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1.0 SUMMARY

This memorandum provides the task technical and quality assurance plans for the activities necessary to develop technologies for direct disposal of aluminum spent nuclear fuels (Al SNF) in a geologic repository. Technology development for co-disposing the fuel with the borosilicate glass waste form from high level defense waste is included. The activities are listed under two major tasks in a technical plan provided in Appendix A.

The feasibility of interim dry storage of Al SNF has been demonstrated as part of a previous technology program. The first task in this present program is to perform analyses and experiments to support the design and safety of a facility to transfer the fuel from wet to dry storage. This facility will be built under the Transfer & Storage Facility (TSF) project which will provide the engineering system to place the fuel in canisters at SRS that are "road-ready" for shipment to the federal repository at Yucca Mountain, Nevada. Subtasks include: a) applying dry-storage criteria to develop the performance requirements of the systems of the facility, b) performing engineering analyses in support of the design and safety of the facility, and c) developing an instrumented test canister to validate the storage criteria for the road-ready waste form.

The second task is to perform analyses and experiments to demonstrate that direct-disposed fuel is an acceptable waste form for the repository. Subtasks include: a) performing analytical and experimental work to characterize radionuclide release and movement, and criticality behavior under anticipated repository conditions, b) preparing an assessment and overall demonstration to assure that the fuel meets criteria for release rates and criticality safety in the repository, and c) preparing the results of the performance characterization for integration into the performance assessment for the repository. The period of performance of this task is anticipated to be several years to address emerging federal requirements and test protocols for the waste form.

The fuels considered in this plan are aluminum spent nuclear fuel under the current or future jurisdiction of the United States Department of Energy including SNF from research reactors within the United States, from foreign research reactors (FRR), and from the Savannah River Site (SRS) production reactors.

2.0 DIRECT DISPOSAL TECHNOLOGY DEVELOPMENT PROGRAM

2.1 Background - Technical Strategy for the Treatment, Packaging, and Disposal of Al SNF

The Research Reactor Spent Nuclear Fuel Task Team was established by the DOE - Office of Spent Fuel Management to assist DOE in developing a technical strategy for the interim management and ultimate disposition of the foreign and domestic aluminum-based research reactor spent fuel under DOE's jurisdiction. The team issued a report that evaluated and compared alternatives to reprocessing and concluded that direct co-disposal of the fuel with defense highlevel waste canisters was the alternative with the highest overall score [1].

None of the alternative waste forms for disposal, other than the borosilicate glass which is obtained from the base case of reprocessing, is qualified for the Federal repository in Yucca mountain. However, activities at the national level are in progress to qualify metallic waste forms for this repository and it is anticipated that direct disposal and co-disposal waste forms will be reviewed for qualification.

The aluminum-clad fuels will be placed in a road-ready form at SRS during the qualification process and while the repository is prepared for receipt of the SNF. The project to design and

construct a Transfer & Storage Facility [2] to provide the conditioning, characterization, and storage systems for a transportable, road-ready storage system has been initiated and will require continued interfacing with the technology developed under this task plan. The facility is anticipated to be an NRC-licensed fuel storage system with a design life of up to 20 years.¹

The bases for, and demonstration of, the acceptability of the Al SNF and canister materials for repository storage will be developed by WSRC under task 2 of the task plan in appendix 1 of this memorandum. Qualification for storage will be decided through interactions among the U. S. DOE and NRC.

2.2 Technical Background - Aluminum Spent Fuel Acceptance Criteria Program

Acceptance criteria for drying and storing Al SNF for up to 50-years has been previously developed and are summarized in WSRC-TR-95-347 [3]. The results from the technical activities of that program will be applied to develop performance requirements for the systems of the TSF [2].

It is assumed that the stored fuel must remain handleable and maintain radionuclide confinement while in road-ready storage system before placement in the repository. Meeting this assumption will assure that fuel placed in road-ready storage will be fully-retrievable from the storage system. Based on the results from the previous dry storage program [3], excessive corrosion, creep, and release of radioactivity through cladding breaches may occur during road-ready storage if the environments are outside the allowable levels. Therefore the environments of the TSF must be within limits

2.3 Technical Background - Waste Acceptance for Repository Storage

Detailed and generalized acceptance criteria for disposal of wastes in the U. S. repository at Yucca Mountain, NV have not been established. The existing overall requirements as identified by the Civilian Radioactive Waste Management System (DOE-RW) are being adapted to the DOE Al SNF as a wasteform [4]. These requirements include those for materials performance of the wasteform.

