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RCT-PXP-013

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Project Execution Plan for the Development of Shielded Payload Containers

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1.0 PROJECT OVERVIEW

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 (M&O) contractor. By definition, TRU waste is either contact-handled (CH) or remote-handled (RH). The largest portion, approximately 97%, of the TRU waste is CH TRU because it has a radiation dose rate of less than or equal to 200 millirem per hour (mrem/hr) at the surface of the payload container. CH TRU waste may be safely handled by personnel in close proximity to the payload container. A very small portion, approximately 3%, of the TRU waste is RH TRU because it has a surface dose rate that is greater than 200 mrem/hr. RH TRU waste must be handled remotely or it must be sufficiently shielded to reduce the radiation to less than or equal to 200 mrem/hr at the surface of the payload container.

The purpose of this project is to develop shielded payload containers that will allow safe handling and shipment of RH TRU waste to facilities that are capable of characterizing RH TRU waste.

The scope of this project is limited to one or more shielded payload containers that may be shipped in TRUPACT-II or HalfPACT. The scope of this project includes the following:

- Certification as a U.S. Department of Transportation (DOT) Specification 7A, Type A packaging.

- Approval from the US Nuclear Regulatory Commission (NRC) as an authorized payload container for TRUPACT-II and/or HalfPACT.

This project is currently a relatively low priority since it is neither budgeted nor scheduled. However, this Plan Execution Plan (PXP) has been prepared in anticipation that the development of shielded payload containers will be funded and thereby become a high priority for the DOE and WTS.

2.0 CONTRACT OVERVIEW

The development of shielded payload containers supports the WTS prime contract with the DOE by facilitating the removal of RH TRU waste from DOE generator/storage sites.

3.0 PROJECT ORGANIZATION

The development of shielded payload containers project will be performed by the Retrieval, Characterization, and Transportation (RCT) Packaging Group organization. Depending on schedule and priorities, the following individuals will most likely be assigned to this project:

- [redacted], Project Lead
- [redacted] Analysis, Design, and Test
- [redacted], CH Packaging Cognizant Engineer
- [redacted], Type A Payload Container Cognizant Engineer
- [redacted], Draftsman
- [redacted], Procurement

4.0 PROJECT ADMINISTRATION

The development of shielded payload containers project will be administered by the RCT Packaging Group.

5.0 PROJECT BUDGET AND SCHEDULE

5.1 Activities

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

- Perform an analysis to determine optimum sizes and weights and preliminary design of shielded payload containers.
- Prepare a design specification for procurement of test articles.
- Write a test plan.
- Meet with the U.S. NRC to discuss the concept.
- Place contract(s) for the fabrication of test articles.
- Place contract(s) for testing.
- Fabricate test articles.
- Conduct tests and evaluate results.
- Prepare NRC application and submit.
- NRC review and approval.

5.2 Budget

The following budget is based on the assumption that this project will be completed using subcontract personnel to supplement the RCT Packaging Group.

Table 1. BUDGET

Activity	Subcontracts	Travel	Sub Total
Analysis (2 man months)		-	
Design			
Test Plan		-	
Build Prototypes			
Test & Report			
Prepare Application		-	
NRC Review Cycle			
TOTAL			

Table 1. Budget

5.3 Schedule

The development of shielded payload containers project will formally begin when funded by the DOE Carlsbad Field Office (CBFO) and will be considered complete when one or more shielded payload containers are approved by the U.S. NRC as authorized payload container(S) and are listed in the Certificates of Compliance for TRUPACT-II and/or HalfPACT. The following schedule durations are based on funding availability:

Table 2. Schedule

Activity	Duration
1. Analysis	2 months
2. Design Specifications	2 months
3. Test Plan and NRC Discussion	2 months
4. Build Prototype	3 months
5. Test and Report	1 months
6. Application to NRC	2 months
7. NRC Review and Approval	9 months
TOTAL	**21 months**

Table 2. Schedule

6.0 PROJECT RESOURCES

The development of shielded payload containers will require subcontract support for design, fabrication, testing, and preparation of the application to the NRC. Utilization of these resources is customary and routine for the RCT Packaging Group.

7.0 UNIQUE PROJECT CONSIDERATIONS

7.1 Receiver Site Waste Acceptance Criteria

In addition to the DOT Type A certification and NRC approval, the shielded payload containers will also have to meet the Waste Acceptance Criteria (WAC) of the receiver site(s). This will require careful coordination between the designer, shipper site, and receiver site. The RCT Packaging Group is responsible for ensuring this coordination is successfully managed.

