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RCT-PXP-025

Revision 0

Project Execution Plan for the Neutron Shielded Canister Project

EFFECTIVE DATE: 05/04/2009

[redacted]

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RECORD OF REVISION

Revision Number	Date Approved	Description of Revision
0	05/04/2009	Initial issue.

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LIST OF ATTACHMENTS

1.0 PROJECT OVERVIEW

1.1 Background

The Waste Isolation Pilot Plant (WIPP) was built by the U.S. Department of Energy (DOE) for the permanent disposal of transuranic (TRU) waste. Washington TRU Solutions (WTS) is the WIPP managing and operating contractor. As defined in Public Law 102-579, *Waste Isolation Pilot Plant Land Withdrawal Act* (LWA), as revised, contact-handled (CH)-TRU waste containers have a surface dose rate not greater than 200 millirem per hour (mrem/hr), and remote-handled (RH)-TRU waste containers have a surface dose rate of greater than 200 mrem/hr. These dose rates are typically dominated by gamma radiation, but in the case of certain RH-TRU waste streams, can include a significant contribution from neutron emitters. By request from DOE (letter CBFO:OOM:RN:AAC:08-0027:UFC5822.00, dated 7/14/08), WTS has been tasked with developing a new waste package configuration for RH-TRU waste containing significant quantities of neutron emitting radioisotopes.

Because of the inherently high surface dose rates associated with the handling of RH-TRU waste, as low as reasonably achievable (ALARA) considerations dictate that such waste be handled remotely and/or using heavily shielded equipment, and transported in shielded, U.S. Nuclear Regulatory Commission (NRC)-certified, Type B shipping casks, such as the 72-B or 10-160B. These casks include significant amounts of lead shielding and are therefore well suited to minimize dose rates associated with gamma emitters. However, neither the transportation casks nor the payload containers therein, or the various pieces of handling equipment now in existence throughout the DOE complex, include any neutron shielding. Thus, distance is the only current means available to attenuate dose associated with neutron emitters. As such, it is not currently possible to transport any significant quantities of neutron emitting radioisotopes within the 72-B or its associated payload canister (Removable Lid Canister [RLC]). Notably, a significant quantity of RH Waste at Oak Ridge National Laboratory (ORNL), which is scheduled for relatively near term shipment, is reported to yield approximately equal gamma and neutron dose rates external to loaded 55-gallon drums already containing the waste. To effectively transport this waste to WIPP, some form of neutron shielding will clearly be required.

Given the above, it is necessary to have the option of adding neutron shielding around the RH waste during loading, transport, unloading, and emplacement operations. Although such shielding could be independently added to each piece of handling equipment and each transportation cask, a better approach is considered to be adding neutron shielding materials

within existing payload canisters. Although this requires repackaging of the neutron emitting RH waste currently within 55-gallon drums and/or other containers into containers with diameters smaller than 55-gallon drums, it avoids the negative cost and schedule impacts associated with developing and producing shielding components for numerous pieces of equipment and certifying a new Type B packaging design (i.e., one that specifically incorporates neutron shielding). Notably, addition of neutron shielding external to 55-gallon drums would correspondingly grow the diameter of the surrounding payload containers, thus requiring modifications to the designs of all handling and transport equipment and, ultimately, could require an increase in the diameter of bore holes in the walls of the WIPP facility. Such a change is not considered to be a viable path forward.

1.2 Purpose

The purpose of this project is to develop a neutron shielded payload canister that retains the current external geometry of existing canisters that were developed for transport in the 72-B cask. If at all possible, the existing canister designs are to be retained and simply adopt internal neutron shielding liners in the form of cylinders with top and bottom end caps. Initially, it is to be assumed that the RH waste containing significant neutron emitting radioisotopes and currently in 55-gallon drums or larger containers will be repackaged into 30- or 15-gallon drums. As more is learned about the specific waste stream(s) to be handled, alternative configurations for repackaging the 55-gallon drums can be considered, if efficiencies are gained by doing so. The overriding objective is to be able to handle and transport loaded canisters containing neutron shielding in the same manner, with the same equipment, and under the same operating procedures and restrictions as RH waste is already being accommodated.

1.3 Scope

The scope of this project includes the following main elements:

1. **Project Administration** – development and maintenance of this Project Execution Plan (PXP), initiation of a Program Change Request to secure funding, project controls, project management, and communications.