The borosilicate glass wasteform from the Defense Waste Processing Facility was qualified by extensive leach and durability testing of candidate glasses. Through a series of test programs, the characteristics of the candidate glasses were established and shown to be consistent with the anticipated behavior of the repository. Extensive and long-term interactions developed glass production processes, including chemistry control, to assure that the materials characteristics of the resulting glasses are both acceptable and predictable.

The qualification program for the zircaloy-clad, UO₂ commercial nuclear fuels was entirely different. This waste form was declared to be qualified as an extensive analytical and experimental program was established to assure that direct disposal of the commercial fuels did not adversely impact repository performance. It is anticipated that neither of these "qualification protocols" will be used for the direct disposal and/or co-disposal of Al SNF.

The Al SNFs differ significantly from the commercial fuels in terms of enrichment and from either of the qualified waste forms in terms of tendency toward corrosion. Because of these differences, the transfer and application of previous waste form technologies to the direct disposal of Al SNFs is not practical. Therefore, a technology development program is required to assure both criticality

¹The intention by the U. S. DOE to obtain an NRC license for the Transfer Facility was stated to WSRC at a program review meeting at SRS, September 29, 1996.

safety and radionuclide containment as the SNF moves from the current, primarily wet storage facilities, through the transfer facility and into the repository. The data and analysis which result from this technology development program will provide the technical basis for the overall performance assessment to allow qualification of the Al SNF for direct and/or co-disposal in the repository.

2.4 Overview of Program to Develop Technologies for Direct Disposal of Al SNF

The program is organized into two major tasks: 1) Task 1 involves technical activities supporting the Transfer Facility project to provide the handling and conditioning necessary to place the fuel in road-ready storage. The materials performance objective for the road-ready storage is to limit degradation in handling and storage to within established criteria throughout a 40-year period or twice the expected NRC license period of 20 years. 2) Task 2 involves technical activities to demonstrate that the materials performance of the direct or co-disposal wasteform meets release and criticality criteria for repository storage. The specific criteria will be provided through interactions with regulatory agencies or will be consistent with the needs established through the technology development program.

The general subtask activities supporting the Transfer aFacility and the development of an acceptable are shown in the schematic below. The task plan (Appendix A of this document) contains the specific subtasks and program deliverables.



Figure 1 - General Subtask Activities to Support the Design of a Transfer & Storage Facility and to Develop an Acceptable Wasteform to be Qualitied for Repository Storage by Federal Agencies

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3.0 REPORTING AND ACTIVITY MILESTONES

The estimated period of performance to support the design of the TSF shall be from September 30, 1996 to September 30, 1998. The estimated period of performance to demonstrate that direct disposal is an acceptable wasteform and to provide the bases for respository qualification shall be from September 30, 1996 to beyond 2000. It is anticipated that the task plan will be revised prior to each new fiscal year to reflect changes and updates to the program. The reporting and major activity milestones for FY97 are:

- 1. Develop Task Technical Plan for Direct Disposal Technology Development Program Date: September 30, 1996 -- AOP Milestone
- 2. Publish Report on the Technology Status of a Direct/Co-Disposal System for Al SNF Date: April 30, 1997 -- AOP Milestone
- 3. Design and Construct a Test Canister and Issue a Report Date: September 30, 1997 -- Incentive Fee Milestone
- 4. Publish Report on the Preliminary Functional Requirements for Drying and Storing Al SNF in the TSF Date: September 30, 1997 -- AOP Milestone
- 5. Publish Interim Report on Testing for Release of Radionuclides Date: September 30, 1997

These deliverables exceed in scope or schedule or both those specified in TTR No. EF&RFSP/SNFP-TTR 97-01.

