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16-WSC-0050

SEP 27 2016

Ms. Alexandra K. Smith, Program Manager
Nuclear Waste Program
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Department of Ecology
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Ms. Smith:

REQUEST FOR CONCURRENCE ON SELECTED SCENARIOS FOR THE RIVER PROTECTION PROJECT SYSTEM PLAN, REVISION 8

The U.S. Department of Energy (DOE), Office of River Protection is requesting your concurrence on the jointly developed attachment as partial fulfillment of milestone M-062-40. The specific criteria being met is as follows: "One year prior to the issuance of the System Plan, DOE and Ecology will each select the scenarios (including underlying common and scenario specific assumptions) that will be analyzed in the System Plan, with DOE and Ecology each having the right to select a minimum of three scenarios each."

If you have any questions, please contact me or your staff may contact Ben J. Harp, Assistant Manager, Waste Treatment and Immobilization Plant Startup, Commissioning and Integration, on (509) 376-1462.

Kevin W. Smith
Manager

WSC:KWB

Attachment

cc w/attach:
J. Lyons, Ecology
D. McDonald, Ecology
TPA Administrative Record

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SEP 28 2016
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ATTACHMENT

16-WSC-0050

SELECTED SCENARIOS FOR THE RIVER PROTECTION PROJECT SYSTEM PLAN, REVISION 8

54 pages (including cover page)

EXECUTIVE SUMMARY

PARTIAL COMPLETION OF HANFORD FEDERAL FACILITY AGREEMENT AND CONSENT ORDER (TRI-PARTY AGREEMENT) INTERIM MILESTONE M-62-040

The U.S. Department of Energy (DOE), Office of River Protection (ORP) and Washington State Department of Ecology (Ecology) are submitting the attached, *Selected Scenarios for the River Protection Project System Plan, Revision 8,* in fulfillment of the criteria established by milestone M-62-040. "One year prior to the issuance of the System Plan, DOE and Ecology will each select the scenarios (including underlying common and scenario specific assumptions) that will be analyzed in the System Plan, with DOE and Ecology each having the right to select a minimum of three scenarios each."

The attached plan is a result of joint efforts by members of both ORP and Ecology to provide a broad set of scenarios to inform future decision makers regarding the potential outcomes for the waste currently stored at Hanford. In addition to the Base Case, ten other scenarios were proposed and are described in the attached plan. Each scenario was prioritized and will be modeled according to priority with an expectation that many, if not all cases will be able to be completed. Both parties contributed to the list of scenarios and their final priorities. The identification of the scenarios presented by each party has been removed to avoid bias and represent the combined effort of the bi-party team; however, four of the scenarios were proposed by ORP and six were proposed by Ecology to demonstrate conformance to the milestone.

ORP and Ecology expect continued open dialogue as scenarios are modeled to increase a common understanding of the mission.

Kevin W. Smith 9/27/16

Kevin Smith, Manager
Office of River Protection

Alexandra K. Smith
Nuclear Waste Program Manager
Washington State Department of Ecology

RPP-RPT-59581
Rev. 0A

Selected Scenarios for the River Protection Project System Plan, Revision 8

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Date Published

August 2016

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washington river protection solutions

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Office of River Protection under Contract DE-AC27-08RV14800

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LIST OF TERMS

CH-TRU	contact-handled transuranic[1]
DFHLW	direct-feed high-level waste
DFLAW	direct-feed low-activity waste
DOE	U.S. Department of Energy
DST	double-shell tank
Ecology	Washington State Department of Ecology
EMF	Effluent Management Facility
ERDF	Environmental Restoration and Disposal Facility
ETF	Effluent Treatment Facility
FEP	Feed Evaporation Process
HFFACO	*Hanford Federal Facility Agreement and Consent Order* (TPA)
HLW	high-level waste
IDF	Integrated Disposal Facility
IX	ion exchange
LAW	low-activity waste
LAWPS	Low-Activity Waste Pretreatment System
LERF	Liquid Effluent Retention Facility
LWA	*Land Withdrawal Act*
MTG	metric tons of glass
MYOP	Multi-Year Operating Plan
NEPA	National Environmental Policy Act
ORP	Office of River Protection

[1] As defined in the Waste Isolation Pilot Plant [WIPP] *Land Withdrawal Act* [LWA] [Public Law (P.L.) 102-579], as amended by P.L. 104-201.