2. **Packaging** – design, test (as/if necessary), and certify an existing 72-B payload canister that has been internally lined with neutron shielding material. When lined with neutron shielding and loaded with waste, the canister shall retain its U.S. Department of Transportation (DOT) 7A Type A pedigree and be approved by the NRC as an acceptable payload configuration for transport in the Type B-certified, 72-B Package.

3. **Repository Performance** – evaluate the effects, if any, of emplacement of neutron shielded canisters containing neutron emitting isotopes in the walls of the WIPP repository on the performance of the repository, and secure needed U.S. Environmental Protection Agency (EPA) concurrence or approval as needed.

4. **Documented Safety Analysis** (DSA) – evaluate the safety basis and obtain necessary DOE regulatory DSA-related approvals for waste receipt, handling, storage, and disposal of neutron shielded canisters containing neutron emitting isotopes at the WIPP facility.

5. **Hazardous Waste Facility Permit** (HWFP) – evaluate HWFP sections potentially affected by management of neutron shielded canisters at WIPP. Secure needed modifications to the HWFP to allow the receipt, storage, handling, and disposal of neutron shielded canisters at WIPP.

6. **Facility Operations** – evaluate changes (if any) needed to facility operations to support receipt, handling, storage, and emplacement of neutron shielded canisters; develop and demonstrate any needed changes to procedures.

7. **Procurement** – utilize a Basic Ordering Agreement (BOA) for obtaining neutron shielded canisters to be used in the DOE Complex.

1.4 Priority

This project is to be given a priority consistent with the DOE request referenced in the first paragraph of Section 1.1. The goal is to submit, in parallel, applications to both the NRC and the EPA in January of 2010. Project planning and priorities are to be established consistent with this goal.

2.0 CONTRACT OVERVIEW

The development of payload canisters lined with neutron shielding supports the WTS prime contract with the DOE by facilitating the removal of RH TRU waste containing a significant quantity of neutron emitting radioisotopes from DOE generator/storage sites.

3.0 PROJECT ORGANIZATION AND RESOURCES

The Neutron Shielded Canister Project will be executed by a variety of resources. The following individuals are assigned to this project:

- Overall Project Lead, To Be Determined (TBD)
    - Project Controls and Scheduling, [redacted]
    - Packaging Lead, [redacted]
    - Design, Analysis and Certification, [redacted]
    - Testing, [redacted]
    - RH Packaging Cog Engineer, [redacted]
    - Type A Cognizant Engineer, [redacted]
    - Draftsman, [redacted]
    - Procurement Coordinator, [redacted]
- Repository Performance Lead, TBD
- Documented Safety Analysis Lead, TBD
- Hazardous Waste Facility Permit Lead, TBD
- Facility Operations, TBD

As the project moves forward, and in accordance with scheduling and budget constraints, other individuals may be assigned as appropriate. [redacted] WTS Manager of Packaging Integration, is the Cost Account Manager (CAM) for all Packaging activities and WTS management sponsor for this project. The DOE Carlsbad Field Office point of contact for this project is [redacted]

4.0 PROJECT ADMINISTRATION

This project will be managed through a disciplined process in accordance with this PXP, application of disciplined Project Controls, and a secure, web-based workspace (Documentum™ eRoom) to support team collaboration and development of key documents.

5.0 PROJECT ACTIVITIES, BUDGET, AND SCHEDULE

5.1 Activities

The estimated budget and schedule for the key elements are based on the following activities:

5.1.1 Project Administration

- Develop and maintain PXP.
- Apply project controls and scheduling discipline for duration of project.
- Coordinate and manage work activities for duration of project.
- Ensure that key assumptions and requirements are established and agreed to early on, and kept up to date for the duration of the project; an early on, thorough, and complete definition of the source term to be accommodated is considered to be critical to project success.

5.1.2 Packaging

- Perform an evaluation to determine optimum configurations, sizes and weights and develop preliminary designs for neutron shielded canisters.
- Develop an analysis and/or test plan for Type A certification.
- Develop an analysis and/or test plan for Type B neutron shielded canister certification.
- Prepare a specification for procurement of any needed test articles.
- Meet with the NRC to discuss the concept.
- Place contract(s) for the fabrication of test articles, if any.
- Place contract(s) for any needed Type A analysis or testing.
- Place contract(s) for any needed Type B neutron shielded canister analysis or testing.
- Fabricate any needed test articles.
- Perform analyses, conduct tests and evaluate results.