Additional deliverables from the task activities are listed within the Task Technical Plan (Appendix A). The status of the task activities (per activities Appendix A) will be reported monthly as part of the Materials Technology Section Monthly Report.

4.0 REFERENCES

- 1. "Technical Strategy for the Treatment, Packaging, and Disposal of Aluminum-Based Spent Nuclear Fuel," Volume 1 of a Report of the Research Reactor Spent Nuclear Fuel Task Team prepared for the Department of Energy - Office of Spent Fuel Management, May 1996.
- 2. M-CDL-G-00001, Conceptual Development Plan for the SRS Spent Nuclear Fuel (SNF) Program's SNF Management Project, September 17, 1996, Savannah River Site.
- 3. WSRC-TR-95-0347, "Acceptance Criteria for Interim Dry Storage of Aluminum-Alloy Clad Spent Nuclear Fuels (U)," R. L. Sindelar, H. B. Peacock, Jr., P. S. Lam, N. C. Iyer, and M. R. Louthan, Jr., Westinghouse Savannah River Company, March 1996.
- 4. G-ESR-C-00002, Rev. 0 (draft), Waste Form Criteria SRS Spent Nuclear Fuel Transfer & Storage Facility (U), November 12, 1996.

APPENDIX A TO SRT-MTS-96-2047

TASK TECHNICAL PLAN

- Task Title: Development of Technologies for Direct Disposal of Al-Clad Spent Nuclear Fuel
- Purpose: To develop the technologies and technical basis supporting the development of a road-ready storage system in the Transfer & Storage Facility project (TSF) and to demonstrate that direct disposal in the repository is acceptable for aluminum-based spent nuclear fuels (Al SNF). Road-ready storage is interim storage providing for: transportability (to the repository), monitoring, and retrievability of the fuels. The interim period is planned to be up to twice an NRC-license period for dry storage of 20 years. Repository storage is ultimate disposition with no provisions for retrievability.
- Scope: The task involves experimental and analytical activities to develop the technical basis for direct disposal of aluminum-clad spent nuclear fuels under the current or future jurisdiction of the United States Department of Energy. Per the Task Technical Request, the scope shall include as a minimum:
 - 1) Determination of the Al-clad SNF consolidation options
 - 2) Study of the packaging requirements
 - 3) Determination of the compatibility of the materials in the overpack
 - 4) Determination of the environmental requirements for repository storage

5) Initiation of waste form acceptance testing

Characterization requirements are to be covered under a separate task plan.

Overview: Provided in SRT-MTS-96-2047

References:

- 1. Task Technical Request: EF&RFSP/SNFP-TTR 97-01
- 2. Technical Strategy for the Treatment, Packaging, and Disposal of Aluminum-Based Spent Nuclear Fuel, A Report of the Research Reactor Spent Nuclear Fuel Task Team, May 1996.
- Customer: Spent Fuel Storage Division Alternative Technology Project Department

1.0 TASK 1 - Analyses and Experiments for the Transfer and Storage Facility

1.1 Subtask 1.1 Drying and Storage Requirements for Facility Design Description

Subtask 1.1 FY97 Activities:

5

1.1.1 Identify initial fuel condition that would not be acceptable (i.e., too degraded) for direct disposal/co-disposal and would require an alternate handling/disposition path which may include reprocessing, special canning, and/or special conditioning -- Start 10/1/96; Finish 11/30/96

1.1.2 Review 10CFR72 and WSRC-TR-95-0347 to develop criteria for changes (degradation) in fuel condition during handling and storage and associated safety limits (e.g. limit for H₂ build-up due to corrosion) in the TSF -- Start 10/1/96; Finish 12/15/96

1.1.3 Publish technical memorandum containing preliminary criteria for acceptable changes in the fuel condition during handling and storage and associated safety limits -- Start 12/1/96; Finish 1/15/97

1.1.4 Identify systems in the TSF requiring environmental condition limits to avoid defined changes in materials' conditions and safety -- Start 10/1/96; Finish 3/15/97

1.1.5 Review experimental work, including new data collected under subtask 2.1 activities, and identify environmental condition limits for handling and storage operations -- Start 6/1/96; Finish 8/31/97