PT	Pretreatment (Facility)
RPP	River Protection Project
SBS	submerged bed scrubber
SLAW	supplemental low-activity waste
SP8	System Plan, Revision 8
SpG	specific gravity
SST	single-shell tank
TOE	total operating efficiency
TPA	Tri-Party Agreement (HFFACO)
TRU	transuranic
TWCSF	Tank Waste Characterization and Staging Facility
WAC	waste acceptance criteria
WESP	wet electrostatic precipitator
WIPP	Waste Isolation Pilot Plant
WRF	Waste Receiving Facility
WRPS	Washington River Protection Solutions, LLC
WTP	Hanford Waste Treatment and Immobilization Plant
WVR	waste volume reduction

1.0 INTRODUCTION

The purpose of this paper is to document the scenarios selected for inclusion in the River Protection Project (RPP) System Plan, Revision 8, hereinafter referred to as SP8. This revision to the System Plan is being prepared to meet milestone M-062-40 of the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989; HFFACO), also known as the Tri-Party Agreement (TPA).

1.1 SCOPE

Milestone M-062-40 describes the requirements for the System Plan, including content requirements and due dates. A minimum of three scenarios each can be selected by the Washington State Department of Ecology (Ecology) and the U.S. Department of Energy (DOE) to be analyzed in the System Plan, and the descriptions of the defined scenarios is due one year prior to issuing the System Plan.

The objective of the System Plan process is to promote mutual understanding between Ecology and the DOE of the issues, risks, and uncertainties surrounding the RPP mission in order to lay the foundation for future TPA renegotiations. Over several months, personnel from Ecology, the DOE, and Washington River Protection Solutions, LLC (WRPS), met on a regular basis to develop the scenarios to be presented in SP8. The strategy employed in this revision includes:

- Establishing a Baseline Case that reflects the best estimate of how the mission is thought to proceed given current conditions, constraints, and assumptions (Scenario 1).
- Defining alternative scenarios that address known risks and uncertainties to compare to the Baseline Case and understanding the impacts to the mission (Scenarios 3, 7, and 11).
- Defining alternative scenarios that implement initiatives to reduce risk, accelerate retrieval/treatment completion, or improve mission cost/performance over the Baseline Case (Scenarios 2, 4, 5, 6, 8, 9, and 10).

Eleven scenarios and their basic assumptions were developed, reviewed, and finalized. With limited resources, it is unlikely that all eleven scenarios can be fully defined and modeled. Therefore, the scenarios were ranked and prioritized as a team (see Table 1). The goal is to include all scenarios from both priority groups A and B in SP8. However, if needed, scenarios will be eliminated sequentially from the bottom up from priority group B. Priority group C will be included if time allows.

Table 1. List of Scenarios for System Plan, Revision 8, by Priority.

Priority Group	Scenario #	Scenario Name
Priority A	Scenario 1*	Baseline Case
	Scenario 2	Early Direct-Feed High-Level Waste (DFHLW)
	Scenario 3*	Early Direct-Feed High-Level Waste (DFHLW) with No Waste Treatment and Immobilization Plant (WTP) Pretreatment (PT)
	Scenario 4	Risk-Informed Single-Shell Tank (SST) Retrievals
	Scenario 5	Accelerated Retrieval Completion
	Scenario 6	Tri-Party Agreement (TPA) Compliant

Table 1. List of Scenarios for System Plan, Revision 8, by Priority.

Priority Group	Scenario #	Scenario Name
Priority B	Scenario 7*	Reduced Throughput
	Scenario 8	Early U-Farm Retrievals
	Scenario 9	Offsite Effluent Treatment
Priority C	Scenario 10	Retrieval Contingency
	Scenario 11	Direct-Feed High-Level Waste (DFHLW) (Grand Challenge)

* Indicates that an additional sensitivity case(s) has been selected which includes a minor analysis of a variation to the primary case.

Note: Some of the activities described herein may be subject to and/or undergo an analysis required by the *National Environmental Policy Act* (42 U.S.C. § 4321, et seq; NEPA). Additionally, some of the technologies described herein may be subject to and/or undergo analysis under DOE O 413.3B, *Program and Project Management for the Acquisition of Capital Assets*. They are included within this document for planning purposes only, not for decisional purposes, which would be conducted following the NEPA and/or DOE O 413.3B process.

