NRC FORM 189 (Rev. 04-83)

U.S. NUCLEAR REGULATORY COMMISSION

PROJECT AND BUDGET PROPOSAL FOR NRC WORK

Date of Proposal: August 1983

■ New
□ Revision No.

Project Title: IN-PILE FISSION PRODUCT BEHAVIOR STUDIES

FIN: A6321

NRC Office: Office of Nuclear Regulatory Research (RES), Division of Accident Evaluation (DAE)

NRC B&R Number: 60 19 02 01

DOE Contractor: EG&G Idaho, Inc.

Contractor Account Number: I-810

Site: IDAHO NATIONAL ENGINEERING LABORATORY (INEL)

DOE B&R Number: 40 10 01 060

COGNIZANT PERSONNEL	ORGANIZATION	FTS PHONE NUMBER	PERIOD OF PERFORMANCE
NRC Project Manager: M. Silberberg	NRC/RES	427-4266	Starting Date: 10/01/83
Other NRC Technical Staff: M. W. Jankowski	NRC/RES	427-4266	Completion Date: 09/30/84
DOE Project Manager: D. L. Rose	DOE-ID	583-1982	
Contractor-Project Manager: W. A. Spencer	EG&G Idaho	583-9712	
Principal Investigator(s): P. E. MacDonald	EG&G Idaho	583-9634	

STAFF YEARS OF EFFORT (Round to nearest tenth of a year)		FY-1983	FY-1984	FY-1985	FY-1986	FY-1987
Direct Scientific/Technical		20.1	37.6	25.9		
Other Direct (Graded)		9.4	17.1	11.7		
TOTAL DIRECT STAFF YEARS		29.5	54.7	37.6	23.0	10.0
COST PROPOSAL ($000)						
Direct Salaries		815	1619	1205		
Material and Services (Excluding ADP)		631	1650	1234		
ADP Support		81	153	42		
Subcontracts		0	115	45		
Travel Expenses	Foreign	0	4	4		
	Domestic	9	27	25		
Indirect Labor Costs	Direct Labor Overhead	668	1360	1036		
	Common Support	460	938	718		
Other (Specify)	(carryover)	0	0	0		
Other (Specify)		0	0	0		
General and Administrative (14.0 %)		319	694	531		
TOTAL OPERATING COST		2983	6560	4840	2995	1330
Capital Equipment		0	0	0	0	0
TOTAL PROJECT COST		2983	6560	4840	2995	1330

FY 19 84 MONTHLY FORECAST EXPENSE	October	November	December	January	February	March
	394	384	621	598	598	598
Total Forecast Expense $ 6560K	April	May	June	July	August	September
	578	578	578	544	544	545

APPROVAL AUTHORITY-SIGNATURE: W. A. Spencer Date: 8/12/83

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IN-PILE FISSION PRODUCT BEHAVIOR STUDIES

DOE Proposing Organization: IDAHO OPERATIONS OFFICE (ID)

FORECAST MILESTONE CHART: Scheduled to Start - △——▲ - Completed (Shown in Quarter Year)
PROVIDE ESTIMATED DOLLAR COST FOR EACH TASK FOR EACH FISCAL YEAR

TASK		FY -1983				FY -1984				FY -1985				FY -1986				FY -1987			
		1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
FPDS Program Support (425100000)	Schedule	△																			▲
	Cost	291K				293K				316K				220K				110K			
Test Specific FPDS (425200000)	Schedule	△																			▲
	Cost	711K				1140K				887K				820K				350K			
SFD 1-3 Test (425310000)	Schedule	△																			▲
	Cost	788K				1188K				707K				300K				6K			
SFD 2-3 Test (425330000)	Schedule					△															▲
	Cost					377K				784K				1330K				639K			
FPDS Development (425400000)	Schedule	△					▲														
	Cost	273K				34K															
SFD 1-1 Fission Product Mods (4255A0000)	Schedule	△				▲															
	Cost	313K																			
SFD 1-3 Fission Product Mods (425580000)	Schedule		△				▲														
	Cost	284K				557K															
SFD 2-1 Fission Product Mods (4255C0000)	Schedule	△								▲											
	Cost	323K				2732K				1833K											
SFD 2-3 Fission Product Mods (4255F0000)	Schedule									△			▲								
	Cost									88K				100K							
Topical Reporting (425600000)	Schedule					△															▲
	Cost					239K				225K				225K				225K			
SUBTOTAL		2983K				6560K				4840K				2995K				1330K			
CARRYOVER		0K				0K				0K				0K				0K			
TOTAL ESTIMATED PROJECT COST		2983K				6560K				4840K				2995K				1330K			

