF THE
EXTENDED FUEL MOTION THAT WOULD OCCUR AFTER A HYPOTHETICAL CORE-DISRUPTIVE LOSS-OF-FLOW ACCIDENT
WITHOUT SCRAM IN THE FAST TEST REACTOR. THESE DATA INDICATE THAT SEVERELY DAMAGED SUBASSEMBLIES
WILL NOT BE COOLABLE IN SITU BY RETURNING SODIUM AFTER THE ACCIDENT, BECAUSE OF STEEL AND FUEL
BLOCKAGES, AND SUGGEST THAT THE SEVERELY DAMAGED, MELTED FUEL WILL EVENTUALLY DISPERSE UPWARD
UNDER THE INFLUENCE OF VAPOR GENERATED BY DECAY HEATING.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REACTOR, LMFBR + FTR (TR) + ACCIDENT, LOSS OF FLOW + CORE MELTDOWN + ACCIDENT, CORE DISRUPTIVE + DECAY HEAT +
FLOW BLOCKAGE + ANL + JACOBS

130653

GARDNER PL + ERMAN CA + REYNOLDS AB
CONDENSATION OF FUEL ONTO THE ABOVE-CORE STRUCTURE DURING AN LMFBR CORE-DISRUPTIVE ACCIDENT
UNIV. OF VA., CHARLOTTESVILLE

130653 *CONTINUED*
NUREG-0344 +. 141 PPS, 8 TABS, 16 FIGS, 51 REFS, OCT, 1977

CONDENSATION OF A PURE, SATURATED VAPOR ONTO A VERTICAL, MELTING SUBSTRATE IS ANALYZED FOR BOTH ONE- AND TWO-MATERIAL SITUATIONS. THE RESULTS OF THIS ANALYSIS HAVE APPLICATIONS IN THE AREA OF LMFBR ACCIDENT ANALYSIS. CONDENSATION OF THE FUEL (A MIXTURE OF URANIUM DIOXIDE AND PLUTONIUM DIOXIDE) ONTO THE ABOVE-CORE STRUCTURE (STEEL) IS A MECHANISM FOR REDUCING THE ENERGY AVAILABLE TO MECHANICALLY DAMAGE THE PRIMARY SYSTEM BOUNDARY. CONDENSATION WILL ALSO ALTER THE RADIOACTIVE AEROSOL SOURCE TERM AVAILABLE FOR POTENTIAL RELEASE FROM THE PRIMARY SYSTEM.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REACTOR, LMFBR + ACCIDENT ANALYSIS + *ACCIDENT, CORE DISRUPTIVE + *CONDENSATION + *VAPOR EXCHANGE +
*CONTAINMENT INTEGRITY + MAIN COOLING SYSTEM + FUEL ROD + AEROSOL, RADIOACTIVE + FISSION PRODUCT TRANSPORT +
JACOBS + HJCK + NRC-7

130851
MATERIALS SCIENCE AND TECHNOLOGY - ANS 1977 WINTER MEETING
125 PPS, ANS TRANSACTIONS, VOL. 27, PP. 220-345 (DEC. 1977)

THESE PAPERS WERE PRESENTED AT THE 1977 ANS WINTER MEETING AT SAN FRANCISCO IN NOV-DEC CONCERNING MATERIALS SCIENCE AND TECHNOLOGY. TOPICS INCLUDE MATERIALS FOR LMFBR COMPONENTS; FUEL CLADDING TECHNOLOGY; CREEP ANALYSIS; SWELLING; IRRADIATION TESTING OF METALS; THORIUM BEHAVIOR AND COMPUTER MODELS; MATERIALS TECHNOLOGY OF THORIUM FUELS; COMPUTER MODELING FOR NUCLEAR MATERIALS APPLICATIONS; AND FISSION FUELS FOR FISSION-FUSION HYBRID REACTORS.

AVAILABILITY - AMERICAN NUCLEAR SOCIETY, 244 E. OGDEN AVE., HINSDALE, ILL. 60521

*MATERIAL + *TECHNOLOGY + REACTOR, LMFBR + COMPONENTS + FUEL ROD + CLADDING + IRRADIATION TESTING + METALLURGY
+ THORIUM + ANALYTICAL MODEL + FUEL, NUCLEAR + FUSION + *POWER PLANT, NUCLEAR

130974
SUN Y-H + OKRENT D + CATTON I + KASTENBERG *E
A SIMPLIFIED METHOD OF COMPUTING CLAD AND FUEL STRAIN AND STRESS DURING IRRADIATION
UNIV. OF CALIF., LOS ANGELES
NUREG-0260 +. 287 PPS, TABS, FIGS, REFS, JUNE 1977

THIS DISSERTATION DEVELOPS A SIMPLIFIED, FAST-RUNNING AXISYMMETRIC COMPUTER CODE, NAMED KRASS (KWIK RUNNING ANALYSIS FOR STRESS AND STRAIN), INTENDED FOR THE PREDICTION OF FUEL ELEMENT CONDITIONS AFTER LONG-TERM STEADY-STATE OPERATION IN A LMFBR. THE OUTPUT OF KRASS INCLUDES THE RADIAL AND AXIAL STRESS AND STRAIN DISTRIBUTION OF THE FUEL AND CLAD AS A FUNCTION OF THE BURN-UP. RESULTS OF THE CALCULATIONS INDICATE THAT THE AXIAL VARIATION OF THE FUEL-CLAD MECHANICAL INTERACTION GREATLY DEPENDS ON THE FLUENCE-TO-BURNUP RATIO, AS WELL AS ON THE APPLICABLE STAINLESS STEEL SWELLING CORRELATION. AT HIGH FLUENCE-TO-BURNUP RATIOS, THE CENTRAL AXIAL NODES FREQUENTLY EXHIBIT GAP REOPENING TENDENCIES.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

FUEL ELEMENTS + FUEL CLAD INTERACTION + STRESS STRAIN DATA + REACTOR, LMFBR + COMPUTER PROGRAM + CREEP +
SWELLING + STEEL, STAINLESS + HJCK + NRC-7

12. PLANT SAFETY FEATURES - REACTOR

119193

MCPHEETERS CC + RAUE D

CONTROL OF TRITIUM IN LMFBR SODIUM BY COLD TRAPPING

ARGONNE NATIONAL LABORATORY, ILLINOIS

CONF-760503-3 +. 7 PPS, FROM INTERNATIONAL CONFERENCE ON LIQUIFIED METAL TECHNOLOGY IN ENERGY PRODUCTION; CHAMPION, PA, MAY 3, 1976

CONTROL OF TRITIUM IN THE SODIUM COOLANT OF LMFBRs IS IMPORTANT FOR ACHIEVING AS LOW AS PRACTICABLE RELEASE OF RADIOACTIVITY. COLD-TRAPPING HAS BEEN SHOWN TO BE AN EFFECTIVE METHOD FOR CONTROLLING HYDROGEN IN SODIUM AND SHOULD BE EFFECTIVE FOR CONTROLLING TRITIUM AS WELL. TWO MECHANISMS FOR REMOVAL OF TRITIUM FROM SODIUM HAVE BEEN STUDIED: (1) COPRECIPITATION OF HYDROGEN AND TRITIUM FROM SOLUTION IN SODIUM IN A COLD TRAP AND (2) ISOTOPIC EXCHANGE OF TRITIUM IN SODIUM WITH HYDROGEN IN SOLID NaH IN A COLD TRAP. THE ISOTOPIC EXCHANGE MECHANISM BY ITSELF CANNOT BE EXPECTED TO ADEQUATELY CONTROL TRITIUM IN LMFBRs. HYDROGEN SOURCES SUCH AS CORROSION IN THE STEAM GENERATORS WILL BE IMPORTANT FACTORS IN CONTROLLING THE TRITIUM LEVEL.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

FILTER, TRAP + DECONTAMINATION + REACTOR, LMFBR + TRITIUM + SODIUM + HYDROGEN

121014

HILLIARD RK + MCCORMACK JD + POSTMA AK

EVALUATION OF AIR CLEANING SYSTEM CONCEPTS FOR EMERGENCY USE IN LMFBR PLANTS

HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.

HEDL-TME 76-41 +. 267 PPS, 51 TABS, 50 FIGS, DEC. 1976

NINETEEN DIFFERENT AIR CLEANING CONCEPTS ARE ARRANGED INTO TWENTY-FOUR SYSTEMS AND EVALUATED FOR USE AS ACCIDENT MITIGATING SYSTEMS IN LMFBR PLANTS. BOTH SINGLE, LOW-LEAKAGE CONTAINMENT PLANTS AND ONCE-THROUGH OPERATION, APPLICABLE TO CONTAINMENT/CONFINEMENT PLANTS ARE CONSIDERED. PLANT CHARACTERISTICS AFFECTING AIR CLEANING REQUIREMENTS ARE DEFINED FOR 1000 MWE PLANTS AND A SODIUM AND RADIOLOGICAL RELEASE TERM IS POSTULATED. THE ACCIDENT CONDITIONS UNDER WHICH THE EMERGENCY AIR CLEANING SYSTEM (EACS) MUST FUNCTION IS ESTABLISHED BY USE OF SOFIRE-II AND HAA-3B COMPUTER CODES. CRITERIA ARE DEVELOPED FOR EVALUATING THE VARIOUS SYSTEMS AND FOR ASSIGNING COMPARATIVE RATINGS.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

AIR CLEANING + FISSION PRODUCT RELEASE + AEROSOL + CONTAINMENT + DESIGN CRITERIA + FILTER, BED + REACTOR, LMFBR + SODIUM + CHARCOAL + SCRUBBER + FILTER, SAND + FILTERS + JACOBS

121729

GLUEKLER EL

EX-VESSEL CORE RETENTION CONCEPT FOR EARLY SIZED LMFBRs

GENERAL ELECTRIC CO., SUNNYVALE, CALIF.

GEAP-14121 +. 53 PPS, 8 TABS, 27 FIGS, 19 REFS, AUG, 1976

THE SELECTION OF AN EXVESSEL POST-ACCIDENT HEAT REMOVAL AND CORE RETENTION CONCEPT IS DESCRIBED. A CRUCIBLE SYSTEM WITH ACTIVE HEAT REMOVAL SYSTEM SEEMED THE MOST PROMISING. THE CRUCIBLE CONCEPT IS DESCRIBED IN DETAIL AND SCOPING ANALYSES ADDRESSING THE THERMAL AND STRUCTURAL PERFORMANCE OF THE SYSTEM ARE PRESENTED.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

*CORE CATCHER + REACTOR, LMFBR + ACCIDENT, CORE DISRUPTIVE + CORE MELTDOWN + THERMAL ANALYSIS + PERFORMANCE + JACOBS + SODIUM + ACCIDENT, HYPOTHETICAL

124676

RICKARD CL + SIMON RH + BUTTEMER DR

GAS-COOLED FAST REACTOR SAFETY

GENERAL ATOMIC CO., SAN DIEGO, CALIF.

IAEA-CN-36/36 +. 11 PPS, FROM INTERNATIONAL CONFERENCE ON NUCLEAR POWER AND ITS FUEL CYCLE; SALZBURG, AUSTRIA, MAY 2-13, 1977

THE INHERENT AND DESIGN RELATED SAFETY FEATURES OF THE 300-MW(e) GAS-COOLED FAST BREEDER REACTOR (GCFR) DEMONSTRATION PLANT ARE DESCRIBED. THE INHERENT FEATURES ARE PRINCIPALLY ASSOCIATED WITH THE HELIUM COOLANT AND THE NUCLEAR COEFFICIENTS WHEREAS THE DESIGN RELATED FEATURES INFLUENCING SAFETY INCLUDE THE TWO REACTOR SHUTDOWN SYSTEMS, THE TWO RESIDUAL HEAT REMOVAL SYSTEMS, PRESTRESSED CONCRETE REACTOR VESSEL, AND THE METHOD OF CORE SUPPORT EMPLOYED. THE SAFETY CHARACTERISTICS ARE FOUND TO IMPROVE AS PLANT SIZE INCREASES.

