

## **Integrated Readiness Activities for the Direct Feed Low Activity Waste (DFLAW) Program – 16221**

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### **ABSTRACT**

The WTP is a one-of-a-kind nuclear waste treatment facility being designed and constructed for the DOE by Bechtel National, Inc. (BNI) and principal subcontractor URS-AECOM, to process and vitrify radioactive waste stored in underground tanks at the Hanford Site. The Tank Operations Contractor (TOC), Washington River Protection Solutions (WRPS), has the responsibility to retrieve, stage, pretreat, and deliver the pretreated feed directly to the WTP Low-Activity Waste Vitrification Facility, scope referred to as Direct Feed Low Activity Waste (DFLAW). Extensive planning is in progress under the auspices of One System, an effort with joint participation by WTP and TOC personnel.

To support an integrated approach to readiness for the DFLAW Program, an Integrated Operational Readiness Committee (IORC) was established to contribute to a safe and effective operational readiness of the WTP. The IORC, an advisory committee, comprising representatives from BNI, WRPS, and the Hanford interfacing partners for WTP operations, Mission Support Alliance (MSA) and CH2M HILL Plateau Remediation Company (CHPRC).

In addition, an Operational Readiness (OR) workshop was conducted with several objectives accomplished to support an integrated approach to readiness with specific focus on the management of interfaces between the various contractors and facilities.

This culminated in the development of a readiness strategy document called the Operational Readiness Support Plan (ORSP). This ORSP describes the joint approach to WTP startup operating in the DFLAW configuration.

### **INTRODUCTION**

The DFLAW Program encompasses multiple standalone support facilities (see Figure 1), each of which are run by various contractors with independent contractual requirements (scopes) and differing operational procedural sets. This section provides an overview of the DFLAW Program scope and the requisite support facilities.

### **Direct Feed Low Activity Waste Scope**

The purpose of DFLAW is to treat and immobilize low-activity waste prior to the startup of the WTP Pretreatment (PT) Facility. As such, the LAW Facility will first receive low-activity waste from the Hanford Tank Farms via the Low-Activity Waste Pretreatment System (LAWPS) after filtration and cesium removal. The current planning for implementation of DFLAW includes involvement of the following existing and proposed facilities: LAWPS, portions of AP and AW Tank Farms, LAW Facility and adjacent Effluent Management Facility (EMF), Analytical Laboratory (Lab), Balance of Facilities (BOF), Integrated Disposal Facility (IDF), Immobilized Low-Activity Waste (ILAW) Transporter, Effluent Treatment Facility (ETF), Consolidated Solid Waste Management Facility, 222-S Laboratory, 242-A Tank Waste Evaporator, and other required infrastructure. Increased loads on the 222-S Laboratory, the 242-A Evaporator, and other TOC infrastructure are anticipated and will be evaluated as details become available.



## **WTP Scope**

Low-Activity Waste Vitrification Facility - The LAW Facility receives low-activity waste from the LAWPS Facility. In the LAW Facility, glass formers are mixed with low-activity waste. The prepared feed is fed to the melters to produce ILAW glass. The glass product produced by the LAW Facility melters is poured into stainless steel containers.

Effluent Management Facility - The DFLAW design effort has established a conceptual design for an Effluent Management Facility (EMF) that will provide three major functions:

- Receive radioactive liquid effluents from the LAW Facility and Lab and concentrate them through evaporation.
- Collect concentrated radioactive liquid effluents for characterization, conditioning, and transfer to one of three disposal paths: return to the TOC for addition to the existing tank farms double-shell tank (DST) inventory; LAW concentration receipt process system for recycle to the LAW Facility melters and inclusion in ILAW glass production; or tanker truck for offsite disposal.
- Collect LAW Facility secondary offgas/vessel vent process (LVP) system caustic scrubber effluent and evaporator overhead condensate for characterization, conditioning, and transfer to the TOC Liquid Effluent Retention Facility (LERF) / ETF.

Analytical Laboratory – The physical, chemical, and radiochemical analyses and environmental compliance of radioactive samples for WTP process control, waste acceptance and product quality will be performed in the WTP Lab Facility.