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Date: August 1983

Project Title

IN-PILE FISSION PRODUCT BEHAVIOR STUDIES

DOE Proposing Organization: IDAHO OPERATIONS OFFICE (ID)

PROJECT DESCRIPTION: (Provide narrative descriptions of the required topics in numerical order. If an item is not applicable, list title and so state.)

(1) Objective of Proposed Work

The Thermal Fuels Behavior Program (TFBP) In-Pile Fission Product Behavior Studies provide information on the behavior of Light Water Reactor (LWR) fuels during severe accidents. All efforts in the TFBP Severe Fuel Damage test program (A6305) associated with fission product and hydrogen release and transport are covered under this 189 (A6321). In addition, because the fourth Severe Fuel Damage (SFD) test, SFD 1-3, is primarily directed towards fission product release studies, the entire SFD 1-3 test is budgeted under this account (A6321).

The objectives of the SFD tests are to: (a) characterize fuel rod damage resulting from severe cladding oxidation and melting, UO_2 dissolution and melting, and fuel rod fragmentation; (b) measure the release rates, transport and deposition of fission products; (c) measure the magnitude and timing of hydrogen generation; (d) measure coolability characteristics of test bundles with various types and degrees of damage; (e) determine the effects of irradiated fuel rods and control rods on rubble bed formation and coolability.

The data obtained from the PBF Severe Fuel Damage tests will be combined with results from Three Mile Island-2 (TMI-2) examination, results from small scale experiments being performed at other laboratories, and with development of mechanistic computer models to: (a) develop more accurate and reliable probabilistic risk assessment consequence analysis, (b) help the United States Nuclear Regulatory Commission (USNRC) set performance requirements for reactor designs and engineered safety features that will best protect the public from radiation, (c) help the USNRC decide the correct emergency response during a severe accident, and (d) provide a comprehensive understanding of what happened at TMI-2.

(2) Summary of Prior Efforts

FY-1983:

See Attachment I.

(3) Work to be Performed and Expected Results

FY-1984:

See Attachment II.

Project Title

IN-PILE FISSION PRODUCT BEHAVIOR STUDIES

DOE Proposing Organization IDAHO OPERATIONS OFFICE (ID)

PROJECT DESCRIPTION: (Provide narrative descriptions of the required topics in numerical order. If an item is not applicable, list title and so state.)

(3) Work to be Performed and Expected Results (continued)

FY-1985:

See Attachment III.

(4) Description of Any Follow-On Effort

FY-1986, FY-1987, and Beyond:

The post-test reporting for SFD 2-3 including the Non-Destructive Examination (NDE) report, the Post-Irradiation Exam (PIE), the Fission Product Detection System (FPDS) report and the Test Results Report (TRR) will be completed.

It is anticipated that at least two more Series 2 SFD tests will be performed and the test train fabrication, assembly, and conduct of these tests will be planned.

(5) Relationship to Other Projects

The major thrust of the PBF program during FY-1984 and in the foreseeable future is to provide the data and understanding that will lead to the resolution of the presently unresolved safety issues for severe fuel damage accidents. Severe fuel damage accidents are of concern because failure or bypass of the containment during such accidents may lead to significant public risk from fission product release. Therefore, the SFD experimental program in the PBF is designed to obtain data necessary to understand fission product release and fission product and aerosol deposition and transport, hydrogen generation, and their relationship to fuel behavior and coolability. Results from the planned SFD test program will contribute to improved Probabilistic Risk Assessments (PRAs), formulation of requirements for improved designs for accident mitigation, emergency response actions based on a better understanding of risk, and proper interpretation of the TMI-2 core examintion.