AVAILABILITY - UNIPUB, INC., P.O. BOX 433, NEW YORK, N.Y. 10016

*REACTOR, GCR + REACTOR, FAST + REACTOR, BREEDER + SAFETY ANALYSIS + SYSTEM DESCRIPTION + *REACTOR DESCRIPTION

126085

CHAN CK + MIN TK + OKRENT D + CATTON I + KASTENBERG WE

A LOOK AT ALTERNATE CORE DISRUPTION ACCIDENTS IN LMFBRs

126085 *CONTINUED*
UNIV. OF CALIF., LOS ANGELES
NUREG-0259 +. 65 PPS, 5 TABS, 14 FIGS, 10 REFS, MAY 1977

THIS REPORT EXPLORES IN PRELIMINARY FASHION THE COURSE OF A POSTULATED ACCIDENT SCENARIO IN AN LMFBR INVOLVING RUPTURE OF ALL PIPING CONNECTED TO A REACTOR VESSEL IN THE EVENT OF AN EARTHQUAKE (OR AN EQUIVALENT SCENARIO INVOLVING BOTH LOSS OF HEAT REMOVAL AND SYSTEM RUPTURE). THE CORE IS SUCCESSFULLY SHUT DOWN BUT DECAY HEAT IMPOSES A THREAT TO CORE INTEGRITY. A POSSIBLE ACCIDENT SCENARIO WITH THESE INITIAL CONDITIONS IS PRESENTED, INCLUDING SODIUM VOIDING, CLAD AND FUEL MELTDOWN, AND POSSIBLE RECRITICALITY.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

ACCIDENT, CORE DISRUPTIVE + REACTOR, LMFBR + ACCIDENT, LOSS OF COOLANT + DECAY HEAT + FUEL MELTDOWN + CORE MELTDOWN + ACCIDENT ANALYSIS + JACOBS + HJCK + NRC-7

127818
MARCHATERRE JF
OVERVIEW OF CORE DISRUPTIVE ACCIDENTS
ARGONNE NATIONAL LAB., ILL.
7 PPS, 2 FIGS, 37 REFS, NUCLEAR ENGINEERING & DESIGN, 42(1), PP. 11-17 (JUNE 1977)

AN OVERVIEW OF THE ANALYSIS OF CORE-DISRUPTIVE ACCIDENTS IS GIVEN. THESE ANALYSES ARE FOR THE PURPOSE OF UNDERSTANDING AND PREDICTING FAST REACTOR BEHAVIOR IN SEVERE LOW PROBABILITY ACCIDENT CONDITIONS, TO ESTABLISH THE CONSEQUENCES OF SUCH CONDITIONS AND TO PROVIDE A BASIS FOR EVALUATING CONSEQUENCE LIMITING DESIGN FEATURES. THE METHODS USED TO ANALYZE CORE-DISRUPTIVE ACCIDENTS FROM INITIATING EVENT TO COMPLETE CORE DISRUPTION, THE EFFECTS OF THE ACCIDENT ON REACTOR STRUCTURES AND THE RESULTING RADIOLOGICAL CONSEQUENCES ARE DESCRIBED.

*ACCIDENT, CORE DISRUPTIVE + *REVIEW + REACTOR, LMFBR + ACCIDENT, CONSEQUENCES + CONTAINMENT INTEGRITY + ENGINEERED SAFETY FEATURE + DESIGN CRITERIA + RADIOLOGICAL IMPACT + ACCIDENT ANALYSIS

130854
NUCLEAR REACTOR SAFETY - ANS 1977 WINTER MEETING
176 PPS, ANS TRANSACTIONS, VOL. 27, PP. 496-672 (DEC. 1977)

THESE PAPERS WERE PRESENTED AT THE 1977 ANS WINTER MEETING AT SAN FRANCISCO IN NOV-DEC CONCERNING NUCLEAR REACTOR SAFETY : SAFETY EXPERIMENTS (IN AND OUT OF PILE) AND ANALYSIS, STRUCTURAL RESPONSE/SODIUM FIRES AND SPILLS, ACCIDENT ANALYSIS, OFF-NORMAL HEAT TRANSFER/DETECTION METHODS, AND FUEL BEHAVIOR MODELING/SAFETY RELATED DESIGN; THERMAL REACTOR SAFETY: CONTAINMENT ANALYSIS AND EXPERIMENTS, FUEL BEHAVIOR AND PRESSURE VESSEL THERMAL SHOCK, AND LOCA/ECCS EXPERIMENTS AND ANALYSIS; BEHAVIOR OF AIRBORNE RADIOACTIVITY RELEASE IN CONTAINMENT; PROBABILISTIC DESIGN AND SAFETY ANALYSIS; POST-ACCIDENT HEAT REMOVAL; AND MOLTEN FUEL-COOLANT INTERACTION.

AVAILABILITY - AMERICAN NUCLEAR SOCIETY, 244 E. OGDEN AVE., HINSDALE, ILL. 60521

REACTOR, FAST + REACTOR, LMFBR + REACTOR, PWR + REACTOR, BWR + *SAFETY ANALYSIS + *ACCIDENT ANALYSIS + CONTAINMENT ANALYSIS + PRESSURE VESSELS + THERMAL ANALYSIS + ACCIDENT, LOSS OF COOLANT + ACCIDENT, CORE DISRUPTIVE + FUEL COOLANT INTERACTION + ACCIDENT, PROBABILITY OF + EMERGENCY COOLING SYSTEM + SODIUM + FIRE

13. PLANT SAFETY FEATURES - NONREACTOR

119248

PASCHALL RK
DECONTAMINATION AND DECOMMISSIONING CRITERIA FOR USE IN DESIGN OF NEW PLUTONIUM FACILITIES
ATOMICS INTERNATIONAL, CANOGA PARK, CALIF.
AI-ERDA-13156 +. 127 PPS, 12 REFS, JUNE 30, 1975

DECONTAMINATION AND DECOMMISSIONING (D&D) CRITERIA WERE ASSEMBLED FOR USE IN DESIGNING NEW PLUTONIUM FACILITIES. THESE CRITERIA WERE GATHERED FROM LITERATURE SEARCHES AND VISITS TO MANY PLUTONIUM FACILITIES AROUND THE COUNTRY. THE RECOMMENDATIONS OF REPORTS AND EXPERIENCED PERSONNEL WERE USED. SINCE TOTAL D&D COSTS CAN BE MILLIONS OF DOLLARS, IMPROVED DESIGNS TO FACILITATE D&D WILL RESULT IN CONSIDERABLE SAVINGS IN COST AND TIME AND WILL HELP TO LEAVE THE SITE FOR UNRESTRICTED FUTURE USE AFTER D&D. FINALLY, BETTER DESIGN WILL REDUCE HAZARDS AND IMPROVE SAFETY DURING THE D&D EFFORT.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

DECONTAMINATION + DECOMMISSIONING + DESIGN CRITERIA + FUEL REPROCESSING + REACTOR, LMFBR + PLUTONIUM + WASTE DISPOSAL

120966

GUILLAUME B
PROBLEMS RAISED BY THE PRESENCE OF TRANSURANIC ELEMENTS IN NUCLEAR FUEL REPROCESSING WASTES (IN FRENCH)
15 PPS, 7 FIGS, 24 REFS, BULLETIN D'INFORMATIONS SCIENTIFIQUES ET TECHNIQUES, NO. 217, PP. 31-46 (SEPT. 1976)

ACTINIDE ELEMENTS WILL BE ESSENTIALLY RESPONSIBLE FOR THE LONG TERM RADIOACTIVE HAZARD OF NUCLEAR WASTES. A CHARACTERISTIC HAZARD INDEX HAS BEEN CALCULATED SO THAT ACTINIDE REMOVAL REQUIREMENTS COULD BE EVALUATED TO REACH A BEARABLE RADIOTOXICITY LEVEL FOR WASTES. THESE CALCULATIONS HAVE TAKEN ACCOUNT OF THE REACTOR TYPE AND ACTINIDE ELEMENTS WITH THEIR DECAY PRODUCTS. THE MOST SUITABLE REMOVAL TECHNIQUE APPEARS TO BE SOLVENT EXTRACTION. THREE EXAMPLES OF PROMISING PROCESSES, BASED UPON THIS TECHNIQUE ARE BRIEFLY EXPOSED.

FUEL REPROCESSING + FUEL CYCLE + WASTE TREATMENT + REACTOR, LMFBR + TRANSURANIC ELEMENT + ACTINIDE

121108

LMFBR - FUEL CYCLE TECHNOLOGIES UNDERDEVELOPED--GAD
1 PG, NUCLEAR NEWS, 20(1), PG. 37 (JAN. 1977)

THE GENERAL ACCOUNTING OFFICE HAS PROJECTED THAT THE FUEL CYCLE TECHNOLOGIES--REPROCESSING, FUEL FABRICATION, AND WASTE DISPOSAL--ASSOCIATED WITH THE LIQUID-METAL FAST BREEDER REACTOR ARE MORE LIKELY TO SLOW UP THE COMMERCIALIZATION OF THE LMFBR THAN THE DEVELOPMENT OF THE REACTOR ITSELF. THE GAO JUDGES THE LMFBR FUEL CYCLE TECHNOLOGIES TO BE LAGGING, AND THIS CONDITION MAY ALLOW ONLY FOUR TO SIX COMMERCIAL LMFBR'S TO BE IN OPERATION BY THE YEAR 2000. THE GAO RECOMMENDED THAT ERDA ASSEMBLE A MORE COORDINATED DEVELOPMENT PROGRAM FOR THE LMFBR AND ITS THREE SUPPORT TECHNOLOGIES.

FUEL CYCLE + REACTOR, LMFBR + AGENCY, ERDA + LEGALISTICS + FUEL REPROCESSING + WASTE MANAGEMENT

121348

TENNERY VJ + BOMAR ES + BOND WD + MORSE LE
ENVIRONMENTAL ASSESSMENT OF LMFBR ADVANCED FUELS: A RADIOLOGICAL ANALYSIS OF FUEL REPROCESSING, REFABRICATION AND TRANSPORTATION
OAK RIDGE NATIONAL LABORATORY, TENNESSEE
ORNL-5230 +. 47 PPS, 26 TABS, 17 FIGS, 25 REFS, NOV. 1976

A RADIOLOGICAL ENVIRONMENTAL ASSESSMENT WAS PERFORMED FOR ADVANCED LMFBR FUELS AND THE RESULTS COMPARED WITH THOSE FOR REFERENCE MIXED OXIDE FUEL. TOTAL-BODY DOSE COMMITMENTS TO THE MAXIMALLY EXPOSED INDIVIDUAL FOR OXIDE AND CARBIDE FUEL ARE ABOUT 2.8 MILLIREMS, WHILE NITRIDE FUEL WOULD RESULT IN A RANGE OF 59 TO 3.4 MILLIREMS AS THE 14N CONTENT IN FRESH FUEL IS VARIED FROM 99.64% TO ZERO. DOSES TO TRANSPORT WORKS AND THE GENERAL POPULATION WHICH RESULT FROM TRANSPORTATION OF THE VARIOUS FUEL FORMS AND WASTE MATERIALS WERE ALSO CALCULATED. DOSES TO THE GENERAL POPULATION ALONG THE TRANSPORTATION ROUTES WERE CALCULATED AS 354, 316, AND 325 MAN-REMS/YEAR FOR OXIDE, CARBIDE, AND NITRIDE FUELS RESPECTIVELY.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

*TRANSPORTATION AND HANDLING + DOSE CALCULATION, EXTERNAL + *POPULATION EXPOSURE + WASTE TRANSPORTATION + JACOBS + MIXED OXIDE + FUEL REPROCESSING + REACTOR, LMFBR + FABRICATION FACILITY + RADIOACTIVITY RELEASE + FUEL RECYCLE

122839

HORNER DE + CROUSE DJ
LABORATORY DEVELOPMENT OF SOLVENT EXTRACTION PROCESS FOR SPENT LMFBR FUELS
OAK RIDGE NATIONAL LAB., TENN.
ORNL/TM-5729 +. 92 PPS, 26 TABS, 17 FIGS, 27 REFS, JAN. 1977

RESULTS ARE SUMMARIZED FOR LABORATORY-SCALE DEVELOPMENT STUDIES OF SOLVENT EXTRACTION PROCESSES FOR TREATING SHORT-COOLED LMFBR FUELS. AMINE EXTRACTANTS WERE EVALUATED, BUT THE PUREX (TEP

122839 *CONTINUED*

EXTRACTION) PROCESS RECEIVED PRINCIPAL EMPHASIS AND IS THE RECOMMENDED PROCESS. EXTENSIVE PLUTONIUM AND URANIUM EXTRACTION AND STRIPPING DATA WERE OBTAINED OVER A RANGE OF NITRIC ACID CONCENTRATIONS, TBP CONCENTRATIONS, AND TEMPERATURES. THESE DATA WERE USED TO ESTIMATE SUITABLE FLOWSHEET CONDITIONS FOR EACH PROCESS CYCLE, AND BATCH COUNTERCURRENT DEMONSTRATIONS WERE THEN MADE WITH SIMULATED FEEDS. FINALLY, 5-CYCLE BATCH DEMONSTRATIONS OF THE FIRST EXTRACTION-STRIPPING CYCLE WERE MADE WITH ACTUAL FUEL SOLUTIONS. A COMPUTER CODE (SEPHIS) WAS DEVELOPED FOR PREDICTING THE STAGewise DISTRIBUTION OF PLUTONIUM, URANIUM, AND NITRIC ACID IN THE EXTRACTION AND STRIPPING SYSTEMS.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION: SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

FUEL REPROCESSING + FUEL RECYCLE + COMPUTER PROGRAM + REACTOR, LMFBR + PLUTONIUM + PHOSPHATE + SOLVENT EXTRACTION PROCESS + JACOBS

124449

ALLARDICE RH + BUCK C + WILLIAMS J
FAST REACTOR FUEL REPROCESSING IN THE UK
UKAEA + BRITISH NUCLEAR FUELS LTD.

IAEA-CN-36/66 +. 15 PPS, FROM INTERNATIONAL CONFERENCE ON NUCLEAR POWER AND ITS FUEL CYCLE; SALZBURG, AUSTRIA, MAY 2-13, 1977

DEVELOPMENT WORK ON THE LMFBR HAS BEEN CARRIED OUT IN THE UK SINCE THE EARLY 1950S. THE DOUNREAY EXPERIMENTAL REACTOR ESTABLISHMENT (DERE) INCLUDED PLANTS SPECIFICALLY DESIGNED FOR THE REPROCESSING, CONVERSION AND REFABRICATION OF HIGHLY ENRICHED URANIUM FUEL TO PROVIDE A TOTAL FUEL CYCLE CAPABILITY TO SUPPORT THE OPERATIONS OF DFR. DERE COULD BE CLAIMED TO HAVE BEEN THE FIRST NUCLEAR COMPLEX IN WHICH ALL FUEL CYCLE SERVICES WERE SITUATED ON THE SAME SITE AS A SINGLE REACTOR.