1.1.6 Publish report containing preliminary functional requirements for drying and storage environmental conditions for systems of the TSF -- Start 2/1/97; Finish 9/30/97

1.1.7 Publish final report on functional requirements for drying and storage of Al SNF in the TSF -- Start 7/1/98; Finish 9/30/98

This subtask involves adapting storage and drying criteria from the previous dry storage program (ref. WSRC-TR-95-0347) in the form of functional requirements for the systems of the transfer facility including the canister storage configuration for road-ready storage. Functional requirements also eminate from federal requirements for dry storage and repository systems (e.g. 10CFR72 and 10CFR60). The requirements would be updated, if warrented, based on the results from the environmental testing under subtask 2.1.

Requirements for drying and storing fuel degraded beyond that assumed in the dry storage program (i.e., highly degraded) will not be provided. It is assumed these materials will be processed or handled on a case-by-case basis.

Performing organization: E&CS-Projects; SRTC-MTS; SRTC-ATS; SFS Estimated FY97 Budget: 120K

1.2 Subtask 1.2 - Drying Specification for Conditioning System

Subtask 1.2 FY97 Activities:

1.2.1 Review existing drying methods for spent nuclear fuels; identify recommended method; and evaluate need to perform additional testing of fuel mock-ups - Start 11/15/96; Finish 3/31/97

5

1.2.2 Perform selected testing of fuel mock-ups (if recommended under 1) and report results --Start 4/1/97; Finish 7/31/97

1.2.3 Publish preliminary specification for drying for the conditioning system of the TSF-- Start 7/31/97; Finish 8/31/97

1.2.4 Publish final specification for drying for the conditioning system of the TSF -- Start 7/1/98; Finish 9/30/98

This subtask involves the development of a specification to achieve the dryness level specified in the criteria to be supplied under subtask 1.1. The first phase of the work is a review of the drying techniques and conditions from INEL and Hanford. These techniques will be evaluated and a technique applicable to the FRR fuels be will recommended. If necessary to ensure the technique will adequately cover the scope of fuels and conditions at SRS, testing will be performed on mock-up MTR assemblies.

The results of this task will be input to the performance requirements for the conditioning system.

Performing organization: SRTC-ATS; SRTC-MTS; SFS; subcontracts Estimated FY97 Budget: 240K

1.3 Subtask 1.3 - Instrumented Test Canisters

Subtask 1.3 FY97 Activities:

1.3.1 Prepare test canister specifications including for two identical canisters including dimensions; monitoring subsystems; and hardware requirements -- Start 11/1/96; Finish 12/16/96

1.3.2 Identify set-up location; design canisters; procure parts; and begin assembly -- Start 12/1/96; Finish 3/31/97

1.3.3 Perform check-out testing of monitoring systems -- Start 5/1/97; Finish 5/31/97

1.3.4 Complete assembly of cansiters and perform cold assembly check-out testing -- Start 5/31/97; Finish 8/15/97

1.3.5 Publish report on canister design and fabrication -- Start 8/1/97; Finish 9/30/97

1.3.6 Publish test matrix for Al SNF Testing -- Start 10/1/97; Finish 11/15/97

1.3.7 Perform tests in the canister facility -- Start 11/15/97; Finish 9/30/98 (and beyond for lead-sample surveillance)

This subtask involves the development of several instrumented test canisters to store irradiated MTR fuel assemblies. The canisters will be used in a test program to verify that storage conditions are maintained and to validate that storage conditions within the criteria does not lead to an unacceptable material response. The environment of the canisters will be monitored for temperature, relative humidity, volatile species, and the fuel condition. Heat transfer and materials response analysis of the fuel-in-canister system will be performed. A test plan for the canisters containing MTR assemblies will be issued in FY98.

The subtask includes development of specifications for monitoring the environment and measurements of selected materials' response in a selected full-scale, road-ready canister.

Recommendations for the monitoring/measurements in the roady-ready system will be made in FY98.