The PBF Severe Fuel Damage experiments will complement the Loss-of-Fluid Test (LOFT) Organization for Economic Cooperation and Development (OECD) fission product tests, the out-of-pile experiments at Kernforschungzentrum, Karlsruhe (KfK), West Germany; and the test program being performed at Sandia to develop a data base on separate effects of individual key phenomena.

The PBF Severe Fuel Damage experiments will provide data that will be used directly to deve'op and assess the SCDAP (Severe Core Damage Analyses Package) computer code. The SCDAP code will provide input into the SASA (Severe Accident

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Project Title

IN-PILE FISSION PRODUCT BEHAVIOR STUDIES

DOE Proposing Organization: IDAHO OPERATIONS OFFICE (ID)

PROJECT DESCRIPTION: (Provide narrative descriptions of the required topics in numerical order. If an item is not applicable, list title and so state.)

(5) Relationship to Other Projects (continued)

Sequence Analysis) and PRA programs being sponsored by the NRC. Analysis being performed for the specification of the Series 2 SFD experiments in PBF is being used directly and is being partially funded by the SASA program.

The PBF SFD experiments also complement the examination of the damaged core of the Three Mile Island (TMI-2) reactor, sponsored by the Department of Energy (DOE). The SFD experiments precede the TMI-2 examination and thus provide insight into the kinds of damage and debris that are being encountered in the TMI-2 core and will establish techniques for remote examinations of the debris.

(6) Reporting Schedule

FY-1983:

Alan M. Snyder, et. al., Severe Fuel Damage Series 2 Tests Conceptual Design of the Test Train and Facility Support Systems, EGG-ME-6165, (March 1983).

K. Vinjamuri and D. J. Osetek, Results of the Severe Fuel Damage Scoping Test Sample Analysis, (September 1983).

A. W. Cronenberg, et al., Liquefaction and Quench-Induced I, Cs, and Te Release During Severe Core Damage Accidents, (September 1983).

FY-1984:

D. J. Osetek, et al., Results of SFD 1-18 Sample Analyses, (May 1984).

D. J. Osetek, et al., Fission Product Behavior During SFD-ST, (September 1984).

A. D. Appelhans, et al., Fission Product Release During Severe Core Damage Accidents, (September 1984).

A. D. Appelhans, et al., Fission Product Deposition During Severe Core Damage Accidents, (September 1984).

(7) Description of Major Non-Labor Costs

Non-labor costs within this 189 consist of test train hardware procurement, hot cell activities associated with assembly of test trains with irradiated rods and posttest examination of fuel bundles, documentation publication, and miscellaneous materials required for program support.

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Project Title

IN-PILE FISSION PRODUCT BEHAVIOR STUDIES

DOE Proposing Organization: IDAHO OPERATIONS OFFICE (ID)

PROJECT DESCRIPTION: (Provide narrative descriptions of the required topics in numerical order. If an item is not applicable, list title and so state.)

(7) Description of Major Non-Labor Costs (continued)

	($000) FY-1984	FY-1985
Material and Services		
Test train hardware	$ 135	$ 172
Hot cell	757	713
Documentation publication	90	77
Miscellaneous materials	668	272
Total	$ 1650	$ 1234
Subcontracts		
A. W. Cronenberg, Fission Product Release Topical	$ 30	$ 0
Massachusetts Institute of Technology, Deposition Modeling	45	45
Argonne National Lab-West, Neutron Radiography	$ 40	$ 0
Total	$ 115	$ 45

(8) List New Capital Equipment Required

Not applicable.

(9) Describe Special Facilities Required

The facility used for this project consists primarily of an open tank reactor vessel; canal; 28 MW driver core region with an active length of 0.9 m (3 feet); central flux trap region containing an in-pile tube in which the test fuel is located; a pressurized water flow loop that permits control of the test fuel rod coolant flow rate, temperature, and pressure within typical pressurized water reactor (PWR) conditions; and a fission product detection system which provides a real-time on-line capability for sampling and detection of fission products from the fuel rod test space effluents during severe fuel damage operating conditions.

(10) Conflict of Interest Information

There is no apparent conflict of interest.