AVAILABILITY - UNIPUB, INC., P.O. BOX 433, NEW YORK, N.Y. 10016

*FUEL REPROCESSING + *UNITED KINGDOM + REACTOR, FAST + REACTOR, LMFBR + *FUEL CYCLE + WASTE MANAGEMENT + R AND D PROGRAM

124989

IRVINE AR + JONES FJ
LMFBR SPENT FUEL REPROCESSING: A STUDY OF AN INDUSTRIAL-SCALE FACILITY
OAK RIDGE NATIONAL LAB., TENN.
ORNL/TM-5723 +. 287 PPS, FIGS, REFS, MARCH 1977

A SCOPING STUDY OF A LARGE-SCALE REPROCESSING FACILITY WAS PERFORMED AS A MEANS OF IDENTIFYING UNRESOLVED PROBLEMS IN THE REPROCESSING OF SPENT LMFBR FUELS AND DEVELOPING GENERAL CRITERIA FOR THE CONCEPTUAL DESIGN OF A PILOT PLANT TO TEST AND DEMONSTRATE SUCH REPROCESSING. THE RESULTS OF THIS STUDY, REPORTED HERE, COVER REMOTE MAINTENANCE, FEASIBILITY OF FLUIDS RECYCLE, FLOW DIAGRAM CONSIDERATIONS, VARIOUS ASPECTS OF FACILITY DESIGN AND ARRANGEMENT, AND THE EFFECTS OF VARIATION IN PREPROCESSING DECAY TIME BETWEEN 60 AND 365 DAYS. THE STUDY DEVELOPED THE RATIONALE FOR SIGNIFICANT PORTIONS OF THE PILOT-PLANT CRITERIA, WHICH ARE PRESENTED AS PART OF THE REPORT.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION: SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

FUEL REPROCESSING + DESIGN CRITERIA + TESTING + FUEL HANDLING + HOT CELL + REACTOR, LMFBR + COVER GAS + JACOBS + FUEL RECYCLE

125292

ENGLISH JL
CONSIDERATIONS FOR USE OF WATER COOLANT FOR DECAY STORAGE OF LIQUID-METAL FAST BREEDER REACTOR SPENT FUEL ELEMENTS--A LITERATURE SURVEY
OAK RIDGE NATIONAL LAB., TENN.
ORNL/TM-5762 +. 60 PPS, 115 REFS, APRIL 1977

THE APPEAL OF WATER STORAGE OF SPENT FUEL ELEMENTS FOR THE PROPOSED LMFBR FUEL REPROCESSING HOT PILOT PLANT (HPP) IS CONSIDERABLE. WATER IS TRANSPARENT, ECONOMICAL, AND EASILY HANDLED IN A REPROCESSING PLANT THAT EMPLOYS BASICALLY AQUEOUS SEPARATION PROCESSES. THE EFFECT OF WATER ON THE INTEGRITY OF FUEL ELEMENT CLADDING CAN BE SEVERE, PROBABLY DUE TO CAUSTIC EMBRITTLEMENT AND LOCAL STRESSES GENERATED BY THE OXIDATION OF SODIUM IN MICROFISSURES EXISTING IN THE CLADDING. THAT MICROFISSURES DO EXIST SEEMS UNDENIABLE, AND THE MANY MECHANISMS POSTULATED FOR THE DETERMINATION OF THE PHYSICAL PROPERTIES OF AUSTENITIC STAINLESS STEEL IRRADIATED IN 1200 DEG F SODIUM ALL LEAD TO ENHANCED SUSCEPTIBILITY TO INTERGRANULAR FAILURE.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION: SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

FUEL REPROCESSING + FUEL STORAGE + STRESS + RADIATION DAMAGE + FFTF (TR) + REACTOR, HTGR + REACTOR, LMFBR + SODIUM + CORROSION + CLADDING + FUEL RECYCLE + MASS TRANSFER

126357

KASTEN PR + HOMAN FJ + ALLEN EJ + NOTZ KJ

126357 *CONTINUED*

ASSESSMENT OF THE THORIUM FUEL CYCLE IN POWER REACTORS
OAK RIDGE NATIONAL LAB., TENN.
ORNL/TM-5565 +. 252 PPS, TABS, FIGS, JAN. 1977

THREE THERMAL REACTORS WERE CONSIDERED: THE LWR, HTGR, AND HWR OF THE CANDU TYPE. A SUMMARY COMPARING THORIUM AND URANIUM FUEL CYCLES IN FAST BREEDER REACTORS (FBRs) WAS ALSO COMPILED. RELATIVE TO THERMAL REACTORS, RESULTS SHOW THAT BETTER U(SUB 3)O(SUB 8) UTILIZATION IS POSSIBLE USING THORIUM FUEL CYCLES THAN CAN BE ACHIEVED WITH URANIUM CYCLES. HOWEVER, THORIUM CYCLE USE DOES NOT CHANGE THE NEED FOR FBRs, THORIUM FUEL CYCLES COULD PRODUCE LOWER COST POWER THAN URANIUM CYCLES, PARTICULARLY AT HIGHER U(SUB 3)O(SUB 8) PRICES. GENERALLY, IT APPEARS MORE DESIRABLE ECONOMICALLY TO RECYCLE PLUTONIUM WITH THORIUM RATHER THAN WITH URANIUM IN THERMAL REACTORS. THE THORIUM CYCLE DOES NOT APPEAR TO COMPETE ECONOMICALLY IN PRESENT LWRs EVEN AT URANIUM PRICES OVER \$100/LB. THORIUM FUELED HTGRs AND HWRs HAVE THE BEST FUEL UTILIZATION PERFORMANCE. USE OF METAL FUEL PROVIDES THE BEST NUCLEAR PERFORMANCE FROM THORIUM CYCLES, AND MIGHT LEAD TO AN ECONOMIC FBR WITH HIGH FUEL-UTILIZATION CHARACTERISTICS.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

POWER PLANT, NUCLEAR + THORIUM + URANIUM + PLUTONIUM + FUEL CYCLE + COST BENEFIT + REACTOR, LWR + REACTOR, HTGR + REACTOR, HWR + REACTOR, BREEDER

127498

NICHOLSON EL
THE PUO2 DISSOLUTION PROBLEM FOR LWR PLUTONIUM RECYCLE AND LMFBR FUELS: FABRICATION AND REPROCESSING PROBLEMS AND THEIR RESOLUTION
OAK RIDGE NATIONAL LAB., TENN.
ORNL/TM-5903 +. 137 PPS, JULY 1977

A SURVEY WAS MADE OF THE INFORMATION REPORTED TO DATE FOR LABORATORY-SCALE DISSOLUTION EXPERIMENTS ON PUO2-UO2 FUELS, OF REPROCESSING PLANT PROBLEMS THAT MIGHT BE ENCOUNTERED WITH THESE FUELS, AND OF THE FABRICATION METHODS FOR PRODUCING THESE FUELS. THE POSSIBILITY OF PRODUCING FUELS THAT WILL BE HIGHLY SOLUBLE IN PURE NITRIC ACID WITHOUT RESORTING TO THE USE OF CORROSIVE FLUORIDES FOR COMPLETE DISSOLUTION IS EXAMINED. THE REPORT CONCLUDES THAT PRODUCTION OF HIGHLY SOLUBLE FUEL IS POSSIBLE, THAT IT IS PROBABLY ECONOMICALLY JUSTIFIABLE, AND THAT FLUORIDES ARE NOT NECESSARY FOR DISSOLUTION.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

JACOBS + *DISSOLUTION + PLUTONIUM DIOXIDE + URANIUM DIOXIDE + FLUORIDE + MIXED OXIDE + *FUEL REPROCESSING + REACTOR, LWR + REACTOR, LMFBR

16. METEOROLOGICAL CONSIDERATIONS

118387
SNYDER WH + LAWSON RE
DETERMINATION OF A NECESSARY HEIGHT FOR A STACK CLOSE TO A BUILDING--A WIND TUNNEL STUDY
U.S. ENVIRONMENTAL PROTECTION AGENCY, RESEARCH TRIANGLE PARK, N.C.
9 PPS, ATMOSPHERIC ENVIRONMENT, VOL. 10, PP. 683-91 (1976)

WIND TUNNEL TESTS WERE CONDUCTED TO SHOW THAT THE 2.5 TIMES RULE FOR THE DETERMINATION OF A NECESSARY HEIGHT FOR A STACK CLOSE TO A BUILDING IS ADEQUATE FOR A BUILDING WHOSE WIDTH PERPENDICULAR TO THE WIND DIRECTION IS TWICE ITS HEIGHT, BUT THAT IT IS UNNECESSARILY CONSERVATIVE FOR A TALL THIN BUILDING. AN ALTERNATIVE RULE, CALLED BRIGGS' ALTERNATIVE, IS SHOWN TO BE ADEQUATE. THE STUDY WAS UNDERTAKEN IN A METEOROLOGICAL WIND TUNNEL BY PLACING MODEL STACKS AND BUILDINGS IN A SIMULATED NEUTRAL ATMOSPHERIC BOUNDARY LAYER.

*STACK + *DOWNWASH + BUILDING + METEOROLOGY + *LAPSE RATE, ADIABATIC, NEUTRAL + WIND TUNNEL EXPERIMENT

124148
RUSSO AJ + WAYLAND JR + RITCHIE LT
INFLUENCE OF PLUME RISE ON THE CONSEQUENCES OF RADIOACTIVE MATERIAL RELEASES
SANDIA LABS., ALBUQUERQUE, N.M.
SAND-76-0534 +. 26 PPS, 19 FIGS, JAN. 1977

ESTIMATES OF HEALTH CONSEQUENCES RESULTING FROM A POSTULATED NUCLEAR REACTOR ACCIDENT CAN BE STRONGLY DEPENDENT ON THE BUOYANT RISE OF THE PLUME OF RELEASED RADIOACTIVE MATERIAL. THE SENSITIVITY OF THE CONSEQUENCES OF A POSTULATED ACCIDENT TO TWO DIFFERENT PLUME RISE MODELS HAS BEEN INVESTIGATED. ONE OF THE MODELS INCLUDES THE EFFECTS OF EMISSION ANGLE, MOMENTUM, AND RADIOACTIVE HEATING OF THE RELEASED MATERIAL. THE DIFFERENCE IN THE CONSEQUENCE ESTIMATES FROM THE TWO MODELS CAN EXCEED AN ORDER OF MAGNITUDE UNDER SOME CONDITIONS, BUT IN GENERAL THE RESULTS ARE SIMILAR.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

PLUME BEHAVIOR + HEIGHT OF RISE + METEOROLOGY + DECAY HEAT

130540
GRIFFITHS RF
EFFECT OF DURATION OF RELEASE ON THE DISPERSION OF EFFLUENT RELEASED TO THE ATMOSPHERE
UKAEA SAFETY & RELIABILITY DIRECTORATE, WARRINGTON, UK
SRD-R-85 +. 35 PPS, JULY 1977

A BRIEF REVIEW OF THE AVAILABLE LITERATURE IS FOLLOWED BY A DESCRIPTION OF A COMPUTATIONALLY CONVENIENT METHOD OF INCORPORATING THE EFFECT OF DISPERSION CALCULATIONS BASED ON THE MODIFICATION OF THE CROSSWIND DISPERSION COEFFICIENT BY THE TIME DEPENDENT BEHAVIOR OF THE STANDARD DEVIATION OF THE WIND DIRECTION. THE METHOD HAS BEEN INCORPORATED AS AN OPTION IN THE SRD DISPERSION-AND-CONSEQUENCE PROGRAM TIRION. A NUMBER OF GRAPHS ARE PRESENTED ILLUSTRATING THE BEHAVIOR OF THE METHOD IN ALL SIX PASQUILL WEATHER CATEGORIES, BOTH WITH AND WITHOUT PLUME DEPLETION BY DEPOSITION. THESE RESULTS ARE PRESENTED IN TERMS OF NORMALIZED CONCENTRATION VS DISTANCE.