- Certify as Type A.
- Prepare NRC application and submit.
- NRC review and approval of 72-B neutron shielded canisters.

5.1.3 Repository Performance

- Perform evaluations of waste streams in TRU waste inventory that are candidates for shipment in neutron shielded canisters.
- Evaluate performance assessment impacts, if any, on long term performance of the repository considering emplacement of neutron emitting RH-TRU waste in neutron shielded canisters.
- Prepare needed documents for submission to EPA to secure their approval or concurrence.
- Evaluate the impact of the high loading of cellulose, plastic, and rubber (CPR) materials resulting from the use of hydrogenous neutron shielding materials.

5.1.4 Documented Safety Analysis

- Based upon final design specs of the neutron shielded canisters, evaluate impacts, if any, related to receipt, handling, storage, and emplacement of the canisters at WIPP.
- Prepare needed documents to amend existing DSA.
- Secure DOE approval of any DSA changes related to the neutron shielded canisters.

5.1.5 Hazardous Waste Facility Permit

- Based upon final design specs of the neutron shielded canisters, evaluate needed modifications to the HWFP related to receipt, handling, storage, and emplacement of the canisters at WIPP.
- Develop a permit modification request for submission to New Mexico Environment Department (NMED).
- Secure modified permit allowing WIPP Permittees to receive, handle, store, and dispose of TRU waste in neutron shielded canisters.

5.1.6 Facility Operations

- Evaluate any changes that need to be made to facility infrastructure, program documents, and/or procedures to make WIPP capable to receive, handle, store, and dispose of neutron shielded canisters.
- Make necessary changes to facility infrastructure, program documents, and procedures.
- Demonstrate WIPP readiness to receive, handle, store, and dispose of the canisters.
- Secure DOE approval to start up operations at WIPP involving the canisters.
- Start operations at WIPP involving neutron shielded canisters.

5.1.7 Procurement

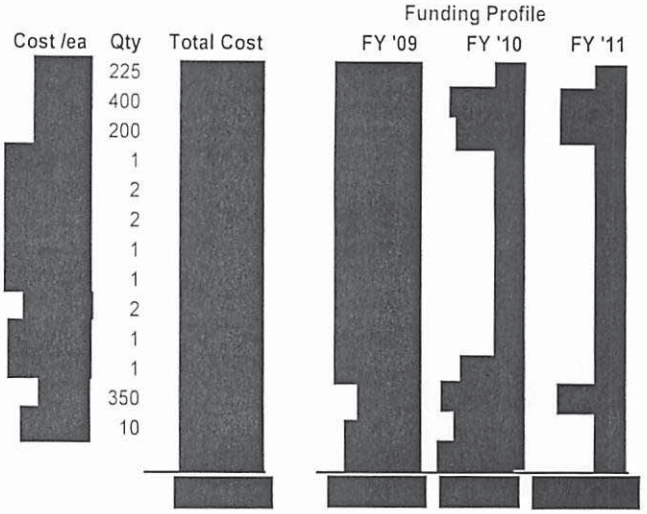
- Develop necessary documents for procurement of neutron shielded canisters by generator sites in the DOE complex.
- Complete procurement and establish a Basic Ordering Agreement with a vendor.
- Coordinate between site, procurement, and fabricator to ensure a supply of the canisters will be available when needed.

5.2 Budget

The budget estimate, broken out by FY and major project element, is provided below, with a total packaging certification budget (excluding tax) of [redacted]

Neutron Shielded Canister - Packaging Certification Cost Estimate

Item	Cost /ea	Qty	Total Cost	Funding Profile FY '09	FY '10	FY '11
[redacted] - Design Scoping Analyses		225				
[redacted] - SAR Analyses		400				
[redacted] - SAR Analyses		200				
Neutron Shielded Canister Test Fixture		1				
Removable Lid Canister Test Article		2				
NS30 Shield Insert Test Article		2				
Drop Test Instrumentation		1				
Portable Environmental Conditioning Unit		1				
Insulated Conditioning Chamber		2				
Flap Gasket Hydrogen Performance Testing		1				
Drop Testing		1				
NRC Review Fees		350				
Travel		10				
15% Contingency						
Total						



5.3 Schedule

The development of neutron shielded canisters began in July 2008, but was on hold from October 2008 through March 2009. Schedule is driven by the desired completion milestone for submittal of applications to the NRC and the EPA in January of 2010. Attachment A, Packaging Certification Project Schedule, shows the major elements of the project and key milestones leading to Safety Analysis Report (SAR) submittal in January 2010 and NRC certification in 2011.