Balance Of Facilities – The BOF provides utilities (such as steam, water, air, and electricity) and chemical reagent services to all WTP facilities. The BOF also provides the glass former reagent system which is designed to store and process bulk glass forming chemicals from off-site suppliers.

## **Tank Farms Scope**

Waste Feed Delivery and Feed Stream Characterization – To achieve the DOE's Office of River Protection (DOE-ORP) mission, optimized and reliable tank waste feed must be provided from the Hanford Tank Farms to the WTP. The Waste Feed Delivery (WFD) projects will design, construct, and commission the systems required for using selected DFLAW DSTs to prepare and deliver feed to LAWPS on a sustained basis. The overall scope includes performing project planning, design and engineering system upgrades/replacements, and operations (including waste feed characterization) to accomplish WFD to LAWPS. The specific WFD scope subject to this plan includes those facilities, systems, and operations that interface with or support LAWPS hot commissioning (such as feed, feed prep, and waste

recycle receipt tanks, associated pumps, waste transfer piping networks, and distributed control systems.).

Low-Activity Waste Pretreatment System – One portion of the direct feed LAW process is to design, construct, commission, and operate the LAWPS Facility systems to remove solids and radioactive cesium and characterize/condition the waste in order to meet the WTP LAW Facility waste acceptance criteria.

Immobilized Low-Activity Waste Product and Secondary Solid Waste Handling and Disposal – This scope provides for preparation of the regulatory basis (including waste incidental to reprocessing process) and the specification, procurement, and provision of transport equipment (e.g., ILAW transporter) necessary to enable ILAW and solid waste disposal at the IDF.

Secondary Liquid Waste – Radioactive and hazardous WTP secondary liquid process wastes are pumped to the LERF/ETF for treatment and disposal. The TOC scope includes the completion of upgrades and permitting and the future operation of the LERF/ETF, as necessary, in order to support DFLAW hot commissioning.

222-S Laboratory – This laboratory will work in conjunction with the WTP Analytical Laboratory for waste sample analysis.

242-A Tank Waste Evaporator – The evaporator will concentrate radioactive waste by boiling off water prior to transfer to the WTP.

### **Other Hanford Contractor Scope**

Plateau Remediation Contractor - Manages the IDF and will receive and dispose of solid radioactive and radioactive mixed wastes as delivered by the TOC. The solid wastes include, but are not limited to, filled low-activity waste glass canisters, and secondary solid wastes from tank waste treatment, including spent melters. PRC is responsible for ensuring that the IDF is ready to operate on a schedule required to support the LAW Facility hot commissioning.

Mission Support Contractor - Provides infrastructure services such as electrical utilities, water services, roads, and land location.

Off-Site Disposal Subcontractors - In addition to waste treatment and disposal services provided by ETF and IDF, waste may also be dispositioned off-site. Details and decisions regarding these treatment and disposal facilities are pending.

### **DIRECT FEED LOW ACTIVITY WASTE READINESS ACTIVITIES SEQUENCE**

The planned sequence of the readiness review activities for the DFLAW Program facilities are as follows:

1. LAWPS and tank farms are Hazard Category 2 nuclear facilities that have readiness activities closely coupled to the LAW Facility, EMF, and potential ETF/LERF readiness activities.

Commissioning of the LAWPS Facility will require a sequence of contractor achieving readiness activities, management assessments, followed by both a Contractor and DOE Operational Readiness Review (ORR) prior to hot commissioning.

LAWPS readiness activities Startup Notification Report (SNR), Management Self-Assessments, readiness review plan of actions (POA), implementation plans (IP), contractor certification of operational readiness, Startup Plan, and Contractor ORRs will culminate with the DOE ORR and approval to commence hot commissioning. The SNR is the first key readiness document to be submitted to DOE for approval regarding the facility start-up and addresses the: proposed type of DOE Order (O) 425.1D, *Verification of Readiness To Start Up or Restart Nuclear Facilities*, review; justification for the proposed type of review; proposed Startup Authorization Authority; and the projected submittal date for the POA.