AVAILABILITY - THE EDITOR, UNITED KINGDOM ATOMIC ENERGY AUTHORITY, SAFETY AND RELIABILITY DIRECTORATE, CULCHETH, WARRINGTON WA3 4NE, ENGLAND

JACOBS + ANALYTICAL TECHNIQUE + *COMPUTER PROGRAM, METEOROLOGICAL + *DISPERSION + *AIRBORNE RELEASE + WIND + WIND PROFILE

17. OPERATIONAL SAFETY AND EXPERIENCE

116400
 CONTE F
 ONE YEAR OF PHENIX OPERATION
 CEA CENTRE DE MARCOULE, FRANCE
 ORNL-TR-4004 + CONF-750411-84 +. 19 PPS. FROM EUROPEAN NUCLEAR CONFERENCE; PARIS, FRANCE, APRIL 21, 1975
 (TRANSLATION OF FRENCH REPORT)

A CHRONOLOGICAL DESCRIPTION IS ACCOMPANIED BY DIAGRAMS FOR TIMES UP UNTIL THE END OF MARCH 1975. PRODUCTION STATISTICS, MAIN OPERATING VARIABLES AT DIFFERENT STATES, AND A SUMMARY OF THE INCIDENTS THAT HAVE OCCURRED DURING USE. FROM THESE ELEMENTS CHARGE RATES AND AVAILABILITY OF 76% AND 81% WITH A GROSS OUTPUT GREATER THAN 45% ARE FOUND. THE CHIEF SUBASSEMBLIES OF THE STATION ARE REVIEWED WITH DETAILS OF POSSIBLE INCIDENTS, MODIFICATIONS MADE, AND PARTIAL CONCLUSIONS THAT CAN BE DRAWN. IN PARTICULAR, PROBLEMS OF FUEL, BLOCK REACTOR STRUCTURES, SODIUM PUMPS, CLAD RUPTURE DETECTION, STEAM GENERATORS, SODIUM CIRCUITS, AND ENERGY PRODUCTION INSTALLATIONS ARE ENUMERATED. IN GENERAL, PERFORMANCE OF THE INSTALLATION AND VALUES PREDICTED HAVE BEEN IN GOOD AGREEMENT.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

FUEL HANDLING + OPERATING EXPERIENCE + PUMPS + COMPONENTS + PHENIX (LMFBR) + REACTOR, LMFBR + SODIUM + TRANSPORTATION AND HANDLING + INSTRUMENT, FAILED FUEL DETECTION + STEAM GENERATOR

118532
 MEGY JM + CONTE F + NOEL H + GODDET J
 PHENIX CONSTRUCTION AND OPERATING EXPERIENCE
 COMMISSARIAT A L'ENERGIE ATOMIQUE, FRANCE + ELECTRICITE DE FRANCE, PARIS
 7 PPS, 3 TABS, COMBUSTION, 47(12), PP. 25-31 (JUNE 1976)

THE OBJECTIVE WAS TO CONFIRM THE VALIDITY AND RELIABILITY OF THE ENTIRE SYSTEM BY SHOWING THAT IT WAS POSSIBLE TO BUILD A FAST-NEUTRON POWER PLANT AND TO OPERATE IT SATISFACTORILY. PRELIMINARY STUDIES STARTED IN 1965 CONSTRUCTION AND FABRICATION STARTED IN 1969, CONSTRUCTION WORK WAS PRACTICALLY COMPLETED IN 1972, AND CRITICALITY WAS ACHIEVED IN AUGUST 1973. THE AVAILABILITY FACTOR FOR 1975 WAS 70.26%. THE OVERALL INSTALLATION DEMONSTRATES ALMOST PERFECT STABILITY BOTH WITH RESPECT TO THE REACTOR AND THE BALANCE OF THE PLANT. OPERATOR INTERVENTIONS ARE INFREQUENT. AN EXAMINATION OF THIS SURVEY SHOWS THAT LAUNCHING THE CONSTRUCTION OF SUPER PHENIX HAS EXCELLENT CHANCES OF SUCCESS.

REACTOR, LMFBR + PHENIX (LMFBR) + CONSTRUCTION + TESTING + OPERATION + COMPONENTS

121474
 SMITH CRF + HOLMES JT
 PURITY OF EBR-II SODIUM: 1967-1974
 ARGONNE NATIONAL LABORATORY, ILLINOIS
 ANL-75-26 +. 145 PPS, 18 TABS, 79 FIGS, DEC. 1975

THIS REPORT CONSOLIDATES ALL INFORMATION AVAILABLE ON RADIO-METRIC AND CHEMICAL ANALYSES MADE ON SODIUM IN EBR-II FOR 1967-1974. SYSTEMS, EQUIPMENT, AND TECHNIQUES USED FOR SAMPLING THE SODIUM ARE DESCRIBED AND EVALUATED. THE BEST METHODS FOR MEASURING HYDROGEN, CARBON, AND OXYGEN IN SODIUM ARE (1) THE HYDROGEN-DIFFUSION METER; (2) EQUILIBRATION OF LOW-CARBON STAINLESS STEEL TABS WITH SODIUM; AND (3) EQUILIBRATION OF VANADIUM WIRES WITH SODIUM RESPECTIVELY. ELECTROCHEMICAL OXYGEN METERS ARE USEFUL FOR CONTINUOUS MEASUREMENT OF OXYGEN IN SODIUM, BUT THEY NEED TO BE RECALIBRATED BY VANADIUM-WIRE EQUILIBRATION APPROXIMATELY MONTHLY. SPECIAL TECHNIQUES ARE USED FOR ANALYZING FOR IMPURITIES THAT (1) SEGREGATE FROM SODIUM DURING SAMPLE COOLING (E.G., 3H, 131I, AND 137CS) OR (2) VOLATILIZE DURING DISTILLATION OF SODIUM SAMPLES (E.G., HYDROGEN, CADMIUM, AND ZINC).

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

FILTER, TRAP + IMPURITY + SAMPLING + ANALYTICAL TECHNIQUE + EBR 1 AND 2 (RE) + REACTOR, LMFBR + SODIUM + TRITIUM + HYDROGEN + OXYGEN + CARBON + CESIUM + JACOBS

121754
 CALRK AF + NOBLES RG + BUSCHMAN HW
 OPERATING EXPERIENCE WITH THE EBR-II ROTATING-PLUG FREEZE SEALS - 1969-1975
 ARGONNE NATIONAL LABORATORY, ILLINOIS
 ANL-75-10 +. 66 PPS, 7 TABS, 37 FIGS, MARCH 1976

THE EBR-II ROTATING-PLUG FREEZE SEALS HAVE CONTINUED TO FULFILL THE DESIGN REQUIREMENTS OF ACTING AS A BLANKET-GAS SEAL WHILE PROVIDING A SOLID MECHANICAL SEAL DURING REACTOR POWER RUNS AND A MOVABLE LIQUID SEAL DURING FUEL HANDLING. OPERATION OF THE SEALS HAS NOT BEEN TROUBLE-FREE, AND MODIFICATIONS WERE MADE TO IMPROVE OPERATION AND MAINTENANCE. SINCE 1969, EXTENSIVE CHANGES WERE MADE IN THE TEMPERATURE CONTROL OF THE SEALS IN ORDER TO REDUCE THE MAINTENANCE EFFORT AND IMPROVE THE OPERATIONAL CHARACTERISTICS OF THE SYSTEM.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

JACOBS + OPERATING EXPERIENCE SUMMARY + SEAL + EBR 1 AND 2 (RE) + REACTOR, LMFBR + MODIFICATION + MAINTENANCE AND REPAIR + ANL

122830
UNITED KINGDOM NEARS DECISION ON COMMERCIAL-SIZE FAST BREEDER REACTOR
3 PPS, ELECTRIC PERSPECTIVES, 77(1), PP. 19-21 (JAN. 1977)

HERE, BY WAY OF PROVIDING A PERSPECTIVE ON FAST BREEDER REACTORS GENERALLY, IS A REVIEW OF THE
BRITISH EXPERIENCE SO FAR.

UNITED KINGDOM + *REACTOR, FAST + REACTOR, BREEDER + PFR (LMFR) + DOUNREAY (LMFBR) + *REACTOR, LMFBR + N-POWER
FORECAST + *OPERATING EXPERIENCE

124369
OLDS FC
BRITAIN'S PROTOTYPE FAST REACTOR
3 PPS, 5 FIGS, POWER ENGINEERING, 81(3), PP. 36-43 (MARCH 1977)

PFR IS A 250-MWE SODIUM-COOLED FAST BREEDER REACTOR OF THE POOL DESIGN. IT IS THE THIRD PROTOTYPE
FAST REACTOR NOW IN SERVICE IN THE WORLD. THE BRITISH DEVELOPED PFR AS A SELF-SUSTAINING FAST
BREEDER SYSTEM. IT HAS A COMPLETE FUEL CYCLE FROM FABRICATION TO REPROCESSING AND WASTE
MANAGEMENT. SUPPORT FACILITIES, R&D, PUBLIC HEALTH, SAFETY, SAFEGUARDS AND FUEL TRANSPORT ARE
INCLUDED. PFR'S NUCLEAR SIDE HAS BEEN RUNNING WITH AN AVAILABILITY OF OVER 90%, BUT
CONVENTIONAL SIDE PROBLEMS HAVE BEEN A STEADY AGGRAVATION. TROUBLES AND ALL, HOWEVER, KNOWLEDGE
FROM PFR IS UNDERPINNING THE CONCEPTS AND DESIGNS FOR THE ONCOMING COMMERCIAL FBR SYSTEMS

UNITED KINGDOM + *REACTOR, FAST + *REVIEW + PFR (LMFR) + DOUNREAY (LMFBR) + REACTOR, LMFBR + OPERATING
EXPERIENCE + *DESIGN STUDY + SAFETY ANALYSIS + FUEL CYCLE

124616
DELPEYROUX P + BALLOFFET Y + BLANCHARD P + CARTERET Y
CHARACTERISTICS AND BEHAVIOUR OF THE PHENIX FUEL ELEMENT
COMMISSARIAT A L'ENERGIE ATOMIQUE, FRANCE
IAEA-CN-36/268 +. 14 PPS, FROM INTERNATIONAL CONFERENCE ON NUCLEAR POWER AND ITS FUEL CYCLE; SALZBURG,
AUSTRIA, MAY 2-13, 1977

RECALLS BRIEFLY THE DESCRIPTION OF THE FUEL ELEMENT AND SUBASSEMBLY AND THE RUNNING CONDITIONS
WHICH WERE FORESEEN FOR THE START-UP; THEN SHOWS HOW IT WAS POSSIBLE, BY THE WAY OF A RATHER
SIMPLE QUALIFICATION PROGRAM, TO INCREASE THE ORIGINAL BURNUP. DESCRIBES THE BEHAVIOR OF THE
MIXED OXIDE AND ITS INTERACTION WITH THE CLADDING AS WELL AS THE STRAINS IN CLADDING AND
HEXAGONAL WRAPPERS, STRAINS WHICH MAKE UP, FROM THE RESULTS OF HOT-CELL EXAMINATIONS, THE FIRST
END-OF-LIFE LIMIT EXPECTED TO MEET. DISCUSSES THE EXCELLENT FIABILITY OF THE FUEL ELEMENT.

AVAILABILITY - UNIPUB, INC., P.O. BOX 433, NEW YORK, N.Y. 10016

*BEHAVIOR + REACTOR, LMFBR + FRANCE + PHENIX (LMFBR) + FUEL BURNUP + COMPONENT DESCRIPTION + CLADDING + MIXED
OXIDE + OPERATING EXPERIENCE + *FUEL ELEMENTS

124943
COOPER MH
PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON LIQUID METAL TECHNOLOGY IN ENERGY PRODUCTION
AMERICAN NUCLEAR SOCIETY
CONF-760503-P1 +. 466 PPS, MEETING HELD IN CHAMPION, PA., MAY 3-6, 1976

THE FIRST SESSIONS CONTAINED THE FOLLOWING: OPERATING REACTOR; LOOP OPERATIONS; FRICTION WEAR,
AND SELF-WELDING; FREE ELECTRON NOTES; STEAM GENERATOR; RADIOACTIVE CORROSION AND FISSION PRODUCT
TRANSPORT; EFFECTS OF SODIUM ON MECHANICAL PROPERTIES; CORROSION AND ADVANCED APPLICATIONS.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

FILTER, TRAP + CORROSION + HIGH TEMPERATURE + WEAR + WELOS + EMBRITTLEMENT + REACTOR, LMFBR + OPERATING
EXPERIENCE + SODIUM + THERMODYNAMICS + PROPERTY, MECHANICAL + STEAM GENERATOR + JACOBS + OUT OF PILE
EXPERIMENT

126181
CHOPRA PS + STONE CC + HUTTER E
FAIL-SAFETY OF THE EBR-II STEAM GENERATOR
ARGONNE NATIONAL LAB., ILL.
CONF-760503-3 +. 10 PPS, FROM INTERNATIONAL CONFERENCE ON LIQUIDIFIED METAL TECHNOLOGY IN ENERGY PRODUCTION;
CHAMPION, PA., MAY 3, 1976

FAIL-SAFE ANALYSES OF THE EBR-II STEAM-GENERATOR SYSTEM SHOW THAT A POSTULATED NON-INSTANTANEOUS
LEAK OF WATER OR STEAM INTO SODIUM, THROUGH A DUPLEX TUBE OR A TUBESHEET, AT CREDIBLE LEAK RATES
WILL NOT STRUCTURALLY DAMAGE THE EVAPORATORS AND SUPERHEATERS. HOWEVER, CONTAMINATION OF THE
SYSTEM AND POSSIBLE SHELL WASTAGE BY SODIUM WATER REACTION PRODUCTS MAY RENDER THE SYSTEM
INOPERABLE FOR A PERIOD EXCEEDING 6 MONTHS. THIS PERIOD WOULD BE SHORTENED TO 3 MONTHS IF THE
SYSTEM WERE MODIFIED BY ADDING A REMOTELY OPERATED WATER DUMP SYSTEM, A STEAM VENT SYSTEM, A
SECONDARY SODIUM SUPERHEATER RELIEF LINE, AND A TUBESHEET LEAK-DETECTION SYSTEM.