ATTACHMENT II

A6321 FY-1984

IN-PILE FISSION PRODUCT BEHAVIOR STUDIES (6560.0K)

425100000 FISSION PRODUCT DETECTION SYSTEM (FPDS) PROGRAM SUPPORT (293.0K)

4251100000 FPDS Planning and Coordination

This task will provide a full time project engineer to manage the work associated with the fission product studies during the Severe Fuel Damage (SFD) tests. Work includes planning, budgeting, organizing and scheduling multiple tasks related to data acquisition during tests and sample processing posttest, support organization coordination, data reporting, results reporting, progress reporting and program planning support. This work package also supports the project engineer's administrative costs such as word processing, graphics, travel and miscellaneous supplies.

425120000 Spectra Analysis Development

The techniques used for analysis of fission product data will be improved to include correlations with deposition coupon data. The addition of new measurement techniques for deposition of fission products in Tests SFD 1-3 and 1-4 requires new analysis to provide results useful for assessment of release and transport models.

425140000 FPDS Spare Detector

A spare germanium detector for use as a replacement for any of three spectrometers in the FPDS is required to minimize test interruption. Failures have been more frequent than originally anticipated and factory repair is expensive and time consuming with a usual turnaround of 5 weeks. This package provides funding for the purchase, modification and calibration of a new intrinsic germanium detector for the FPDS.

425100000 FISSION PRODUCT DETECTION SYSTEM (FPDS) PROGRAM SUPPORT (293.0K) (continued)

425150000 FPDS Maintenance

This task will maintain all fission product detection system equipment in good condition and ready for test monitoring, repair any failed component on a timely basis to support test monitoring, oversee all work contracts between the Light Water Reactor (LWR) Fuel and Fission Product Section and the Physics Division, track spending and schedules, as well as minimize budget and schedule changes.

425200000 TEST SPECIFIC FPDS (1140.0K)

425220000 SFD-ST FPDS

This task will provide for the completion and issuance of the SFD-ST fission product behavior report.

425231000 SFD 1-1B FPDS

This task will conduct quick look data analysis and report, coordinate test SFD 1-1B sample processing and analysis, conduct detailed analyses of on-line spectra, reduce and analyze sample data, and correlate fission product data to fuel behavior data, draft and issue a data report and a fission product behavior report. The final report will not include Post Irradiation Examination (PIE) fission product data unless it is available for incorporation into the report draft.

425250000 SFD 1-3 FPDS

This task will prepare the FPDS for test monitoring, prepare hot cells to receive samples, supervise data acquisition during the test, conduct quick look data analysis and report, coordinate

425200000 TEST SPECIFIC FPDS (1140.0K) (continued)

425250000 SFD 1-3 FPDS (continued)

sample removal, processing and analysis, conduct detailed analyses of on-line spectra, reduce and analyze sample data, correlate fission product data to fuel behavior data, draft and issue a data report and a fission product behavior report. The final report will not include PIE fission product data unless it is available for incorporation in the report draft.

425260000 SFD 1-4 FPDS

This task will prepare the FPDS for test monitoring, prepare hot cells to receive samples, supervise data acquisition during the test, conduct quick look data analysis and report, coordinate sample removal, processing and analysis, conduct detailed analyses of on-line spectra, reduce and analyze sample data, as well as correlate fission product data to fuel behavior data.

425310000 SFD 1-3 TEST (1188.0K)

425311200 SFD 1-3 Experiment Operating Specifications (EOS)

This task provides funding for final publication costs of the SFD 1-3 EOS.

425312300 SFD 1-3 Test Train Design

This task will provide funding for final design completion.

425312600 SFD 1-3 Test Train Assembly

This task will assemble the test train inlet and outlet assemblies and complete test train final assembly, assuming hot cell assembly of irradiated fuel rods in the bundle and final

425310000 SFD 1-3 TEST (1188.4K). (continued) assembly of test

425310000 SFD 1-3 TEST (1188.0K) (continued)

425312600 SFD 1-3 Test Train Assembly (continued)

train in the Materials Test Reactor (MTR) canal. This task also provides for disassembly and shipment of the test train after completion of the test.