Performing organizations: SRTC-EES; SRTC-MTS; SRTC-ATS Estimated FY97 Budget: 560K

1.4 Subtask 1.4 - Thermal Analyses of Road-Ready, Direct, and Co-Disposal Storage Configurations

Subtask 1.4 FY97 Activities:

5

1.4.1 Perform engineering analyses to estimate fuel temperatures during conditioning and storage in the systems of the TSF, and in various storage configurations in the repository -- Start 10/1/96; Continue throughout program

This subtask involves thermal modeling and analyses of the systems of the TSF and direct disposal storage/co-disposal storage configurations to estimate the fuel temperatures and support the materials' response analyses. The systems to be analyzed include those identified under subtask 1.1 as requiring environmental limits.

Performing organization: SRTC-ATS; E&CS-Projects; SFS Estimated FY97 Budget: 220K

2.0 TASK 2 - Analyses and Experiments for Development and Qualification of an Acceptable Waste Form

2.1 Subtask 2.1 Release Studies Program

Subtask 2.1 FY97 Activities:

2.1.1 Continue corrosion testing program to evaluate effects of temperature, relative humidity, and radiation on the corrosion of aluminum cladding alloys and aluminum-based fuel materials. Extend test temperature range to 250°C to investigate bounding conditions for the anticipated repository environments. Investigate mechanisms of accelerated (breakaway) corrosion for aluminum-cladding alloys in vapor environments (This program was initiated under the task plan in WSRC-RP-94-360, Rev. 1) -- Start 10/1/96; Finish 9/30/98

2.1.2 Continue volatile release testing program to evaluate temperature/time response on radioisotopic species release at temperatures $\leq 275^{\circ}$ C -- Start 10/1/96; Finish 9/30/98

2.1.3 Publish interim report on the corrosion response of aluminum cladding alloys and aluminum-based fuels in vapor environments as an update to WSRC-TR-95-345 -- Start 2/1/97; Finish 4/30/97

2.1.4 From literature sources, compile material database of fuel materials, candidate canister materials, candidate cask and overpack materials and their corrosion response to the J-13 environment -- Start 3/1/97; Finish 7/30/97

2.1.5 Develop initial model for release of radioisotopes directly from surface of fuel-- Start 6/1/97; Finish 8/31/97

2.1.6 Perform corrosion testing in J-13 water environment -- Start 10/1/97; Finish 9/30/98 (possibly beyond)

Estimated FY97 Budget: 785K

2.1.1 Subtask 2.1.1 - Corrosion Testing Program (Vapor & Radiation)

This subtask involves testing and modeling of the corrosion response of aluminum cladding and aluminum-based fuel materials to vapor and vapor/air under gamma radiation. This corrosion program is a continuation of the corrosion testing and modeling program described in the task plan of report WSRC-RP-94-360, Rev. 1. The SRTC gamma cell facilities, autoclave facilities, and environmental chamber facilities will be used to characterize the materials' response over the applicable range of repository environments of temperature, humidity, and radiation.

Alloy dependency was observed in the test results and a high corrosion rate was observed following an initial exposure. An investigation of the mechanism(s) has been initiated. This work will continue under this subtask.

Performing organization: SRTC-MTS; subcontracts

2.1.2 Subtask 2.1.2 - Dissolution Testing in Repository Ground Water

This subtask involves corrosion testing of laboratory-scale specimens in waters with a range of chemistries based around the J-13 water of the repository. The chemistries will include the effects of canister/cask/overpack/fuel interactions in altering the J-13 environment.

The corrosion environment of J-13 including soil types, pH values, and aeration, etc. will be compiled. The initial laboratory-scale corrosion tests will be performed in J-13 water to measure the release rates directly from the waste form surface. Subsequent tests will include modified J-13 water. Dissolution testing per the protocols to be developed under a separate task will also be performed under this task.

This subtask includes preparation of the results of the dissolution testing for integration into the performance assessment of the repository.

Performing organization: SRTC-MTS; SRTC-ATS; subcontracts

2.1.3 Subtask 2.1.3 - Volatile Species Release Testing Program

This subtask involves testing of laboratory-scale specimens to measure volatile species release from the aluminum-based fuel materials and to characterize the temperature/time response. This work has been initiated on aluminum-based fuels at initial test temperatures from 125 to 275°C. This testing will be extended to allow characterization of the time-temperature release response of aluminum-based fuels at low and high burn-up levels.