EBR 1 AND 2 (RE) + REACTOR, RESEARCH + *STEAM GENERATOR + LEAK + SODIUM + METAL WATER REACTION +
*CONTAMINATION + SAFETY ANALYSIS + REACTOR, LMFBR

126673

CLAUZON PP + COULON P + PENET F
SAFETY CONCLUSIONS FROM START-UP TESTS AND FROM THE ANALYSIS OF THE CORE BEHAVIOUR OF PHENIX
CENTRE D'ETUDES NUCLEAIRES DE CADARACHE, FRANCE
CONF-761001(VOL. 1) +. 15 PPS, PP. 61-75 OF THE PROCEEDINGS OF THE INTERNATIONAL MEETING ON FAST REACTOR
SAFETY AND RELATED PHYSICS; CHICAGO, ILL., OCT. 5-8, 1976

PHENIX HAS BEEN IN OPERATION FOR OVER 2 YEARS AND THE INFORMATION FOR CORE SAFETY ANALYSIS DERIVED
FROM ITS OPERATION CAN BE DIVIDED IN 2 AREAS. FIRST, AT NOMINAL STATE OF THE CORE, THE
COMPARISON BETWEEN OBSERVED PHYSICAL PROPERTIES AT START-UP AND DURING ITS LIFE AND THE
CORRESPONDING CALCULATIONS GIVES SUPPORT TO THE SAFETY EVALUATION. FURTHER, THE CORE BEHAVIOR OF
PHENIX HAS BEEN ANALYZED ON 2 ASPECTS: ITS NEUTRONIC FEEDBACKS TO THE MAIN POSSIBLE
PERTURBATIONS OF ITS PHYSICAL STATE, AND ITS CAPABILITY OF NATURAL SODIUM CONVECTION IN CASE OF
PUMP COAST DOWN.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

PHENIX (LMFBR) + REACTOR, LMFBR + REACTOR STARTUP EXPERIENCE + PROPERTY, PHYSICAL + COMPARISON, THEORY AND
EXPERIENCE + PERTURBATION METHOD + REACTOR PHYSICS + HEAT TRANSFER, CONVECTION

127246

SMITH RN + CISSEL DW + SMITH RR
EBR-II OPERATING EXPERIENCE
ARGONNE NATIONAL LAB., IDAHO FALLS
47 PPS, FROM ANS 8TH BIENNIAL TOPICAL CONFERENCE ON REACTOR OPERATING EXPERIENCE; CHATTANOOGA, TENN., AUG. 7-
10, 1977

AS ORIGINALLY DESIGNED AND OPERATED, EBR-II SUCCESSFULLY DEMONSTRATED THE CONCEPT OF A SODIUM-
COOLED FAST BREEDER POWER PLANT WITH A CLOSED FUEL REPROCESSING CYCLE (MINI-NUCLEAR PARK).
SUBSEQUENT OPERATION HAS BEEN AS AN IRRADIATION FACILITY. SINCE THE BEGINNING OF OPERATION IN
1961, OPERATING EXPERIENCE OF EBR-II HAS BEEN VERY SATISFACTORY. TO DATE, NO FAILURES OR
INCIDENTS RESULTING IN SERIOUS IN-CORE OR OUT-OF-CORE CONSEQUENCES HAVE OCCURRED. NO WATER-TO-
SODIUM LEAKS HAVE BEEN DETECTED OVER THE LIFE OF THE PLANT. A PLANT FACTOR OF 76.9% WAS ACHIEVED
FOR THE CALENDAR YEAR 1976.

AVAILABILITY - R. N. SMITH, EBR-II PROJECT, ARGONNE NATIONAL LAB., P.O. BOX 2523, IDAHO FALLS, IDAHO 83401

*EBR 1 AND 2 (RE) + REACTOR, LMFBR + REACTOR, TEST + OPERATING EXPERIENCE SUMMARY + *OPERATING EXPERIENCE +
IRRADIATION TESTING + REACTOR DESCRIPTION

127247

MEGY J + CONTE F + GODDET J
THREE YEARS OF PHENIX OPERATION
COMMISSARIAT A L'ENERGIE ATOMIQUE, FRANCE + ELECTRICITE DE FRANCE, MARCOULE
11 PPS, FROM ANS 8TH BIENNIAL TOPICAL CONFERENCE ON REACTOR EXPERIENCE; CHATTANOOGA, TENN., AUG. 7-10, 1977

PHENIX IS A SODIUM-COOLED FAST NEUTRON BREEDER PROTOTYPE REACTOR, 250 MWE. IT IS LOCATED ON THE
MARCOULS CENTER IN SOUTHERN FRANCE. CONSTRUCTION WAS STARTED IN 1968 AND WAS COMPLETED AT THE
END OF 1973, AND IT BECAME COMMERCIALY OPERATIONAL IN JULY 1974. OPERATING EXPERIENCE AND DATA
ACCUMULATED DURING THE FIRST THREE YEARS ARE PRESENTED. ALSO DISCUSSED IS THE PROBLEM
EXPERIENCED WITH THE INTERMEDIATE HEAT EXCHANGERS AND THE CORRECTIVE MEASURES TAKEN.

AVAILABILITY - AMERICAN NUCLEAR SOCIETY, 244 E. OGDEN AVE., HINSDALE, ILL. 60521

*PHENIX (LMFBR) + REACTOR, LMFBR + *OPERATING EXPERIENCE SUMMARY + OPERATING EXPERIENCE + MAINTENANCE AND
REPAIR + REACTOR DESCRIPTION + DATA PROCESSING + HEAT EXCHANGERS

127315

BOLT PR
PROPOSALS FOR IN-SERVICE INSPECTION AND MONITORING OF SELECTED COMPONENTS LOCATED WITHIN OR PART OF THE
PRIMARY CONTAINMENT OF SODIUM COOLED FAST REACTORS
23 PPS, PAPER PRESENTED AT IAEA MEETING ON IN-SERVICE INSPECTION; BENSBERG, GERMANY, MARCH 1976

DESIGN AND OPERATIONAL EXPERIENCE OF CGB GAS COOLED REACTORS AND CERTAIN OVERSEAS REACTOR PLANTS
ARE REVIEWED IN RELATION TO IN-SERVICE INSPECTION AND MONITORING CAPABILITIES. DESIGN GUIDELINES
AND PRELIMINARY PROPOSALS ARE GIVEN FOR IN-SERVICE INSPECTION AND MONITORING OF SELECTED
COMPONENTS LOCATED WITHIN OR PART OF THE PRIMARY CONTAINMENT OF SODIUM COOLED FAST REACTORS.
SPECIFIC COMMENTS ARE MADE ON THE ITEMS OF FURTHER DESIGN AND DEVELOPMENT WORK BELIEVED TO BE
NECESSARY. A LIST OF FAILURES AND DETERIORATION PROCESSES THAT HAVE OCCURRED ON FAST AND THERMAL
REACTORS IS APPENDED.

AVAILABILITY - UNIPUB, INC., P.O. BOX 433, NEW YORK, N.Y. 10016

*INSERVICE INSPECTION + REACTOR, LMFBR + REACTOR, GCR + REVIEW + OPERATING EXPERIENCE + FAILURE, EQUIPMENT

128323

SACKETT JI + GALE NL
DEVELOPMENT OF TECHNICAL SPECIFICATIONS FOR EBR-II: SOME CONSIDERATIONS FOR APPLICATION TO COMMERCIAL LMFBR'S

128323 *CONTINUED*
 ARGONNE NATIONAL LAB., ILL.
 CONF-761001(VOL. II) +. 9 PPS. PP. 411-19, FROM PROCEEDINGS OF THE INTERNATIONAL MEETING ON FAST REACTOR
 SAFETY & RELATED PHYSICS; CHICAGO, ILL., OCT. 5-8, 1976

CONSIDERATIONS MADE IN DEVELOPMENT OF TECHNICAL SPECIFICATIONS FOR EBR-II IDENTIFIED OPERATIONAL-
 SAFETY CONCERNS UNIQUE TO LMFBR'S AND APPLICABLE TO BOTH MAJOR REACTOR TEST FACILITIES AND
 PROTOTYPE COMMERCIAL PLANTS. TECH SPECS DEVELOPED FOR EBR-II DEFINE THE SAFE OPERATING ENVELOPE
 WHILE AT THE SAME TIME PROVIDING THE FLEXIBILITY TO ACCOMMODATE A WIDE RANGE OF TESTS RELEVANT TO
 FAST REACTOR SAFETY. THIS REQUIRED, IN MANY CASES, DEFINITION OF PERFORMANCE CRITERIA RATHER
 THAN SPECIFIC OPERATING LIMITS. MUCH CONSIDERATION WAS GIVEN TO DIFFERENTIATING BETWEEN ITEMS
 TRULY RELEVANT TO PERSONNEL SAFETY AND THOSE RELEVANT ONLY TO REACTOR AVAILABILITY.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*EBR 1 AND 2 (RE) + *TECHNICAL SPECIFICATIONS + OPERATION + ADMINISTRATIVE CONTROL + SAFETY ANALYSIS +
 REACTOR, LMFBR + REACTOR, TEST

129708
 MAFFEI HP + FUNK CW + BALLIF JL
 SODIUM REMOVAL, DISASSEMBLY, AND EXAMINATION OF FERMI SECONDARY SODIUM PUMP
 HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
 HEDL-TC-133 +. 28 PPS, 3 TABS, 13 FIGS, AUG. 1974

IN DEVELOPING THE WATER-VAPOR-NITROGEN SODIUM REMOVAL PROCESS, THE DEMONSTRATION OF THE PROCESS ON
 ACTUAL PLANT COMPONENTS PROVIDES USEFUL EXPERIENCE AND INFORMATION. SEVERAL PLANT-SCALE
 COMPONENTS INCLUDING FERMI 3-IN. BELLOWS SEALS VALUES HAVE BEEN SUCCESSFULLY CLEANED. RECENTLY,
 A 13,000 GPM FERMI SECONDARY PUMP WAS PROCESSED AND THE RESULTS ARE DESCRIBED IN THIS REPORT.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

SODIUM + RECOVERY PROCESS + PUMPS + FERMI (LMFBR) + REACTOR, LMFBR + EXPANSION + PIPES AND PIPE FITTINGS +
 SEAL + COOLING SYSTEM, SECONDARY

130967
 MOFFITT WC
 FFTF OPERATIONS: INITIAL OPERATOR TRAINING SIMULATOR PROGRAM
 HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
 HEDL-SA-1129 + CONF-761099-1 +. 9 PPS, FROM IAEA SPECIALISTS MEETING; STUDSVIK, SWEDEN, OCT. 27, 1976

DESCRIBES THE FFTF OPERATIONS INITIAL TRAINING PROGRAM UTILIZING THE OPERATOR TRAINING SIMULATOR.
 A COMPUTER-DRIVEN SYSTEM THAT PROVIDES REAL TIME RESPONSE OF ESSENTIAL PLANT FUNCTIONS TO A
 CONTROL ROOM MOCKUP. THE FFTF, A 400 MEGAWATT, THREE-LOOP, SODIUM-COOLED FAST TEST REACTOR WILL
 TEST FUELS, MATERIALS AND EQUIPMENT FOR THE U.S. LIQUID METAL FAST BREEDER REACTOR PROGRAM.
 CONSTRUCTION IS EXPECTED TO BE COMPLETED IN AUGUST 1978. INITIAL CRITICALITY IS EXPECTED IN
 EARLY 1979. THIS SCHEDULE WILL REQUIRE FFTF CONTROL ROOM OPERATORS TO BE FULLY QUALIFIED TO
 OPERATE THE FACILITY BY LATE 1979.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*TRAINING + OPERATION + REACTOR, TEST + REACTOR, LMFBR + SIMULATION + FFTF (TR)

18. DESIGN, CONSTRUCTION AND LICENSING

119864

RESPONSE TO QUESTION 001.398 - RELEASE OF FISSION PRODUCTS DURING CLEANING OF LARGE COMPONENTS
CLINCH RIVER BREEDER REACTOR PLANT PROJECT OFFICE, OAK RIDGE, TN
DOCKET 50537-173 +. 1 PG, P. 0001.398-1 OF AMENDMENT 23 TO CLINCH RIVER BREEDER LICENSE APPLICATION, JUNE 30,
1976, DOCKET 50-537, TYPE--LMFBR, MFG--WEST., AE--BURNS & ROE

THE UNCONTROLLED OR RUNAWAY REACTION OF SODIUM WITH WATER AND RESULTANT HYDROGEN GENERATION IN THE
LARGE COMPONENT CLEANING VESSEL (LCCV) IS DEFINED AS AN 'EXTREMELY UNLIKELY EVENT'. THE
POSTULATED ACCIDENT WOULD BE A RESULT OF A FAILURE, MALFUNCTION, OR OPERATOR ERROR BUT
NEVERTHELESS CAN BE USED TO EVALUATE THE DESIGN BASIS FOR THE VESSEL. THE RESPONSE TO QUESTION
001.201 DESCRIBES HOW REGULATION OF WATER VAPOR CONCENTRATION IN THE WATER VAPOR NITROGEN (WVN)
MIXTURE INTRODUCED IN THE CLEANING VESSEL AND REGULATION OF NITROGEN PURGE RATE WILL CONTROL THE
HYDROGEN CONCENTRATION IN THE PRIMARY SODIUM REMOVAL AND DECONTAMINATION (PSK+D) SYSTEM.