425312900 SFD 1-3 Test Train Project Management

This task will provide project management during assembly and testing. Activities included are:

1. Prepare and maintain work packages.

2. Provide support and direction to design, fabrication and assembly groups.

3. Interface with DOE, NRC and other participating companies (both foreign and domestic).

425313100 SFD 1-3 Experiment Operating Procedures (EOP)

This task consists of researching, writing, issuing and revising the Experiment Operating Procedure (EOP) for the Severe Fuel Damage Test 1-3. The EOP will describe the reactor nuclear operations and control on experiment parameters required to complete the subject test. This task provides funding for implementing the precautions and procedures associated with a secondary criticality in the loop and removal of fission gases and products from the facility as required.

425313200 SFD 1-3 Experiment Safety Analysis (ESA)

This task will perform test specific safety analyses for SFD 1-3 to establish test operating envelope within the Power Burst

425310000 SFD 1-3 TEST (1188.0K) (continued)

425313200 SFD 1-3 Experiment Safety Analysis (ESA) (continued)

Facility (PBF) Technical Specification limits, write the ESA, process through EG&G Idaho review and approval and then through DOE-ID review and approval, as well as incorporation of any review comments for final issuance.

425314400 SFD 1-3 Data Processing

This task provides for the support of the Thermal Fuels Behavior Program (TFBP) by performing data processing services for the Quick Look Report (QLR) and TRR analysis and reporting, incorporation of qualified data sets in the TFBP and Nuclear Regulatory Commission (NRC) data banks, as well as appendix plotting of qualified data sets to microfiche.

425314600 SFD 1-3 Data Qualification

This task provides for common analysis and instrument resolution resources which are used for both data qualification and uncertainty estimates. Funding is provided to prepare the Data Acquisition Reduction System (DARS) for Data Acquisition Specification, monitor and adjust all data channels from initial test train instrument system checkout phase through the hydro, heatup, System Operation (SO)/Nuclear Operation, posttest monitoring, and act as chairman of the Data Integrity Review Committee (DIRC). In addition, measurement precision and bias uncertainties are determined for each data parameter and are included on the qualified data tapes as well as the data qualification documentation.

425310000 SFD 1-3 TEST (1188.0K) (continued)

425315200 SFD 1-3 Post Irradiation Examination

This task provides for the nondestructive Post Irradiation Examination (PIE) of the SFD 1-3 fuel bundle and plenum region. The PIE includes gross gamma scanning the bundle in the PBF Canal, drying the bundle and shipping to Argonne National Laboratory-West (ANL-West) for neutron radiography and tomographic reconstruction of the bundle region.

425315900 SFD 1-3 PIE Project Management

This task provides supervision and project management for the SFD 1-3 Post Irradiation Examination.

425316100 SFD 1-3 Quick Look Report

This task provides for pretest document and test preparations including updating the EOS, conducting the test with at least two personnel present at all times while at power, debriefing the Department of Energy (DOE) within 3 weeks after the test and preparing a Quick Look Report which will document the test conduct, summarize the test results and present a comparison of the test results with posttest calculations. The QLR will be issued as a working document.

425316600 SFD 1-3 Nondestructive Examination

This task provides for preparation of an interim report for distribution to the Quick Look Report distribution and incorporation into the TRR that will include results of the gross gamma scanning of the bundle in the PBF canal, neutron radiography of the bundle, and tomographic reconstruction of selected cross sections.

425310000 SFD 1-3 TEST (1188.0K) (continued)

425317100 SFD 1-3 Sample Bombs

This task provides funding to complete the fabrication and installation of the sample bombs originally procured for use in the SFD 1-2 test and applying those bombs to SFD 1-3 test use.

425317300 SFD 1-3 Steam Lines

This task provides for replacement of tubing, heat tape, thermocouples (TC's) and insulation from standpipe to valve number GB-SF-1.

425330000 SFD 2-3 TEST (377.0K)

425331100 SFD 2-3 Experiment Specification Document (ESD)

425332600 SFD 2-3 Test Train Assembly

This funding provides for initial design support during assembly.

425332900 SFD 2-3 Test Train Project Management

This task provides for project management during test train design, fabrication, assembly and testing.

425400000 FPOS DEVELOPMENT (34.0K)

425432000 Series 1 Chemistry

This task will continue development of chemical analysis techniques used on samples acquired from test SFD 1-1.