Performing organization: subcontracts; SRTC-MTS

2.2 Subtask 2.2 - Materials Configurations for Criticality Analyses

Subtask 2.2 FY97 Activities:

2.2.1 Perform criticality assessment of postulated configurations considering fissile species within fuel and canister materials with ground water -- Start 11/15/96; Finish 9/30/98 (and beyond)

2.2.2 Perform materials redistribution analyses -- Start 1/1/97; Finish 9/30/98 (and beyond)

2.2.3. Publish interim report of potential for criticality of Al SNF wasteforms in the repository --Start 7/1/97; Finish 9/30/97

2.2.4 Publish report on potential for criticality of Al SNF wasteforms in the repository -- Start 7/1/98; Finish 9/30/98

Estimated FY97 Budget: 400K

2.2.1 Subtask 2.2.1 - Criticality Analyses of Postulated Configurations

This subtask involves evaluating the potential for criticality by calculating k_{eff} for postulated configurations of fissile species with other fuel and canister materials and with ground water. The postulated configurations will be consistent with those that are shown to be possible under subtask 2.2.2. This subtask will include a literature review of analyses of criticality of materials in the repository and assess their applicability to Al fuels in direct-disposed/co-disposed systems. This subtask will compare the results to the criteria for criticality safety identified in subtask 2.3 for the direct-disposal and co-disposal systems.

Performing organization: E&CS-Safety

2.2.2 Subtask 2.2.2 - Materials Analyses and Assessments of Fissile Species Consolidation

This subtask involves evaluating the potential for fissile species redistribution and isotopic consolidation for cases 1) within the fuel canister and 2) outside the fuel canister over geologic times. The evaluation will be based on mechanistic descriptions of solid-state, liquid-state, and vapor-state diffusion processes. Statistical modeling to estimate the frequency of a critical distribution event will be performed. The results will be input to subtask 2.2.1.

Performing organizations: SRTC-MTS; SRTC-ATS; E&CS-Safety

2.2.3 Subtask 2.2.3- Assessments of Poison Materials and Their Efficacy

This subtask involves evaluating nuclear poison materials and their compatibilities with the Al SNF wasteform and canister materials. This subtask will be performed only if the results from 2.2.1 makes necessary the use of poisons to be able to achieve criticality safety.

This task will be initiated if the results of subtask 2.2.1 and 2.2.2 indicate a potential for unacceptable materials configuration for criticality safety (e.g. if $k_{eff} \ge 0.95$).

Performing organizations: E&CS-Safety; SRTC-MTS

2.3 Subtask 2.3 - Application of Federal Requirements to Direct Disposal of Al-Clad Fuels

Subtask 2.3 FY97 Activities:

1

3

2.3.1 Compile set of current regulatory criteria for radionuclide release and criticality safety for the repository. Include those criteria that, if met, would require significant expense. Identify the methodology to be used to meet the intent of the criteria as applied to the direct-disposal/co-disposal of Al SNF. Prepare draft report specifying the interim criticality criteria and release criteria for Al SNF in a direct-disposal/co-disposal system -- Start 1/1/97; Finish 3/31/97

This subtask involves reviewing the applicable federal requirements for radionuclide release in the repository and identifying their intent. Limits to time release of radionuclide or isotopic species for Al SNF in direct-disposed/co-diposed configurations will be recommended based on the intent of the federal requirements. A proposed methodology to demonstrate the limits are met will be formulated. This subtask is an extention of the requirements identification in G-ESR-C-00002 (draft 11/12/96), "Waste Form Criteria - SRS Spent Nuclear Fuel Transfer & Storage Facility."

This subtask also involves reviewing applicable federal requirements for criticality safety and identifying their intent. A limit to k_{eff} will be recommended based on the intent of the federal requirements. A proposed methodology to demonstrate this limit is met will be formulated.