6.0 PROJECT PRIORITY

There are several initiatives underway to optimize waste shipments to the WIPP. The Neutron Shielded Canister Project is one such optimization initiative and it will require management priority to ensure a dedicated effort for design, fabrication, testing, and preparation of the application to the NRC during execution of the packaging elements of the project, and continued management commitment through the duration of the project.

7.0 UNIQUE PROJECT CONSIDERATIONS

7.1 Neutron Shielded Canister Design Goal

The design goal of this project is the development of a neutron shielded canister with the following features:

- Utilization of the existing 72-B RLC design, as is.
- Addition of neutron shielding material (e.g., polyethylene) internal to the RLC.
- Internal cavity dimensions with neutron shielding in place sufficient to accommodate 15-gallon drums and 30-gallon drums or, if shown to be more efficient or otherwise desirable, a specially designed inner container of RH-TRU waste.
- Current design and certification basis for the RLC is not to be exceeded (e.g., weight and decay heat limits), but can be further tightened if necessary to satisfy all design constraints.
- Certification that the neutron shielded canister meets the requirements of a DOT Specification 7A, Type A container.
- Demonstration that the neutron shielded canister meets the requirements of the NRC for normal and accident conditions defined in 10 Code of Federal Regulations (CFR) Part 71.
- NRC certification of the neutron shielded canister as an authorized payload container for the 72-B.

7.2 Receiver Site Waste Acceptance Criteria

In addition to the DOT Type A certification and NRC approval, the neutron shielded canisters will also have to meet the Waste Acceptance Criteria of the receiver site(s) – not only WIPP as the final disposal site, but also other sites that may be used for intermediate storage and/or characterization. This will require careful coordination between the designer, shipper site, and receiver site. The neutron shielded canister Project Team will ensure this coordination is successfully managed.

7.3 National Environmental Policy Act Evaluation

A supplemental analysis may also be required to demonstrate that shipment of RH-TRU waste containing significant neutron emitting radioisotopes between DOE sites complies with the National Environmental Policy Act (NEPA). If a supplemental analysis is required it is assumed that the DOE Carlsbad Field Office (CBFO) will be responsible for the analysis.

7.4 Interrelationships and Project Dependencies

The main elements of the project are interrelated, and there are several project dependencies. Many project elements hinge upon the ultimate specification of the canister neutron shielding material. For example, evaluation of the DSA and HWFP will be driven in large measure by the material type and weight of the neutron shielding used within the canisters.

8.0 CANISTER ENGINEERING AND DESIGN

The development of neutron shielded canisters encompasses a number of unique requirements found in 10 CFR Part 71 as follows:

8.1 Normal Conditions of Transport / Hypothetical Accident

Evaluate the packaging and canister with associated neutron shield inserts for structural, thermal, containment, shielding, and criticality under the appropriate normal conditions of transport (NCT) and hypothetical accident conditions (HAC). Determine the extent to which the canister with associated neutron shield inserts is credited for maintaining the safety basis of the overall package. This key determination will drive the amount of testing, analysis, certification, and the ultimate quality level determinations applied to the canister. Note: The detailed requirements provided below are based on the assumption that gross particulate confinement of the waste material inside of each canister and associated neutron shield insert is credited such that shielding control credit is being taken for both NCT and HAC.

8.2 Structural Evaluation

The neutron shielded canisters will need to be tested/analyzed in 1 foot (ft) and 30 ft drop scenarios as an assembly inside of the Type B package (Note: For this project, the Type B package is the RH-TRU 72-B) to determine the extent of structural damage to the shielding components. Additionally, the drop tests/analyses will establish the dimensions for the damaged neutron shielded canisters that will be utilized in both shielding and criticality evaluations.

8.3 Thermal Evaluation

A thermal analysis of the Type B package with canister and associated neutron shield inserts will need to be performed to establish the maximum bulk temperature of the neutron shielded canister materials of construction. These temperatures will determine the temperature dependent structural properties of the materials credited in the structural evaluations of the canisters, and drive the need to drop test/analyze at the elevated temperatures. Cold temperature performance of the ultimately selected neutron shielding material will also need to be addressed.

8.4 Confinement

A determination, ideally as a result of the NCT and HAC drop testing, will need to be made to establish that payload is fully-confined within each neutron shielded canister. Loss of confinement of the waste would require that the releasable source term be determined and utilized in the shielding evaluations.