425580000 SFD 1-3 FISSION PRODUCT MODIFICATIONS SFD 1-3 (557.0K)

425581100 Insulating Jacket SFD 1-3

This task provides funding for engineering design, procurement, fabrication, and installation of the steamline insulating jacket which extends from the PBF in-pile tube closure head to the handling machine interface point (a Graylock closure hub). As-built drawings will be provided at the end of the task.

425582100 Cask Support Structure

This task provides for development of design requirements, design, fabrication, and installation of a structure over the vessel to support the deposition rod removal cask. It also provides radiation shielding as required.

425583100 Deposition Rod SFD 1-3

This task provides for design, procurement, and fabrication of a fission product deposition rod to be contained within the steam line. Thermal analysis shall be performed to support the design. Engineering drawings will be prepared, checked, and released. The interfaces between this rod and the test train and handling machine will also be controlled. As-built drawings will be prepared at the end of the task.

425583200 Deposition Rod SFD 1-4

This task provides for fabrication of a complete deposition rod assembly, as well as engineering coverage during the fabrication process based on the SFD 1-3 Deposition Rod Design.

425580000 SFD 1-3 FISSION PRODUCT MODIFICATIONS SFD 1-3 (557.0K) (continued)

425583300 Handling Machine SFD 1-3/1-4

This task provides funding for completion of the necessary mechanical and electrical design and analysis to provide the equipment required to extract the deposition rod from the SFD 1-3/1-4 test train or the sequential deposition sampler from the Series 2 tests and serve as a transport cask for these items from PBF to a hot cell for examination.

425583400 System Operation (S/O) Testing

This task provides for performance of an integrated system operational (S/O) test on SFD 1-3 experiment facility modifications, resolution of deficiencies to demonstrate systems meet experimental needs and documentation and correction of deficiencies on red-line drawings, specifications, Plant Operating Manual (POM) chapters and procedures for later incorporation.

425584200 Blowdown Tank (BDT) Liquid Sample Mod

This task provides for a system modification to permit recirculation of the BDT liquid past the liquid side fission product detector and through the BDT liquid sample bomb. Operation will be outside Cubicle 13 in the reactor building first basement.

425585100 Plenum Heat Control

This task funds the design, installation, and checkout of a two-channel heater control/supply system to provide power into the SFD 1-3 upper plenum heater elements. Power is 240 Volts Alternating Current (VAC), approximately 3.5 kilowatts (KW), and is to be remotely turned on/off.

IN-PILE FISSION PRODUCT BEHAVIOR STUDIES (4840.0K)

425100000 FISSION PRODUCT DETECTION SYSTEM (FPDS) PROGRAM SUPPORT (316.0K)

4251100000 FPDS Planning and Coordination

This task will provide a full time project engineer to manage the work associated with the fission product studies during the Severe Fuel Damage (SFD) tests. Work includes planning, budgeting, organizing and scheduling multiple tasks related to data acquisition during tests and sample processing posttest, support organization coordination, data reporting, results reporting, progress reporting and program planning support. This work package also supports the project engineers administrative costs such as word processing, graphics, travel and miscellaneous supplies.

425120000 Spectra Analysis Development

This task will provide for the addition of new measurement techniques for deposition of fission products in the Series 2 tests. This will require improvement of the analysis to provide correlation of on-line spectra data with aerosol and deposition measurements.

425150000 FPDS Maintenance

This task will maintain all fission product detection system equipment in good condition and ready for test monitoring, repair any failed component on a timely basis to support test

425100000 FISSION PRODUCT DETECTION SYSTEM (FPDS) PROGRAM SUPPORT (316.0K) (continued)

425150000 FPDS Maintenance (continued)

monitoring, oversee all work contracts between the Light Water Reactor (LWR) Fuel and Fission Product Section and the Physics Division, track spending and schedules, as well as minimize budget and schedule changes.

425200000 TEST SPECIFIC FPDS (887.0K)

425250000 SFD 1-3 FPDS

This task will provide for incorporation of the Post Irradiation Examination (PIE) data into the final report, as well as final publication of the SFD 1-3 Fission Product Behavior Report.