Performing organizations: E&CS-Safety; E&CS-Projects; SRTC-MTS; Subcontracts Estimated FY97 Budget: 175K

2.4 Subtask 2.4 - Demonstration of Waste Form Acceptance

Subtask 2.4 FY97 Activities:

2.4.1 Publish report on technology status of direct disposal/co-disposal of Al SNF (interim technology) -- Start 3/15/97; Finish 4/30/97

2.4.2 Publish report on technology status of direct disposal/co-disposal of Al SNF -- Start 8/15/97; Finish 9/30/97

2.4.3 Publish topical report on demonstration of acceptability of direct disposed/co-disposed Al SNF for repository storage -- Start 4/1/98; Finish 6/30/98

This subtask involves the application, on an ongoing basis, the results of the subtasks as they relate to demonstrating the acceptability of the direct-disposed and co-disposed aluminum-clad SNF in road-ready storage and as a waste form in the federal repository in Yucca Mountain, Nevada. A topical report will be prepared to document the demonstration. All results from the program will be provided to external organizations performing the overall performance assessment of the repository.

Performing organizations: SRTC-MTS; E&CS-Projects; E&CS-Safety Estimated FY97 Budget: 100K

APPENDIX B TO SRT-MTS-96-2047

QUALITY ASSURANCE PLAN

The task activities described in Appendix A of SRT-MTS-96-2047 are governed by the requirements of the WSRC 1Q and WSRC E7 manuals and the implementing procedures of the WSRC-SRTC L1 manual (latest revisions of each). Per the TTR, the QA requirements of DOE/RW-0333P must be met. This will be achieved through implementation of L1, 8.21. Revisions to SRT-MTS-96-2047 and the task and QA plans will be made, as necessary, to reflect programmatic and/or technical changes.

The activities described in Appendix A are not expected to affect any established technical baselines of SRS. However, the data and results produced under the activities defined in Appendix A may affect the creation of a new baseline. Consequently these activities are non-baseline and are designated as Research and Development tasks per 1Q QAP 2-3, Rev. 1.

The control of the task activities is shown below. Measurements, testing, and analyses will be performed by technical sections (Materials Technology, Engineering Development, Equipment Engineering) of SRTC. Existing procedures for materials testing contained in the Operating Procedures for Materials Technology (Procedure Manual L9.3) will be used. New special procedures, technical instructions (guides), or both are anticipated and will be developed and used, as appropriate prior to the collection of test and field data to be used in reporting results, and conclusions and recommendations from those results, under this task plan. No special training requirements for collection of test and field data are anticipated.

Subtask leaders and engineers performing the subtasks or their designees are required to read SRT-MTS-96-2047, Rev. 1. They will be trained to the applicable requirements for control of work in RW-0333P. They are responsible for maintaining their own records for subtasks in progress. A copy of the records of completed tasks will be stored by project leader R. L. Sindelar or a designee until program completion. At that time, the task records will be transferred to SRS site records for permanent retention. The task records include the deliverables per the TTP (Appendix A to SRT-MTS-96-2047, Rev. 1).

Customer approval will be secured for all technical and programmatic reports.

Programmatic Risk Review (ref. L1, 7.10, Rev.1, Attachement 3):

Failure to develop the technology for direct disposal of aluminum SNF would not allow the demonstration of acceptability of the fuel as a direct-disposed wasteform as described in Appendix A. A back-up alternative technology, the melt/press-dilution wasteform is being pursued as a parallel program under a separate task plan.

Existing controls are sufficient to ensure the safety and reliability for testing activities planned in Appendix A.