Prior to certifying readiness to operate LAWPS, facility management will perform a Management Self-Assessment to verify readiness to operate the facility. The Management Self-Assessment will occur after all of the affirmations have been completed by the responsible organizations per TOC Readiness Procedures and will be based on the scope described in the LAWPS POA.

Following closure of the Management Self-Assessment pre-start findings (with the exception of a manageable list) and approval of the Management Self-Assessment post-start finding corrective action plans, the TOC can certify readiness to operate to the Contractor ORR team leader and request the Contractor ORR to begin. Both the Contractor ORR and the DOE ORR will be performed in accordance with DOE O 425.1D and applicable contractor procedures.

LAWPS is scheduled to be ready to commence hot commissioning in time to support LAW Facility hot commissioning.

2. Tank Farms, a Hazard Category 2 facility, will undergo modification to accommodate the various interfaces with LAWPS. The TOC will make modifications to various facilities as well as construct new infrastructure to implement the TOC's portion of the DFLAW mission. The principal activities include commissioning of the waste tank infrastructure to support feed preparation and transfer of waste to and from LAWPS.

The Tank Farms is an operating nuclear facility and the planned modifications to these facilities are similar to those implemented as part of regular TOC operations and maintenance. Commissioning of planned modifications within the current tank farm boundary are considered routine. This includes activities such as tank system operations, exhauster operations, evaporator campaigns, waste transfers, obtaining, packaging, and shipping samples to laboratories, and

ETF operations. The TOC will achieve readiness for operation of these facilities, as modified for the DFLAW mission, using the Operational Readiness Checklist (ORC) process in accordance with existing TOC processes and procedures.

Commissioning the ILAW Transporter is anticipated to be a low risk activity based upon the waste form and is consistent with regular radiological waste transportation activities currently performed, and is considered routine. The TOC will achieve readiness for ILAW Transporter operation using the ORC process in accordance with existing TOC processes and procedures. ILAW Transporter activities that interface with LAW Facility (loading) and IDF (unloading) will be included on the respective LAW Facility and IDF ORRs.

3. The LAW Facility, a Hazard Category 2, nuclear facility will receive low-activity waste from TOC/LAWPS and vitrify it. The primary waste processing systems in the LAW Facility include waste feed preparation, waste vitrification, melter offgas treatment, and canister closure, decontamination, and inspection. LAW Facility design allows for hands-on maintenance capability once process fluids and/or containers are removed from work areas. The melters are locally shielded to allow routine replacement of melter consumables (e.g., bubblers, feed tubes) over its design life. Engineered controls, including shielding and ventilation, are provided to protect workers from radiological and chemical hazards during routine facility operations. The BOF Anhydrous Ammonia Facility (AAF), Glass Former Storage (GFS), and Stand-by Diesel Generator (SDG) systems are included with the LAW Facility for DFLAW integration.

The Facility Readiness Plan (used to achieve readiness) for LAW Facility startup will be written early to define all of the actions required to certify readiness and ensure they are scheduled. The POA, developed per WTP Readiness Procedures, will be based on the same scope used to develop the Facility Readiness Plan.

To support cold commissioning of the LAW/EMF, a readiness management assessment will be performed. Prior to certifying readiness to operate the LAW Facility, facility management will perform a Management Self-Assessment to verify readiness to operate the facility. The Management Self-Assessment will occur after all of the affirmations have been completed by the responsible organizations as per WTP Readiness Procedures and will be based on the scope described in the LAW Facility POA. This review will include confirmation of operational readiness at WTP's interfaces with external contractors. A review of the Management Self-Assessment results, issues, and corrective action plans will be performed by the Readiness Assurance Certification Board. Following closure of the Management Self-Assessment pre-start findings (with the exception of a manageable list), approval of the Management Self-Assessment post-start finding corrective action plans, and concurrence by the Readiness Assurance Certification Board, WTP can certify readiness to operate to the Contractor ORR team leader and request the Contractor ORR to begin. Both the Contractor ORR and the DOE ORRs will be performed in accordance with DOE O 425.1D and applicable contractor procedures.