AVAILABILITY - MAGNAGARD, INC., P.O. BOX 3501, OAK RIDGE, TENN. 37830

CLINCH RIVER (LMFBR) + REACTOR, LMFBR + RESPONSE TO NRC QUESTION + *FISSION PRODUCT RELEASE + *DECONTAMINATION
+ COMPONENTS + METAL WATER REACTION + METAL, LIQUID + ACCIDENT + ACCIDENT, PROBABILITY OF

119866

RESPONSE TO QUESTION 001.406 - NATURAL CIRCULATION DECAY HEAT REMOVAL
CLINCH RIVER BREEDER REACTOR PLANT PROJECT OFFICE, OAK RIDGE, TN
DOCKET 50537-173 +. 1 PG, P. 0001.406-1 OF AMENDMENT 23 TO CLINCH RIVER BREEDER LICENSE APPLICATION, JUNE 30,
1976, DOCKET 50-537, TYPE--LMFBR, MFG--WEST., AE--BURNS & ROE

THE CRBRP PROJECT IS COMMITTED TO NATURAL CIRCULATION DECAY HEAT REMOVAL AS A DESIGN REQUIREMENT
FROM RATED THERMAL POWER (975 MW (SUB T)) ON THREE LOOPS. THE PLAN TO ESTABLISH THE CAPABILITY
FOR REMOVAL OF SENSIBLE AND DECAY HEAT VIA NATURAL CIRCULATION IS DEFINED IN A REPORT TITLED
VERIFICATION OF NATURAL CIRCULATION IN CLINCH RIVER BREEDER REACTOR - A PLAN, WHICH HAS BEEN
SUPPLIED UNDER SEPARATE COVER.

AVAILABILITY - MAGNAGARD, INC., P.O. BOX 3501, OAK RIDGE, TENN. 37830

CLINCH RIVER (LMFBR) + REACTOR, LMFBR + RESPONSE TO NRC QUESTION + DESIGN CRITERIA + DECAY HEAT + *SHUTDDOWN
COOLING SYSTEM + *CIRCULATION, NATURAL

119868

RESPONSE TO QUESTION 001.427 - RELIABILITY ASSESSMENT FOR PIPE SLEEVES
CLINCH RIVER BREEDER REACTOR PLANT PROJECT OFFICE, OAK RIDGE, TN
DOCKET 50537-173 +. 1 PG, P. 0001.427-1 OF AMENDMENT 23 TO CLINCH RIVER BREEDER LICENSE APPLICATION, JUNE 30,
1976, DOCKET 50-537, TYPE--LMFBR, MFG--WEST., AE--BURNS & ROE

THE PIPE SLEEVE DESIGN WILL BE SUCH THAT ADEQUATE INSPECTABILITY WILL BE PROVIDED, AS DELINEATED
IN APPENDIX E. THE STRUCTURAL DESIGN OF THE PIPE SLEEVE WILL EMPLOY WELL ESTABLISHED
DETERMINISTIC ANALYSIS AND DESIGN METHODS. UNDER THE DESIGN BASIS PIPE BREAK CONDITIONS, THE
DESIGN OF THE PIPE SLEEVE WILL ASSURE ITS STRUCTURAL INTEGRITY NECESSARY TO PERFORM ITS SPECIFIED
SAFETY FUNCTION. THEREFORE, WE DO NOT PLAN TO PERFORM A *DETAILED RELIABILITY ASSESSMENT FOR THE
PIPE SLEEVE DESIGN*.

AVAILABILITY - MAGNAGARD, INC., P.O. BOX 3501, OAK RIDGE, TENN. 37830

CLINCH RIVER (LMFBR) + REACTOR, LMFBR + RESPONSE TO NRC QUESTION + *PIPES AND PIPE FITTINGS + *CONTAINMENT +
ACCIDENT ANALYSIS + DESIGN CRITERIA + INSERVICE INSPECTION + *RELIABILITY ANALYSIS

119876

RESPONSE TO QUESTION 222.40 - INCORPORATION OF A MARGIN OF ERROR IN PREDICTIONS
CLINCH RIVER BREEDER REACTOR PLANT PROJECT OFFICE, OAK RIDGE, TN
DOCKET 50537-173 +. 1 PG, P. 0222.40-1 OF AMENDMENT 23 TO CLINCH RIVER BREEDER LICENSE APPLICATION, JUNE 30,
1976, DOCKET 50-537, TYPE--LMFBR, MFG--WEST., AE--BURNS & ROE

PROBABILITY DENSITY FUNCTIONS WILL BE GENERATED TO PROVIDE A BASIS FOR DEFINING UNCERTAINTIES
ASSOCIATED WITH THE VARIOUS SYSTEM ELEMENTS. THESE DISTRIBUTIONS WILL BE FORMED BY COMBINING
APPLICABLE EXISTING DATA WITH DATA GENERATED WITHIN THE RELIABILITY PROGRAM. BECAUSE OF
PRACTICAL CONSIDERATIONS, IT WILL NOT BE POSSIBLE TO GENERATE TOP LEVEL DISTRIBUTIONS SOLELY FROM
EXPERIMENTAL DATA ON PROTOTYPIC HARDWARE. FOR EXAMPLE, LARGE SCALE TESTING IN AN IRRADIATION
ENVIRONMENT WILL NOT BE PERFORMED. INSTEAD DATA FROM IRRADIATED SMALL SAMPLES WILL BE USED.

AVAILABILITY - MAGNAGARD, INC., P.O. BOX 3501, OAK RIDGE, TENN. 37830

CLINCH RIVER (LMFBR) + REACTOR, LMFBR + RESPONSE TO NRC QUESTION + *RELIABILITY ANALYSIS + TESTING + MODEL
TESTING + *SAFETY MARGIN

119877

RESPONSE TO QUESTION 222.47 - SHUTDOWN SYSTEM COMPONENT FAILURE
CLINCH RIVER BREEDER REACTOR PLANT PROJECT OFFICE, OAK RIDGE, TN
DOCKET 50537-173 +. 1 PG, 1 TAB, PP. 0222.47-1 THRU 0222.47-3 OF AMENDMENT 23 TO CLINCH RIVER BREEDER LICENSE
APPLICATION, JUNE 30, 1976, DOCKET 50-537, TYPE--LMFBR, MFG--WEST., AE--BURNS & ROE

119877 *CONTINUED*

THE ITEMS ANALYZED IN THE ELECTRICAL PROTECTIVE SYSTEM FMEA ARE LISTED IN THE ATTACHED TABLE WITH THEIR ASSOCIATED FAILURE RATE ESTIMATES AS DESCRIBED IN ATTACHED TABLE 222.47-1. WHEN AN ITEM IS FOUND FAILED THE PROCEDURE WILL BE TO TRIP THE CHANNEL IN WHICH THE FAILED ITEM IS LOCATED. THE ITEM CAN THEN BE REPAIRED. AFTER THE REPAIR IS COMPLETED, THE TRIP WILL THEN BE REMOVED. THUS, DURING THE PERIOD IN WHICH THE ITEM IS REPAIRED, THE 2 OF 3 SYSTEM IS EFFECTIVELY OPERATING AS A 1 OF 2 SYSTEM.

AVAILABILITY - MAGNAGARD, INC., P.O. BOX 3501, OAK RIDGE, TENN. 37830

CLINCH RIVER (LMFBR) + REACTOR, LMFBR + RESPONSE TO NRC QUESTION + *FAILURE MODE ANALYSIS + REACTOR PROTECTION SYSTEM + *CONTROL SYSTEM + MAINTENANCE AND REPAIR + COMPONENTS

119899

RESPONSE TO QUESTION 310.32 - SODIUM FIRE EFFECT ON CONTROL ROOM HABITABILITY
CLINCH RIVER BREEDER REACTOR PLANT PROJECT OFFICE, OAK RIDGE, TN
DOCKET 50537-175 +. 2 PGS, PP. 0310.32-1 THRU 0310.32-2 OF AMENDMENT 24 TO CLINCH RIVER BREEDER LICENSE APPLICATION, JULY 22, 1976, DOCKET 50-537, TYPE--LMFBR, MFG--WEST., AE--BURNS & ROE

THE RELEASE OF SODIUM AND SUBSEQUENT SODIUM FIRES RESULTING IN THE RELEASE OF SODIUM COMBUSTION PRODUCTS TO THE ATMOSPHERE IS DESCRIBED IN SECTION 7.2.1.1 OF THE ENVIRONMENTAL REPORT. A PRELIMINARY ANALYSIS WAS CONDUCTED TO DETERMINE THE EFFECT OF THE RELEASE OF THESE PRODUCTS TO THE ATMOSPHERE ON THE HABITABILITY OF THE CONTROL ROOM IN ACCORDANCE WITH REGULATORY GUIDE 1.78. AT THE TIME OF THE SODIUM RELEASE AND START OF THE FIRE, ANY ONE OF 3 TYPES OF SENSORS, WHICH ARE LOCATED IN NON-INERTED CELLS CONTAINING SODIUM, WILL INITIATE AN ALARM IN THE CONTROL ROOM AND ACTIVATE THE EMERGENCY OPERATING MODE OF THE CONTROL ROOM HVAC SYSTEM.

AVAILABILITY - MAGNAGARD, INC., P.O. BOX 3501, OAK RIDGE, TENN. 37830

CLINCH RIVER (LMFBR) + REACTOR, LMFBR + RESPONSE TO NRC QUESTION + *SODIUM + *FIRE + VENTILATION SYSTEM + *CONTROL PANEL/ROOM + EFFECT + CONTROL SYSTEM

120928

RESPONSE TO QUESTION 011.14 - BOTTLING OF AR-39 AND KR-85 FROM CRYOGENIC STILL
CLINCH RIVER BREEDER REACTOR PLANT PROJECT OFFICE, OAK RIDGE, TN
DOCKET 50537-183 +. 2 PGS, PP. 0011.14-1 THRU 0011.14-2 OF AMENDMENT 25 TO CLINCH RIVER BREEDER LICENSE APPLICATION, AUG. 13, 1976, DOCKET 50-537, TYPE--LMFBR, MFG--WEST., AE--BURNS & ROE

THE CRYOGENIC STILL BOTTOMS CONSIST OF LIQUID ARGON IN WHICH KRYPTON AND XENON ISOTOPES WHICH PASS THROUGH THE CRYOGENIC CHARCOAL BEDS DISSOLVE. THE CRYOSTILL SERVES TO COLLECT AND REMOVE KRYPTON AND XENON ISOTOPES - STABLE AS WELL AS RADIOACTIVE - IN THE RECYCLE GAS STREAM. DURING STEADY STATE OPERATION WITH 1% FAILED FUEL, THE CRYOSTILL BOTTOMS WILL ACCUMULATE 2.0 CURIES/DAY OF KR-85 AND ABOUT 0.01 CURIES/DAY OF AR-39. IT HAS BEEN DETERMINED THAT IF THE STILL WERE OPERATED FOR 10 YEARS, THE ONE CUBIC FOOT OF LIQUID ARGON WOULD CONTAIN 5,377 CURIES OF KR-85, 26 CURIES OF AR-39 AND 0.05 CURIES OF AR-41. THIS WILL FILL 52 1.5 CU. FT. LABORATORY-SIZED GAS BOTTLES AT 150 PSIA. A TOTAL OF 104 CURIES IN EACH BOTTLE.