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WSRC 1Q Manual Section	Applies to Task	Applicable Procedures	Procedures Used
Organization	(Y, N, AK)	10: 1 2 Step Week	
		IQ; I-2 Stop Work	
QA Flogram			
-Training and Qualification	AR AR	1Q; 2-2, Personnel Training & Qual. L1; 5.03, SRTC Training Records	
-R&D Activities	Y Y Y AR Y	L1; 7.10, Control of Technical Work E7; 3.12, Non-Baseline Tech. Ass. Requests 1Q; 2-3, Control of R&D Activities L1; 4.19 Technical Notebook Use E7; 3.70, Qualification of Existing Data L9.3, Materials Technology Operating Procedures	
-Supplemental Requirements	Y	L1; 8.21, Supplemental Quality Assurance Requirements for DOE/RW-0333P	
Design Control			
-Initiation	N N	E7; 2.02, Baseline Technical Task Request E7; 2.05, Plant Modification Traveler	
-Design Control	N N N N AR N	 E7; 2.10 Func. Performance Requirements E7; 2.11, Function Design Criteria E7; 2.13 Task Requirements and Criteria E7; 2.15, Alternative Studies E7; 2.25, Functional Classifications L1; 1.13, Process Hazards Reviews E7; 2.37, Design Change Form 	
-Calculations	N AR	E7; 2.16, Technology Risk Assessment E7; 2.31 Engineering Calculations	
-Reviews	N N N	E7; 2.40, Design Verification and Checking E7; 2.60, Plant Mod. Technical Review E7; 3,14, Design Authority Tech. Reviews	
-Outputs	N	E7; 2.12, Fac. Des. Descrip. and Sys. Des. Descrip.	
	N	E7; 2.41, Interface Coordination	
	Y N	E7; 3.60, Technical Reports L1; 1.22, SRTC Green Letters (Tech. Rec.)	
	AR	L1; 4.01, Preparing Scien. and Tech. Rep. and Papers	
Procurement Document Control	AR	WSRC-3E, Procurement Spec. Manual	
	Y	7B; 1.1, Purchase Requisitioning	
·	Y	1Q; 4-1, Procurement Document Control	
Instructions, Procedures, and	AR	E7; 2.30 Drawings	
Drawings	N ·	L1; 1.01, Procedure Adm. (Field)	
	IN	Tech. Manuals	
	AR	1B; 3.11 Documentation	
Document Control	AR N	E7; 1.20, Engr. Doc. Numbering System E7; 2.03, Tracking and Turnover of Tech.	
	AR	1B; 3.11, Doc. and Corr. Numbering System	

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Control of Purchased Items and	AR	1Q; 7-2, Control of Purchased Items &	
Services		Services	
	N	E7; 3.42, Replacement Item Eval.	
	N	E7; 3.46, Commercial Grade Item Dedication	
		and Material Upgrade	
Identification and Control of Items	N	E7; 1.30, Component Numbering System	
Control of Processes	AR	1Q; 9-1, Control of Processes	
	AR	1Q; 9-2, Control of NDE	
	AR .	1Q; 9-3, Control of Welding and Other	
		Joining Processes	
	N	E7; 2.06, Temporary Modification Control	
	N	E7; 2.38, Design Change Package	
Inspection	N	E7; 2.35, Quality Assessment	
	<u>N</u>	E7; 2.38, Quality Inspection Plan	
Test Control	N	E7; 2.26, Post-Mod. Acceptance Criteria	
	Y	IQ; 11-1, Test Control	
Control of Measuring and Test	Ŷ	1Q; 12-1, Control of M&TE	
Equipment	AK	IQ; 2-7, QA Program Req'ts. for Analytical	
	4.75	Measuring Systems	
Packaging, Handling, Shipping, &	ĄK	IQ; 13-1, Packaging, Handling, Shipping	
Storage	AD	and Storage	
	AK	L1; 2.17, Procurement, Labeling, Handling,	
Inspection Test and Operating	AD	10:14.1 Inspection Test and Operating	
Inspection, Test, and Operating	AK	IQ, 14-1, Inspection, Test, and Operating	
Status	٨R	L1: 3.03 Off-Shift Coverage of	
		Experimental Equipment	
Control of Nonconforming Items &	AR	10: 15-1. Control of Non-conf. Items	
Action	AR	10: 15-2. Control of Non-conf. Activities	
Corrective Action System	AR	10: 16-1. Corrective Action System	
Quality Assurance Records	Y	L1: 8.17. OA Records Management	
Audits	AR	10: 18-1. Quality Assurance Internal Audits	
	AR	10: 18-2. Quality Assurance Surveillances	
•	N	L1; 1.07, Management Assessments	
	N	L1; 1.08, Self Assessment	
Quality Improvement	N	1Q; 19-1, Quality Assurance Trending	
	N	1Q; 19-2, Quality Improvement	
Software Quality Assurance	AR	1Q; 20-1, Software Quality Assurance	
Environmental Quality Assurance	AR	1Q, Environmental Quality Assurance	

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