4. The Lab is a facility designed to provide analytical services in support of WTP as a whole, from analyzing waste samples to determining the compliance of vitrified wastes to regulatory requirements. The current preliminary documented safety analysis categorizes the Lab as a Hazard Category 3 nuclear facility due to analysis which considers LAW, PT, and HLW facility samples.

As directed by DOE-ORP, WTP will prepare for and conduct a Readiness Assessment (RA) to support the Lab startup. In order to support this startup process, an equivalency request will be developed in accordance with DOE O 251.1C, *Departmental Directives Program*, by WTP which supports completion of a DOE O 425.1D-compliant RA in place of the requisite ORR for the Lab startup.

5. The BOF comprises non-nuclear utility and service structures and systems that include electrical distributions systems, utilities (e.g., compressed air system, chiller system, water treatment system, fuel oil system, etc.) and the supporting buildings and infrastructure. BOF is not subject to DOE O 425.1D requirements, but the individual structures and systems will use the approved WTP processes for achieving and confirming operational readiness. A Facility Readiness Plan will be developed which lists the applicable Core Requirements (CR), the objective evidence required to show compliance, the actions needed to produce the evidence, and the expectations of the evidence required to achieve readiness for BOF. The Facility Readiness Plan will also be used to develop a Readiness Management Assessment plan to describe the scope and prerequisites assessment of BOF readiness to operate as required by DOE O 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, Critical Decision (CD)-4 requirements.

Once line management has established the operational readiness of BOF, a Readiness Management Assessment will be performed. This Readiness Management Assessment will apply the CRs in a tailored fashion based on facility requirements. The Readiness Management Assessment final report will be the basis of line management's certification of readiness to operate at BOF to DOE as required prior to CD-4 by DOE O 413.3B. An Integrated Safety Management System (ISMS) Phase II Verification will be performed in parallel with the BOF Readiness Management Assessment to verify the implementation of commissioning and operations programs in BOF procedures and processes. As with the ISMS Phase I verifications, this Phase II verification will be completed in accordance with DOE-HDBK-3027-99, *Integrated Safety Management Systems (ISMS) Verification, Team Leader's Handbook*.

6. The IDF, a Hazard Category 2 nuclear facility, must be capable of receiving the ILAW canisters from the LAW Facility. The IDF, a new nuclear facility that has not been operated, will require a Contractor and DOE ORR to verify that readiness is achieved and to receive DOE approval to start operations. The DFLAW integrated schedule dates show the IDF planned readiness activities for receipt of ILAW canisters. The IDF must be ready to receive ILAW canisters prior to commencing hot commissioning of the LAW Facility and LAWPS.



## **DIRECT FEED LOW ACTIVITY WASTE READINESS**

The activities associated with preparation for the DFLAW readiness are presented below.

### **Integrated Operational Readiness Committee**

To facilitate a safe and effective operational readiness of the WTP and specifically the DFLAW Program, an Administrative Interface Agreement (AIA) for Inter-Contractor Operational Readiness Integration was established with approval by each of the contractors associated with the DFLAW Program.

The Integrated Operational Readiness Committee (IORC) is an advisory board comprising representatives from BNI, CHPRC, MSA, and WRPS. Representatives from the DOE-ORP and the DOE Richland Operations Office are also invited to the IORC meetings.

The focus of the IORC is to ensure that inter-contractor activities that support WTP operational readiness are effectively orchestrated and integrated to optimize project delivery as follows:

- Focus on integration between contractors. Facilitate the reconciliation of readiness issues that affect interfaces involving other contractors.
- Support line management to achieve operational readiness.
- Provide input to an integrated schedule that tracks key readiness activities that require coordination among the contractors or have the potential to adversely impact subsequent startup activities.
- Identify gaps in readiness preparation activities between contractors.
- Review key deliverables such as the WTP ORSP, SNRs, and POAs for consistency at the interfaces, and recommend changes when warranted.
- Ensure activities for readiness that occur at contractor interface points are clearly communicated to affected contractors.
- Provide strong senior management support for implementation of operational readiness activities.
- Review events, issues, and adverse trends with operational readiness activities, including issues that crosscut organizational boundaries, as determined by the IORC Chair.
- Provide a venue for conducting periodic review of the OR processes and recommend improvements necessary to support successful integration.
- Other issues as raised by the IORC members.