425260000 SFD 1-4 FPDS

This task will provide for the completion of the Data Report preparation, as well as the spectra processing, both of which were to have been initiated in FY-1984. This task will also reduce and analyze sample data, correlate fission product data to fuel behavior data, draft and issue a data report and a fission product behavior report. The final report will not include PIE fission product data unless it is available for incorporation in the report draft.

425270000 SFD 2-1 FPDS

This task will prepare the FPDS for test monitoring, prepare hot cells to receive samples, supervise data acquisition during the test, conduct quick look data analysis and report, coordinate sample removal, processing and analysis, conduct detailed analyses of on-line spectral, reduce and analyze sample data,

425200000 TEST SPECIFIC FPOS (887.0K) (continued)

425270000 SFD 2-1 FPOS (continued)

correlate fission product data to fuel behavior data, draft and issue a data report and a fission product behavior report. The final report will not include PIE fission product data unless it is available for incorporation in the report draft.

425310000 SFD 1-3 TEST (707.0K)

425314400 SFD 1-3 Data Processing

This task provides continued support of the Thermal Fuels Behavior Program (TFBP) by performing data processing services for the QLR and TRR analysis and reporting, incorporation of qualified data sets in the TFBP and Nuclear Regulatory Commission (NRC) data banks, as well as appendix plotting of qualified data sets to microfiche.

425315200 SFD 1-3 Post Irradiation Examination

This task provides for the destructive Post Irradiation Examination (PIE) of the SFD 1-3 fuel bundle and plenum region. The PIE includes encapsulation of the bundle with epoxy, dismantling and sectioning, and detailed physical and chemical examination of selected sections by metallography, Scanning Electron Microscopy (SEM), Auger, radiochemistry, and burnup analysis.

In addition, the upper part of the test train will be examined to determine fission product transport and plateout.

425315900 SFD 1-3 PIE Project Management

This task provides supervision and project management for the SFD 1-3 Post Irradiation Examination.

425310000 SFD 1-3 TEST (707.0K) (Continued)

425316400 SFD 1-3 Test Results Report/PIER

This task provides for preliminary posttest analysis using state of the art computer codes.

425316600 SFD 1-3 Nondestructive Examination

This task provides for completion of an interim report for distribution to the Quick Look Report distribution and incorporation into the TRR that will include results of the gross gamma scanning of the bundle in the PBF canal, neutron radiography of the bundle, and tomographic reconstruction of selected cross sections.

425330000 SFD 2-3 TEST (784.0K)

425331200 SFD 2-3 Experiment Operating Specifications (EOS)

This task undertakes preparation and issuance of an EOS for test SFD 2-3. The EOS will describe the basic test design, the conduct of the experiment through the preconditioning and power calibration, fission product inventory buildup phase, the high temperature transient, and the cooldown phase, as well as the data acquisition and recording requirements, posttest operations and data reduction requirements and posttest examination.

425331300 SFD 2-3 Experiment Predictions Report (EPR)

This task provides for final publication of the SFD 2-3 Experiment Predictions Report.

4255F0000 SFD 2-3 FISSION PRODUCT MODIFICATIONS (88.0K) (continued)

4255F1200 SFD 2-3 Mods Documentation

This task provides for S/O test procedures to be prepared, revised, and released.

4255F1300 Fabricate Fission Product and Aerosol Measurement Devices

This task provides funding to fabricate the following aerosol measurement system component and checkout: BESL, impactor, tape reel, sample bombs and discrete sampler.

425600000 TOPICAL REPORTING (225.0K)

425610000 Release Topical

The results from the PBF SFD-ST, 1-1, and 1-3 tests will be evaluated and compared with out-of-pile experimental results and analytical models to describe the release of fission products from severely damaged fuel. The probable mechanisms controlling the release will be evaluated and the implications of the results with respect to reactor safety considerations will be reviewed.

425620000 Deposition Topical

The results from the PBF SFD-ST, 1-1, and 1-3 tests will be evaluated and compared with out-of-pile experimental results and analytical models to describe the deposition of fission products and elucidate the probable mechanisms controlling the deposition and retention on typical reactor material surfaces. The implications of the results with respect to reactor safety considerations will be evaluated.