8.5 Shielding

Demonstration of compliance with the NCT exclusive use dose rate requirements will need to be made such that, under NCT, the dose rate is less than 200 mrem/hr at the surface of the Type B package, and less than 10 mrem/hr at a distance of 2 meter (m) from the surface of the Type B package (if beneficial, the 10 mrem/hr check can be made at 2 m from the side of the trailer instead of the surface of the package). Under HAC, the dose rate is less than 1 rem per hour (rem/hr) at a distance of 1 m from the surface of the Type B package. The analysis shall be performed for both gamma and neutron source terms such that a defined activity limit is established for the Type B package and the associated neutron shielded canister.

8.6 Subcriticality

A criticality analysis that evaluates the effect of the shielding materials on the subcriticality of the Type B package must be performed. The criticality analysis will need to determine, based on the structural evaluations of the neutron shielded canister and the associated "most credible reactive" configuration, the fissile mass limit for the Type B package and the associated canisters to maintain the system reactivity (k_s) value below the upper safety limit (USL).

8.7 Other

The application for a canister with a neutron shield insert, for which the safety basis of the Type B package is dependent, is very extensive. The neutron shielded canister is essentially considered as part of the Type B package when it is credited for maintaining confinement, shielding, and/or criticality. The analysis, testing, and evaluation of the canisters are therefore subject to the full application of 10 CFR 71, as summarized above.

9.0 PROCUREMENT AND MATERIALS MANAGEMENT

Requisitions required for the development of neutron shielded canisters will be prepared by [redacted] The Subcontract Technical Representative will be appointed by [redacted] Manager of Packaging Integration. Procurement will be managed by the WTS Procurement Group utilizing approved procurement procedures.

10.0 PROJECT CONTROLS

The development of neutron shielded canisters will be assigned a work breakdown structure tracking number. As soon as the project is funded, it will be included in the baseline planning documents. WTS Project Controls will track and report the budget and schedule.

11.0 PROJECT QUALITY PLAN

The quality assurance program applicable to the development of neutron shielded canisters is 10 CFR Part 71, Subpart H.

12.0 CONSTRUCTION

Construction and testing of neutron shielded canister test articles, if necessary, will be done by qualified vendor(s) selected in accordance with the requirements of a Statement of Work that will be prepared after the project is funded. Production unit neutron shielded canisters will be in accordance with a competitively bid BOA. If possible, the BOA will be for the production of neutron shielding components only that can be readily installed in 72-B payload canisters produced under an existing, parallel BOA.

13.0 COMMISSIONING AND START-UP

Upon NRC approval of the neutron shielded canister design, responsibility for the neutron shielded canister design(s) will be transferred to the Type A Cognizant Engineer for implementation and compliance with applicable requirements.

14.0 ENVIRONMENT, SAFETY, AND HEALTH

7A Type A and Type B certification of the canisters with neutron shielding in place, coupled with WIPP site-specific analyses and evaluations, will demonstrate that the handling and shipment of RH-TRU waste containing significant quantities of neutron emitting radioisotopes will not adversely impact the environment or human health and safety.

15.0 RISK MANAGEMENT

There are no unusual risks associated with the development of neutron shielded canisters. Certification testing, if any, will be conducted in accordance with approved procedures that will consider personnel safety.

16.0 PROJECT CLOSEOUT

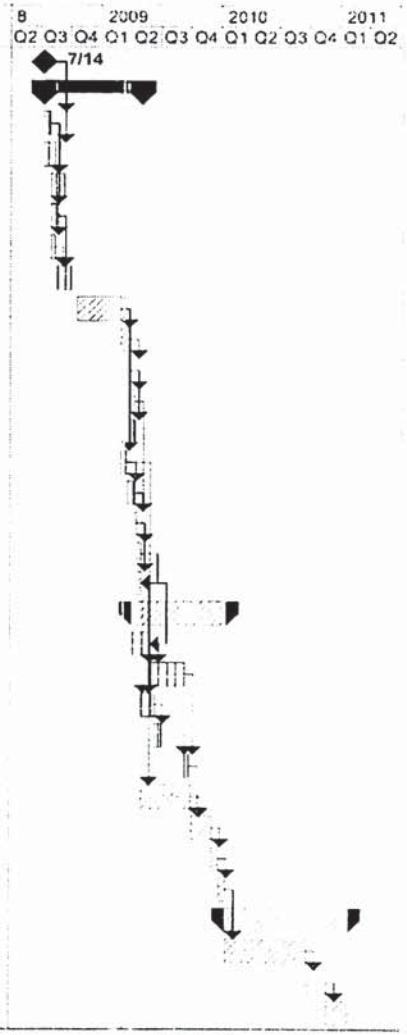
Upon approval from the NRC, the development phase of the Neutron Shielded Canister Project will be considered closed. Production under the BOA will then continue as needed.