The IORC reviews and considers the interface implications of operational readiness items including, but not limited to, readiness documents such as ORCs, POAs, Facility Readiness Plans (FRP), and SNRs that address the scope necessary to ensure inter-contractor operational readiness and the WTP ORSP, an annual joint contract deliverable by BNI and WRPS, for:

- Integration across contractor boundaries.

- Consistent application of operational readiness principles at the interfaces.
- Integrated readiness development and implementing schedules that reflect the sequencing necessary for achieving readiness as defined in the integrated schedule.

The IORC usually meets on a monthly basis to discuss upcoming readiness activities and programmatic issues, risks, and opportunities associated with the DFLAW Program.

### **Operational Readiness Workshop**

A One System OR workshop was held in January 2015, focusing on DFLAW. The intended outcome was to identify recommendations, assumptions, barriers, and potential risks to be considered during planning and scoping for readiness assessment and operational readiness. The workshop was attended by participants from DOE-ORP, CHPRC, MSA, TOC, WTP, and DNFSB.

The objectives of the meeting were:

- Reach agreement on recommendations for a facility-by-facility basis on the type of review that will be conducted, e.g. MSA, RA, or ORR.
- Can any of these activities be combined or which ones are standalone reviews?
- What is the timing for completion of the above reviews? Is there a benefit of sharing resources across the involved contractors for efficiency and diversity of review?
- Identification of interface points with unique identifier amongst the various facilities/systems in a spreadsheet format to support details capture.
- Integrate the above information into the DFLAW integrated schedule.
- Identify those barriers (contractual/programmatic) that could potentially impact the above strategies (e.g. sharing of resources).

The workshop team identified related barriers/risks and recommendations/actions/opportunities with assumptions to be considered and addressed. One of the major results from the workshop was that a strategic plan should be developed to address the agreements reached from the workshop and the “what and where” aspects of the various readiness activities.

### **Operational Readiness Support Plan**

The ORSP is a joint TOC and WTP Contractor contract deliverable that describes an integrated OR strategy. This ORSP describes the joint approach to WTP startup operating in the DFLAW configuration. The OR strategy provides a structured and disciplined approach to support line/functional management in achieving, validating, and verifying operational readiness of all facilities and systems required to support DFLAW operations. The OR strategy described in the plan is collaboratively implemented to prepare the DFLAW Program systems, personnel,

and procedures in order to achieve readiness for plant operations, and to successfully complete readiness reviews as required by DOE O 425.1D and DOE O 413.3B.

As other WTP and TOC facilities are defined and scheduled for startup, the OR strategy details will be included in future revisions to the ORSP.

The Plan includes:

- Roles and Responsibilities
- DFLAW OR Facility Scope
- OR Overview
- OR Review Planning
- Lessons Learned

The plan recognizes that readiness at the interfaces is critical and must be managed, as evidenced from past readiness reviews. Key interfaces and integrating functions include:

Inter-Contractor Interfaces: Operational coordination must be assured between the WTP Contractor, TOC, other Hanford prime contractors and other entities that have a responsibility to implement activities or requirements necessary to achieve readiness to operate DFLAW. Interface control documents (ICDs); or other interface related contract requirement(s) (such as TOC Contract Section J.3, *Hanford Site Services and Interface Requirements Matrix*) help define these interfaces and ensure that each contractor understands their role and responsibilities.

Operational Interface Boundary Equipment Information: This information will be addressed in a One System document, *One System Direct Feed LAW (DFLAW) Interface Matrix*. The interface matrix goal is to ensure there are no gaps in the operational interface boundary equipment points for each of the DFLAW facilities' or systems operational boundaries. The operational interface boundary equipment may be used during the development of assessment plans or POAs to help define the assessment boundaries of the reviews. This report will be issued when the LAWPS design is complete and periodically updated to reflect emergent issues, contractor scope changes, design changes, or other impacts.