AVAILABILITY - MAGNAGARD, INC., P.O. BOX 3501, OAK RIDGE, TENN. 37830

CLINCH RIVER (LMFBR) + REACTOR, LMFBR + RESPONSE TO NRC QUESTION + WASTE TREATMENT + *WASTE TREATMENT, GAS + *WASTE STORAGE + *CRYOGENICS + SYSTEM CAPABILITY + SYSTEM DESCRIPTION + ARGON + KRYPTON + OFF GAS

121273

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION AND OPERATION OF CLINCH RIVER BREEDER
U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON
NUREG-0139 +. APPROX. 410 PPS, TABS, FIGS, REFS, FEB. 1977 (DOCKET 50-537)

THE PROPOSED LOCATION IS IN ROANE COUNTY, TENN., ABOUT 25 MILES WEST OF KNOXVILLE. CRITICALITY IS NOW SCHEDULED FOR OCT. 1983. DURING THE FIRST 5 YEARS OF OPERATION, TVA WOULD OPERATE THE CRBR AND PURCHASE ITS ELECTRICAL OUTPUT AS A DEMONSTRATION PLANT UNDER ERDA'S LMFBR PROGRAM. TVA WOULD THEN HAVE THE OPTION TO PURCHASE THE PLANT. THE CRBR IS DESIGNED TO PRODUCE 975 MWT (380MWE). FUTURE CORE DESIGNS MAY RESULT IN POWER RATINGS OF 1121 MWT AND 439 MWE - THESE HIGHER RATINGS WERE CONSIDERED IN THIS ASSESSMENT. EXHAUST STEAM IS TO BE COOLED USING 2 MECHANICAL DRAFT COOLING TOWERS. ABOUT 20,000 CUBIC METERS OF RIVER BANK AND BOTTOM WOULD BE EXCAVATED TO INSTALL THE COOLING WATER INTAKE AND DISCHARGE AND BARGE UNLOADING FACILITIES.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*CLINCH RIVER (LMFBR) + *STATEMENT, ENVIRONMENTAL + CONSTRUCTION PERMIT PROCESS + COOLING TOWER, MECHANICAL + MAIN COOLING SYSTEM + INTAKE + ECOSYSTEM + TVA + POWER UPGRATING + REACTOR, LMFBR

121581

FRANGOS AZ
FFTF HTS/DHX PROTOTYPE MODULE TESTING IN SCTI FINAL REPORT
ATOMICS INTERNATIONAL, CANOGA PARK, CALIF.
LMC-76-4 +. 360 PPS, 18 TABS, 84 FIGS, OCT. 30, 1976

THIS REPORT COVERS TESTING OF THE FULL-SIZE PROTOTYPE MODULE HEAT TRANSFER SYSTEM/DUMP HEAT EXCHANGER (HTS/DHX), ONE OF TWELVE UNITS TO BE INSTALLED FOR THE FAST FLUX TEST FACILITY (FFTF)

121581 *CONTINUED*

AT HANFORD, WASHINGTON. THE OVERALL OBJECTIVES OF THE HTS/DHX TEST PROGRAM AT LIQUID METAL ENGINEERING CENTER (LMEC) WERE TO DEMONSTRATE STEADY-STATE AND TRANSIENT PERFORMANCE OF THE FULL-SIZED PROTOTYPE MODULE IN A SODIUM LOOP UNDER SIMULATED FFTF PROCESS CONDITIONS AND TO VERIFY DHX INSTALLATION, STARTUP, AND MAINTENANCE PROCEDURES. STEADY-STATE TESTING INDICATED A DEFICIENCY IN THE THERMAL PERFORMANCE. A TWO-PHASE PROGRAM WAS COMPLETED TO INCREASE PERFORMANCE TO DESIGN REQUIREMENTS.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

REACTOR, SAFETY RESEARCH + TESTING + COMPONENTS + HEAT TRANSFER, TWO PHASE + HEAT TRANSFER + FFTF (TR) + REACTOR, LMFBR + FIRE + SODIUM + JACOBS

122105

APOSTOLAKIS GE + CAVE L + EPLER EP + ILBERG D + KASTENBERG WE
LMFBR FUEL ANALYSIS TASK C: RELIABILITY ASPECTS OF LMFBRs. FINAL REPORT JULY 1, 1975-SEPTEMBER 30, 1976
UNIVERSITY OF CALIFORNIA, LOS ANGELES (PREPARED FOR NRC)
NUREG-0148 + UCLA-ENG-76116 +. 144 PPS, JAN. 1977

THE RELIABILITY PROGRAM WHICH WAS ESTABLISHED FOR THE CLINCH RIVER FAST BREEDER REACTOR PROJECT IS REVIEWED. THE REVIEW REVEALS SEVERAL PROBLEMS AND UNCERTAINTIES WHICH NEED TO BE APPROPRIATELY ADDRESSED BY THE RELIABILITY PROGRAM. THE MAIN PROBLEMS ARE STATED TO BE THE CHOICE OF THE RELIABILITY CRITERION, THE PROSPECTS OF ATTAINING HIGH RELIABILITIES OF SYSTEMS AND CRITICAL STRUCTURES, THE ROLE OF EXTERNAL PHENOMENA AS WELL AS THE VERIFICATION BY TESTS AND THE RELIABILITY ASSURANCE PROGRAM.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

JACOBS + RELIABILITY ANALYSIS + REACTOR, LMFBR + CLINCH RIVER (LMFBR) + REVIEW + *DESIGN CRITERIA + *QUALITY ASSURANCE

124126

DONALDSON AM
HEAT REJECTION FOR THE CLINCH RIVER BREEDER REACTOR PLANT
BURNS & ROE INC.
20 PPS, PAPER NO. 146, FROM 39TH ANNUAL MEETING OF THE AMERICAN POWER CONFERENCE; CHICAGO, ILL., APRIL 18-20, 1977

THE CRBRP INCORPORATES A REGENERATIVE FEEDWATER HEATING CYCLE HEATING THE CONDENSATE FROM THE MAIN CONDENSER. THE MAIN CONDENSER IS COOLED BY CIRCULATING WATER FROM THE COOLING SYSTEM. THE COOLING SYSTEM PROVIDES THE MECHANISM FOR DISSIPATION OF THE TURBINE EXHAUST STEAM'S THERMAL ENERGY. THIS PAPER DETAILS THE OPTIMIZATION AND SELECTION OF THE FOLLOWING COOLING SYSTEMS: MECHANICAL DRAFT WET TOWER, MECHANICAL DRAFT WET/DRY TOWER, HYPERBOLIC OR NATURAL DRAFT TOWER AND A SPRAY POND.

AVAILABILITY - ANDREW M. DONALDSON, MECHANICAL GROUP, BURNS & ROE INC., 9800 S. SEPULVEDA BLVD., LOS ANGELES, CALIF.

*CLINCH RIVER (LMFBR) + REACTOR, LMFBR + CONDENSER COOLING SYSTEM + WASTE HEAT + COOLING TOWER, MECHANICAL + COOLING TOWER, NATURAL DRAFT + COOLING POND + *WASTE HEAT MANAGEMENT

125973

MCCONNELL PM
CLINCH RIVER BREEDER REACTOR FUEL ASSEMBLY INLET/OUTLET NOZZLE FLOW TESTS
HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
HEDL-TME 77-8 +. 105 PPS, 8 TABS, 39 FIGS, FEB. 1977

FULL SCALE MODEL COMPONENTS OF THE CLINCH RIVER BREEDER REACTOR FUEL ASSEMBLIES HAVE BEEN TESTED UNDER STEADY-FLOW CONDITIONS WITH 140 DEG F WATER. SHIELD ORIFICE CALIBRATION DATA (23 CONFIGURATIONS), INLET-NOZZLE PISTON-RING LEAKAGE, EFFECTS OF FUEL ASSEMBLY INLET-NOZZLE UNSEATING, AXIAL VELOCITY PROFILES, AND ROUGH CAVITATION THRESHOLD CHECKS ARE REPORTED. THESE DATA PERMIT THE DESIGNER TO ACCURATELY PREDICT THE THERMAL HYDRAULIC PERFORMANCE OF THE PROTOTYPE FUEL ASSEMBLIES FOR A GIVEN SET OF DESIGN CONDITIONS.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

REACTOR, LMFBR + OUT OF PILE EXPERIMENT + FLOW THEORY AND EXPERIMENTS + DESIGN CRITERIA + HYDRAULIC EXPERIMENT + JACOBS + WESTINGHOUSE + CLINCH RIVER (LMFBR)

126176

TZANOS CP + BARTHOLOMEW WP + BOWERS CH
DESIGN-RELATED INHERENT SAFETY CHARACTERISTICS IN LARGE LMFBR POWER PLANTS
ARGONNE NATIONAL LAB., ILL.
CONF-761001-43 +. 18 PPS, FROM INTERNATIONAL MEETING ON FAST REACTOR SAFETY & RELATED PHYSICS; CHICAGO, ILL., OCT. 1976

DESIGN-RELATED SAFETY-ENHANCING FEATURES SUCH AS (1) EXTENDED PUMP COASTDOWN, (2) INCREASED

126176 *CONTINUED*

NEGATIVE REACTIVITY FEEDBACKS, (3) REDUCED SODIUM VOID REACTIVITY, AND (4) SELF-ACTUATED SHUTDOWN SYSTEMS ARE EVALUATED. PRIMARY EMPHASIS IS PLACED ON PREVENTING OR LIMITING CORE DAMAGE. ATTENTION IS ALSO GIVEN TO FEATURES AIMED AT MITIGATION OF THE ENERGETICS POTENTIAL OF HYPOTHETICAL CORE-DISRUPTIVE ACCIDENTS.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*REACTOR, LMFBR + *SAFETY ANALYSIS + PUMPS + TRANSIENT + REACTIVITY, NEGATIVE + REACTIVITY EFFECT, VOID + SHUTDOWN MECHANISM, SELF + ACCIDENT, CORE DISRUPTIVE

127503

CONCEPTUAL DESIGN DESCRIPTION, 3000-KWE SUBSEA NUCLEAR POWER PLANT
ATOMICS INTERNATIONAL, CANOGA PARK, CALIF.
AI-ERDA-13194 +. 79 PPS, 22 TABS, 22 FIGS, APRIL 15, 1977

DESCRIBES THE CONCEPTUAL DESIGN AND PERFORMANCE OF A SUBSEA NUCLEAR POWER SYSTEM FOR APPLICATION IN OFFSHORE OIL AND GAS PRODUCTION. THE SYSTEM IS DESIGNED TO PROVIDE 3000 KW(E) POWER TO OIL PUMPS, AT 4160 V. AND 60 HZ, FOR A PERIOD OF 4 YEARS, IN AN AUTOMATIC, UNATTENDED MODE. THE NUCLEAR POWER SYSTEM IS LARGELY CONTAINED WITHIN TWO SEPARATE PRESSURE VESSELS, CONNECTED BY AN ENCLOSED PIPE CHASE. ONE VESSEL CONTAINS THE REACTOR AND LIQUID METAL PRIMARY COOLANT SYSTEM, WHILE THE OTHER CONTAINS THE ORGANIC RANKINE POWER CONVERSION SYSTEMS. THESE MODULES ARE MOUNTED ON A BARGE WHICH PROVIDES BOTH A MEANS TO TRANSPORT THE SYSTEM AND A MOUNTING STRUCTURE FOR THE SEA FLOOR INSTALLATION. A WASTE HEAT EXCHANGER IS MOUNTED ON THE DECK OF THE BARGE. THE NUCLEAR POWER SYSTEM IS DESIGNED FOR UNATTENDED OPERATIONS.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*POWER PLANT, NUCLEAR + SITING, OFF SHORE + *CONTAINMENT, UNDERWATER + DESIGN STUDY + REACTOR, LMCR + REACTOR, ORGANIC COOLED + JACOBS

127511

LIQUID METAL FAST BREEDER REACTOR CONCEPTUAL PLANT DESIGN, 1000 MWE. VOLUME 1 - EXECUTIVE SUMMARY
ATOMICS INTERNATIONAL + BURNS & ROE INC.
TID-27701-1(VOL.1) + FBR-77-3 +. 106 PPS, 11 TABS, 23 FIGS, MAY 1977

THIS VOLUME PRESENTS A SYNOPSIS OF THE CONCEPTUAL DESIGN AND PERFORMANCE CHARACTERISTICS OF A 1000-MWE LMFBR ELECTRIC-GENERATING POWER PLANT. THIS CONCEPTUAL DESIGN WAS DEVELOPED BY THE ATOMICS INTERNATIONAL AND BURNS & ROE TEAM DURING THE SECOND PHASE OF THE PROTOTYPE LARGE BREEDER REACTOR DESIGN PROJECT. PHASE I TEAM EFFORTS DEVELOPED CONCEPTUAL DESIGNS OF 1000-MWE LMFBR POWER PLANTS UTILIZING "LOOP," "POOL," AND "HYBRID" PRIMARY SYSTEM ARRANGEMENTS. PHASE II EFFORTS CONCENTRATED ON THE ENGINEERING ASPECTS OF THE LOOP CONCEPT. THE REACTOR CORE UTILIZES PUO2-UO2 FUEL AND UO2 BREEDER ELEMENTS, IN A "BULLSEYE" CONFIGURATION, TO IMPROVE OVERALL BREEDING, FUEL CYCLE ECONOMICS, AND SAFETY CHARACTERISTICS.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

*REACTOR, LMFBR + *DESIGN STUDY + URANIUM DIOXIDE + PLUTONIUM DIOXIDE + JACOBS + REACTOR DESCRIPTION

129205

PRISLINGER JJ + JONES RH
FABRICATION OF AN IMPROVED TUBE-TO-PIPE HEADER HEAT EXCHANGER FOR THE FUEL FAILURE MOCKUP (FFM) FACILITY
OAK RIDGE NATIONAL LAB., TENN.
ORNL/TM-5733 +. 17 PPS, 8 FIGS, MAY 1977

THE PROCEDURE USED IN FABRICATING AN IMPROVED TUBE-TO-PIPE HEADER HEAT EXCHANGER FOR THE FUEL FAILURE MOCKUP (FFM) FACILITY IS DESCRIBED. SUPERIOR PERFORMANCE IS ACCOMPLISHED AT REDUCED COST WITH ADHERENCE TO THE ASME BOILER AND PRESSURE VESSEL CODE. THE TECHNIQUES USED AND THE METHOD OF FABRICATION ARE DESCRIBED IN DETAIL.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

FABRICATION + PROCEDURES AND MANUALS + HEAT EXCHANGERS + REACTOR TEST FACILITY + REACTOR, LMFBR + FAILURE, FUEL ELEMENT + ORNL

129737

KOJIMA T + YASUHIRO O + TATSUTOSH I
STUDIES, DESIGN, AND DEVELOPMENT OF COMMERCIAL FAST BREEDER REACTORS IN JAPAN
7 PPS, GENSIRYOKU KOGYO., 22(9), PP. 40-46 (SEPT.-OCT. 1976)

OUTLINES THE RESEARCH AND DEVELOPMENT WORK IN JAPAN ASSOCIATED WITH THE FAST BREEDER REACTOR. PROGRESS ON THE CONSTRUCTION OF THE EXPERIMENTAL REACTOR JOYO AND PLANNED CONSTRUCTION OF THE PROTOTYPE REACTOR, MONJU, IS DISCUSSED. DISCUSSES THE DESIGN AND ROLE OF A 3600 MWt (1500 MWE) COMMERCIAL FAST BREEDER REACTOR IN A NUCLEAR POWER PROGRAM.