17.0 PROJECT PROCEDURES

Procedures applicable to the neutron shielded canisters will be prepared, implemented, and administered by the Type A Cognizant Engineer.

Attachment A – Packaging Certification Project Schedule

ID	Task Name	Duration	Start	Finish	Predecessors
1	DOE Direction Received	0 days	Mon 7/14/08	Mon 7/14/08	
2	**Scoping Analyses, Design and Certification Strategy**	**213 days**	**Mon 7/14/08**	**Wed 5/6/09**	
3	Develop & Evaluate Design Input Requirements	15 days	Mon 7/14/08	Fri 8/1/08	1
4	Develop and Issue Draft PXP	25 days	Mon 7/14/08	Fri 8/15/08	1
5	LANL/CCP Provide Histograms of ORNL Source Term	30 days	Mon 8/4/08	Fri 9/12/08	3
6	Develop Design Concepts	15 days	Mon 8/4/08	Fri 8/22/08	3
7	Develop Analysis SOW and Initiate Contract	10 days	Mon 8/4/08	Fri 8/15/08	3
8	Perform Scoping Analyses and Tradeoff Studies	30 days	Mon 8/25/08	Fri 10/3/08	7,6
9	Project On CBFO Hold	95 days	Thu 10/23/08	Wed 3/4/09	
10	Incorporate Scoping Analyses and Finalize Design	20 days	Thu 3/5/09	Wed 4/1/09	9
11	Perform Design Review	1 day	Thu 4/2/09	Thu 4/2/09	10
12	Incorporate Design Review Comments	10 days	Fri 4/3/09	Thu 4/16/09	11
13	Update PXP, Design Requirements & Source Term	10 days	Fri 4/3/09	Thu 4/16/09	11
14	Develop Surrogate 72-B Test Fixture Designs	15 days	Thu 3/5/09	Wed 3/25/09	9
15	Develop Test Plans	15 days	Thu 3/26/09	Wed 4/15/09	14
16	Prepare for and Meet with NRC	4 days	Fri 4/17/09	Wed 4/22/09	12,15
17	Incorporate NRC Comments	10 days	Thu 4/23/09	Wed 5/6/09	16
18	Finalize Design Drawings	10 days	Thu 4/23/09	Wed 5/6/09	16,17FF
19	**Testing, Analysis, and SAR Preparation**	**205 days**	**Thu 4/9/09**	**Wed 1/20/10**	
20	Develop Test Article Fab SOW and Initiate Contract	40 days	Thu 4/9/09	Wed 6/3/09	18FF+20 days
21	Fabricate Test Articles	75 days	Thu 6/4/09	Wed 9/16/09	20,14
22	Develop Testing SOW and Initiate Contract	30 days	Thu 5/7/09	Wed 6/17/09	15,18
23	Develop Test Procedures	15 days	Thu 6/18/09	Wed 7/8/09	22
24	Perform Tests	10 days	Thu 9/17/09	Wed 9/30/09	21,23
25	Perform Final Analyses and Draft SAR Write-ups	110 days	Thu 5/7/09	Wed 10/7/09	18
26	Integrate Test Results and Finalize SAR	45 days	Thu 10/8/09	Wed 12/9/09	25,24
27	DOE and Peer Review of SAR	15 days	Thu 12/10/09	Wed 12/30/09	26
28	Prepare and Submit Final 72-B SAR Rev. 5 to NRC	15 days	Thu 12/31/09	Wed 1/20/10	27
29	**NRC Certification**	**270 days**	**Thu 1/21/10**	**Wed 2/2/11**	
30	NRC develop RAI on 72-B SAR Rev. 5	36 wks	Thu 1/21/10	Wed 9/29/10	28
31	RAI response	45 days	Thu 9/30/10	Wed 12/1/10	30
32	NRC issue CoC	45 days	Thu 12/2/10	Wed 2/2/11	31



Project: NS15-30 PXP Schedule
Date: Tue 3/10/09

Task | Milestone | Summary | Critical Path