Interface Assessment: The IORC will evaluate this process in Fiscal Year (FY) 2016, and if viable, will develop and approve the interface assessment (IA) process in FY 2016. The primary purpose of an IA is to provide an in-depth review of the people, parts, and procedures applicable to the operation and maintenance of interfaces between two or more contractors. The results of these assessments may be used in DFLAW POAs to justify limiting the scope of a core requirement that will be assessed in a readiness review.

Administrative Interface Agreement: OR Integration establishes methods to ensure integrated execution of the readiness process for achieving, validating, and/or

verifying the start/restart of facilities, activities, and operations at Hanford Contractor interfaces. The implementing document is TOC-AIA-OHC-00041, *Inter-Contractor Operational Readiness Integration*.

Integrated Operational Readiness Committee: The IORC was established via an AIA with the purpose of focusing on enhancing integration between contractors; and to facilitate the reconciliation of readiness issues that affect interfaces involving contractors. The implementing document is TOC-AIA-OHC-00037, *Administrative Interface Agreement between Bechtel National, Inc., and Mission Support Alliance, and Washington River Protections Solutions, and CH2M HILL Plateau Remediation Company for Inter-Contractor WTP Operational Readiness*.

Interface Control Documents: The ICDs are being analyzed to identify specific implementation actions required to fully implement the ICD requirements thus achieving readiness at the operational interfaces. The results of the analysis are technically reviewed by the appropriate contractor personnel to ensure that the specified action will provide adequate objective evidence for achieving readiness at the interfaces.

Criteria and Review Approach Documents (CRAD) will be developed and provided to contractor line management to assess whether the implementation actions are in place to assure that the ICD requirements are met.

One System Program Integration Council: The One System Program Integration Council (OSPIC) is chartered to lead institutional program integration between the TOC and WTP. The OSPIC's objective is to facilitate program owners towards consistent institutional programs for alignment between the TOC and the WTP Contractor operations. The OSPIC sponsors development of program integration plans (PIP) to ensure TOC-WTP program alignment is attained. Achieving the objective will assist in the readiness review process at the interfaces.

## **CONCLUSION**

To support an integrated approach to readiness for the DFLAW Program, an IORC was established to contribute to a safe and effective operational readiness of the WTP. The IORC is an advisory committee comprising representatives from BNI, CHPRC, MSA, and WRPS.

In addition, an OR workshop was conducted with several objectives accomplished to support an integrated approach to readiness with specific focus on the management of interfaces between the various contractors and the facilities they manage.

Integration between all involved contractors associated with the DFLAW Program is critical to ensuring a safe and efficient operational readiness of the various facilities involved with the program. Management of the interfaces is essential based on past readiness reviews and lessons learned. Through the development and continued

implementation of the IORC and the continued updates to the ORSP these integration activities will be effectively managed.

The collaborative effort by DOE and the Hanford contractors, through active participation in workshops, development of integrated readiness strategies and reports, and support of the IORC, has removed barriers and fostered a team environment for achieving DFLAW OR. The process used for integrating these organizations, each exhibiting unique needs and motivations, is a model approach for improving communications, building relationships, and achieving results.

## REFERENCES

1. DOE O 251.1C, *Departmental Directives Program*, U.S. Department of Energy, Washington, D.C., dated January 15, 2009.
2. DOE O 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, U.S. Department of Energy, Washington, D.C., dated November 29, 2010.
3. DOE O 425.1D, Change 1, *Verification of Readiness to Start-up or Restart Nuclear Facilities*, U.S. Department of Energy, Washington, D.C., dated April 02, 2013.
4. DOE-HDBK-3027-99, *Integrated Safety Management Systems (ISMS) Verification, Team Leader's Handbook*, U.S. Department of Energy, Washington, D.C., dated June 9, 1999.