*JAPAN + *R AND D PROGRAM + REACTOR, FAST + REACTOR, LMFBR + REACTOR DESCRIPTION + REACTOR, TEST + CONSTRUCTION + GROWTH/DEVELOPMENT + REACTOR, BREEDER

129918

ERDA-EPRI LMFBR DESIGN PROJECTS PHASE II FINAL REPORT VOL. B2 PLBR BALANCE OF PLANT DESIGN CHARACTERISTICS
STONE & WEBSTER ENGINEERING CORP., BOSTON, MASS.
TID-27690/3 +. 560 PPS, 31 TABS, 61 FIGS, JUNE 1977

CONTAINS A DESCRIPTION OF THE PROTOTYPE LARGE BREEDER REACTOR (PLBR) DESIGN AS IT EXISTED AT THE COMPLETION OF PHASE II ACTIVITY. THE REPORT IS ORGANIZED IN THE GENERAL FORMAT OF A PRELIMINARY SAFETY ANALYSIS REPORT. THE DESIGN INFORMATION AND DATA CONTAINED IN THIS PLANT DESCRIPTION ARE OF A PRELIMINARY NATURE AND SUBJECT TO CHANGE AS THE DESIGN PROGRESSES. SOME DATA ARE ESTIMATES ONLY AND ARE PROVIDED TO PRESENT AN OVERALL DESIGN DESCRIPTION. THE PLBR NUCLEAR POWER PLANT INCLUDES A NUCLEAR STEAM SUPPLY SYSTEM, TURBINE GENERATOR, THEIR AUXILIARIES AND OTHER ONSITE FACILITIES, AND THE NECESSARY AUXILIARIES REQUIRED FOR A COMMERCIAL OPERATING LMFBR POWER PLANT.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

AGENCY, ERDA + EPRI + *DESIGN STUDY + *REACTOR, LMFBR + REACTOR DESCRIPTION + CONTAINMENT DESIGN + ELECTRIC POWER + WASTE DISPOSAL + RADIATION SAFETY AND CONTROL + ENGINEERED SAFETY FEATURE

129944

COMMUNICATIONS SYSTEMS CLINCH RIVER BREEDER PLANT SYSTEM DESIGN DESCRIPTION
BURNS & ROE INC., DRADELL, N.J.
SDD-15(REV.2) +. APPROX. 90 PPS, TABS, FIGS, AUG. 5, 1977

THE CLINCH RIVER BREEDER REACTOR PLANT COMMUNICATIONS SYSTEM SHALL PROVIDE CAPABILITIES FOR INTRA-PLANT COMMUNICATION AND FOR INTER-PLANT COMMUNICATION WITH TVA SUBSTATIONS, GENERATING AND POWER CONTROL FACILITIES, DURING NORMAL AND EMERGENCY OPERATION OF THE PLANT. THIS SYSTEM SHALL ALSO SUPPORT PLANT OPERATIONS, MAINTENANCE AND BUSINESS FUNCTIONS DURING NORMAL OPERATION AND PROVIDE MEANS OF COMMUNICATING WARNINGS AND ALARMS TO THE PLANT-PERSONNEL AND OTHER TVA FACILITIES DURING AN EMERGENCY.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

CLINCH RIVER (LMFBR) + REACTOR, LMFBR + DESIGN CRITERIA + *COMMUNICATION SYSTEM + COMMUNICATION + *SYSTEM DESCRIPTION + EMERGENCY PROCEDURE

129945

CHA BK + FULFORD PJ + HUEBOTTER PR
CONCEPTUAL DESIGN STUDIES OF AN ADVANCED CORE RESTRAINT SYSTEM
ARGONNE NATIONAL LAB., ILL.
ANL-CT-76-52 +. 114 PPS, 21 TABS, 45 FIGS, 19 REFS, AUG. 1976

AN ADVANCED CORE RESTRAINT SYSTEM PROPOSED AND BRIEFLY DESCRIBED IN ANL-CT-75-44 IS INVESTIGATED IN A SERIES OF CALCULATIONS. FIRST BACKGROUND INFORMATION ON THE CONCEPT IS PROVIDED AND AN OUTLINE OF THE STUDY IS GIVEN. THE INITIAL STUDIES EXAMINE THE THREE-POINT SUPPORT CONCEPT IN THE ELASTIC REGIME AND DISCUSS THE CAPABILITIES AND SHORT-COMINGS. THE VARIOUS METHODS OF TREATING INELASTIC BEHAVIOR (CREEP AND SWELLING) ARE PRESENTED; THEY INCLUDE A SINGLE DUCT METHOD, A FULL 2D METHOD AND A 2D TREATMENT IN WHICH ONLY ONE ROW OF DUCTS BEHAVES INELASTICALLY AND THE REST BEHAVE ELASTICALLY.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

REACTOR, LMFBR + *CORE RESTRAINT + *CREEP BEHAVIOR + *SWELLING + ANALYTICAL MODEL + MATHEMATICAL TREATMENT + DESIGN STUDY + ANL

130876

PROTOTYPE LARGE BREEDER REACTOR. PHASE II: CONCEPTUAL DESIGN. VOLUME III: TRADEOFF STUDIES. PART 3: BALANCE OF PLANT ENGINEERING SUPPORT STUDIES
GENERAL ELECTRIC CO. + BECHTEL CORP.
TID-27,745/8 + 6TR-8 +. APPROX. 510 PPS, TABS, FIGS, REFS, JUNE 1977

TOPICS DISCUSSED INCLUDE THE REACTOR CONTAINMENT STRUCTURE AND CONCEPT STUDY, OTHER CATEGORY 1 STRUCTURES, SEISMIC ANALYSIS, CELL LINERS, PLANT CRANE STUDY, TURBINE CONDENSER SIZING STUDY, IMPACT ON BOP OF ALTERNATIVE DECAY HEAT REMOVAL SYSTEMS, RECIRCULATING GAS COOLING SYSTEM ALTERNATIVE, EFFECTS OF INTERMEDIATE HEAT TRANSPORT SYSTEM PIPE PENETRATIONS ON BOP DESIGN, SODIUM LEAK DETECTIONS, PIPING STRESS ANALYSIS, AND PIPE HEATING SYSTEM STUDY.

AVAILABILITY - LIMITATIONS ON DISTRIBUTION; SEND REQUESTS TO DOE TECHNICAL INFORMATION CENTER, P.O. BOX 62, OAK RIDGE, TENN. 37830

DESIGN STUDY + REACTOR, LMFBR + CONTAINMENT DESIGN + CONTAINMENT STRUCTURE + CONTAINMENT LINER + CRANE + PLBR (LMFBR) + CONDENSER + SHUTDOWN COOLING SYSTEM + SODIUM + LEAK DETECTION + STRESS ANALYSIS + PIPES AND PIPE FITTINGS

22. SAFEGUARDS OF NUCLEAR MATERIALS

124774

1976 ASME - ANS INTERNATIONAL CONFERENCE ON ADVANCED NUCLEAR ENERGY SYSTEMS
641 PPS, PROCEEDINGS PUBLISHED BY AMERICAN SOCIETY OF MECHANICAL ENGINEERS, 1976

THIS 3 DAY MEETING WHICH WAS HELD IN PITTSBURGH, PA, IN MARCH 1976 WAS DEVOTED TO A BROAD REVIEW OF ALL ADVANCED NUCLEAR SYSTEMS. SESSION TOPICS INCLUDED LMFBR CONSTRUCTION AND OPERATING EXPERIENCE; ADVANCED DEVELOPMENT IN THERMAL REACTORS; ENVIRONMENTAL ASPECTS OF ADVANCED REACTOR SYSTEMS; LMFBR COOLANT SYSTEM COMPONENTS; ADVANCED REACTOR SYSTEMS; SAFETY OF BREEDER REACTORS; NONELECTRIC NUCLEAR ENERGY; LMFBR REACTOR SYSTEM COMPONENTS; FUSION REACTOR PROGRAMS; COMMERCIAL LMFBR DESIGNS; GAS-COOLED REACTOR COMPONENTS; SITING, LICENSING AND SAFEGUARDS FOR BREEDER REACTORS.

AVAILABILITY - AMERICAN SOCIETY OF MECHANICAL ENGINEERS, 345 E. 47TH ST., NEW YORK, N.Y. 10017

*REACTOR, LMFBR + CONSTRUCTION + OPERATING EXPERIENCE + COMPONENTS + REACTOR, THERMAL + ENVIRONMENTAL QUALITY + N-POWER, SAFETY OF + *REACTOR, BREEDER + SITING, REACTOR + LICENSING PROCESS + REACTOR, THERMONUCLEAR + REACTOR, GCR + SAFEGUARDS, NUCLEAR MATERIAL

126675

TRAUBE K
SAFETY DESIGN OF SNR-300
INTERATOM, BENSBERG, GERMANY
CONF-761001(VOL. 1) +. 15 PPS, PP. 84-98 OF THE PROCEEDINGS OF THE INTERNATIONAL MEETING ON FAST REACTOR SAFETY AND RELATED PHYSICS; CHICAGO, ILL., OCT. 5-8, 1976

THIS JOINT GERMAN-BELGIAN-DUTCH LOOP TYPE 300 MWE LMFBR PROTOTYPE REACTOR IS BEING CONSTRUCTED ON LOWER RHINE AT KALKAR, GERMANY. THIS PAPER DEALS WITH THREE IMPORTANT SAFETY ISSUES: HYPOTHETICAL CORE DISRUPTIVE ACCIDENT (HCDA), PROTECTION AGAINST EXTERNAL EVENTS (PLANE CRASHES, SABOTAGE, MISSILES, EARTHQUAKES), AND PROVISIONS FOR INSERVICE INSPECTION.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

REACTOR, LMFBR + GERMANY + SAFETY ANALYSIS + ACCIDENT, CORE DISRUPTIVE + CONTAINMENT INTEGRITY + AIRCRAFT + EARTHQUAKE + SABOTAGE + INSERVICE INSPECTION

129975

POWERS PN
THE NUCLEAR POWER DILEMMA
PURDUE UNIV., WEST LAFAYETTE, IND.
4 PPS, NATIONAL DEFENSE, 61(342), PP. 483-86 (MAY-JUNE 1977)

THE COSTLY SLOWDOWN IN BUILDING THE U.S. NUCLEAR POWER INDUSTRY IS BECOMING A DANGEROUS THREAT TO NATIONAL SECURITY. THE DELAY IS COSTLY BECAUSE IT INCREASES THE PRICE OF ELECTRICITY, AND IT IS DANGEROUS BECAUSE IT GIVES ENCOURAGEMENT TO THE SPREAD OF FACILITIES AROUND THE WORLD WITH CAPABILITIES FOR PRODUCING MATERIAL FOR NUCLEAR WEAPONS. OTHER NATIONS ARE RELYING LESS ON OUR LEADERSHIP IN NUCLEAR MATTERS, AND OUR STRENGTH IS THREATENED BY ENERGY CRISES SUCH AS THOSE OF 1973 AND 1977 WHICH ARE LIKELY TO BECOME MORE FREQUENT AND MORE SEVERE AND WHICH COULD BE MINIMIZED BY A RAPID INCREASE IN OUR ELECTRIC-GENERATING CAPACITY.

ENERGY + ELECTRIC POWER + POWER PLANT, NUCLEAR + LICENSING PROCESS + COST, CAPITAL + REACTOR, BREEDER + PROLIFERATION

131030

SPIEWAK I + BARTINE DE
THORIUM ASSESSMENT STUDY QUARTERLY PROGRESS REPORT FOR THIRD QUARTER FISCAL 1977
OAK RIDGE NATIONAL LAB., TENN.
ORNL/TM-6025 +. 52 PPS, 24 TABS, 8 FIGS, 15 REFS, OCT. 1977

REPORTS PROGRESS ON THE PROGRAM AIMED AT ASSESSING THE POTENTIAL ROLE OF THORIUM FUEL CYCLES FOR ALLEVIATING SAFEGUARDS CONCERNS. SCENARIOS INCLUDE (1) NO FUEL RECYCLE PERMITTED, (2) FUEL RECYCLE PERMITTED ONLY IN SECURE REGIONS ("ENERGY PARKS") WITH DENATURED (CHEMICALLY NON-SEPARABLE) FUELS ONLY OUTSIDE THESE REGIONS, AND (3) NO LIMITS ON FUEL RECYCLE. A FURTHER OBJECTIVE IS TO PROVIDE NUCLEAR MASS BALANCE DATA ON HTGRS REQUIRED BY ERDA CONTRACTORS FOR COMPARATIVE COST-BENEFIT STUDIES.

AVAILABILITY - NATIONAL TECHNICAL INFORMATION SERVICE, U. S. DEPARTMENT OF COMMERCE, SPRINGFIELD, VA. 22161

*THORIUM + *FUEL CYCLE + SAFEGUARDS, NUCLEAR MATERIAL + FUEL RECYCLE + REACTOR, HTGR + COST BENEFIT + REACTOR, FAST + REACTOR, LMFBR

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