7.2 National Environmental Policy Act (NEPA)

A supplemental analysis may also be required to demonstrate that shipment of RH TRU waste between DOE sites complies with the NEPA. If a supplemental analysis is required it is assumed that CBFO will be responsible for the analysis.

8.0 ENGINEERING AND DESIGN

The development of shielded payload containers encompasses a number of unique requirements found in 10 Code of Federal Regulations (CFR) 71 as follows:

8.1 Normal Conditions of Transport / Hypothetical Accident

Evaluate the shielded payload container for structural, thermal, containment, shielding, and criticality under the appropriate normal conditions of transport (NCT) and/or hypothetical accident conditions (HAC). Determine the extent to which the payload container 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 shielded payload container. Note: The detailed requirements provided below are based on the assumption that confinement of the waste material inside of each shielded payload containers and the associated shielding and criticality control credit is being taken for both NCT and HAC.

8.2 Structural Evaluation

The shielded payload containers will need to be tested in 3 ft. and 30 ft. drop scenarios as an assembly inside of the Type B package (Note: For this project the Type B package is anticipated to be either TRUPACT-II or HalfPACT) to determine whether containment of the contents is maintained and to determine the extent of structural damage to the shielding components. Additionally, the drop tests will establish the dimensions for the damaged array of payload containers that will be utilized in both shielding and criticality evaluations.

8.3 Thermal Evaluation

A thermal analysis of the Type B package with shielded payload containers will need to be performed to establish the maximum bulk temperature of the shielded payload container materials of construction. These temperatures will determine the temperature dependent structural properties of the materials credited in the structural evaluations of the payload containers and drive the need to drop test at the elevated temperatures.

8.4 Containment

A determination, ideally as a result of the NCT and HAC drop testing, of the leak-tightness of the payload containers will need to be made to establish that payload is fully-confined within each payload container. Loss of leak-tightness and/or confinement of the waste would require that the releasable source term be determined and utilized in the shielding and criticality 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 shielded payload container and the Type B package and less than 10 mrem/hr at a distance of 2 meter from the surface of the Type B package. Under HAC, the dose rate is less than 1,000 mrem/hr at 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 shielded payload containers.

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 payload container and the associated 'most credible reactive' configuration, the fissile mass limit for the Type B package and the associated shielded payload containers to maintain the system reactivity value below the upper safety limit (USL). The application for a shielded payload container, for which the safety basis of the Type B package is dependent, is very extensive. The shielded payload container is essentially considered as part of the Type B package when it is credited for maintaining containment, shielding, and/or criticality. The analysis, testing, and evaluation of the payload containers are therefore subject to the full application of 10 CFR 71 as summarized above.

9.0 PROCUREMENT AND MATERIALS MANAGEMENT

Requisitions for the development of shielded payload containers will be prepared by [redacted] The Subcontract Technical Representative (STR) will be appointed by [redacted] Procurement will be managed by WTS Procurement Group utilizing approved procurement procedures.

10.0 PROJECT CONTROLS

The development of shielded payload containers project 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. [redacted], Administrative Assistant will track the budget and schedule.

11.0 PROJECT QUALITY PLAN

The quality assurance (QA) program applicable to the development of shielded payload containers is 10 CFR 71, Subpart H.

12.0 CONSTRUCTION

Construction and testing of shielded payload container test articles will be done by qualified vendor(s) selected in accordance with the requirements of the Statement of Work (SOW) that will be prepared after the project is funded.

13.0 COMMISSIONING AND START-UP

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

14.0 ENVIRONMENT, SAFETY, AND HEALTH

Certification of the shielded payload container design will demonstrate that the handling and shipment of RH TRU waste will not adversely impact the environment or human health and safety.

15.0 RISK MANAGEMENT PLAN

There are no unusual risks associated with the development of shielded payload containers. Certification testing will be conducted in accordance with approved procedures that will consider personnel safety.

16.0 PROJECT CLOSEOUT

Upon approval from the NRC, the development of shielded payload containers project will be considered closed.

17.0 PROJECT PROCEDURES

Procedures applicable to the shielded payload containers will be prepared, implemented, and administered by the Type A Payload Container Cognizant Engineer.