1.2 TERMINOLOGY

Several concepts have been defined below to clarify the intent of the system planning process that will facilitate understanding the relationships between the selected scenarios. The following terminology and guidelines are being adopted for purposes of SP8.

- **Scenario/Case** – A scenario/case is defined as a set of assumptions and/or success criteria intended to be used in the system planning process. Technical assumptions and/or success criteria are defined and used as input parameters for modeling or performing calculations. In the event that a case does not meet the success criteria or other stated objectives, the reasons will be identified and documented, as appropriate.
- **Sensitivity Scenario/Case** – A sensitivity scenario/case is a secondary scenario/case (based off a primary scenario/case) in which limited model parameter(s) or sequence of events are altered in order to identify the impact of those changes on other system parameters. Examples include increasing or decreasing expected WTP melter capacities or changing a glass model.

A description of the objective and case-specific key assumptions for each scenario are presented in Section 2.0.

1.3 HIERARCHY OF ASSUMPTIONS

The assumptions used in the system planning effort form a hierarchy, from upper-level assumptions regarding the purpose and intent of a case, down to detailed modeling assumptions and programming techniques. The top tier of this hierarchy is established by this paper and are intended to satisfy the M-062-40 milestone for selecting the scenarios including the objective and key assumptions for each scenario. These two elements are:

- **Selected Scenarios** – This element includes the name and objective/purpose of each scenario as established and agreed to in this document.
- **Key Assumptions** – This element includes the underlying common (Baseline Case assumptions) and scenario-specific assumptions needed to define and distinguish each case in sufficient detail to begin to prepare detailed assumptions in the next steps following the agreement to the selected scenarios.

The next elements (to follow the "Selected Scenarios" process) are part of routine System Planning and Modeling efforts and are comprised of:

- **Detailed Modeling Assumptions** – Detailed base modeling assumptions are documented in the most current model/software requirements document. The scenario-specific assumptions will be developed using the most current Mission Analysis Information Services process and procedures. Additional detail is provided in Section 5.0, Methodology. This process provides adequate communication between the customer, Subject Matter Expert, and the Modeler to develop the detailed modeling assumptions needed to model or perform necessary calculations for each scenario.
- **Programming Techniques** – Programming techniques involve minor manipulations of the detailed elements of the model software necessary to ensure the model is able to meet the key and detailed modeling assumptions defined for each scenario.

1.4 BRIEF SYSTEM DESCRIPTIONS

The key assumptions presented in this document are organized into categories based on the aspect of the model to which they pertain. The categories are the same for each scenario, and consist of the following:

- **SST Retrievals** – Assumptions related to retrieving SSTs.
- **DST Operations** – Assumptions pertaining to the operation and configuration of double-shell tanks (DSTs), including identifying functionality performed by DSTs and mitigating actions associated with DSTs.
- **242-A Evaporator** – Assumptions related to operating the 242-A Evaporator.
- **LAWPS** – Assumptions related to operating the Low-Activity Waste Pretreatment System (LAWPS) and direct-feed low-activity waste (DFLAW) operations.
- **WTP PT** – Assumptions pertaining to the startup and operation of the WTP PT Facility.
- **WTP HLW** – Assumptions pertaining to the startup and operation of the WTP High-Level Waste (HLW) Vitrification Facility.
- **WTP LAW** – Assumptions pertaining to the startup and operation of the WTP Low-Activity Waste (LAW) Vitrification Facility.
- **CH-TRU** – Assumptions pertaining to the startup and operation of a supplemental contact-handled transuranic (CH-TRU) processing facility that would receive waste from SSTs containing potential CH-TRU waste.

- **LERF/ETF** – Assumptions pertaining to routing effluents and associated operations performed by the Liquid Effluent Retention Facility (LERF)/Effluent Treatment Facility (ETF).
- **EMF** – Assumptions regarding the startup and operation of the Effluent Management Facility (EMF) during DFLAW operations.
- **WRF** – Assumptions pertaining to the startup and configuration of the Waste Receiving Facilities (WRFs).
- **TWCSF** – Assumptions pertaining to the startup and operation of the Tank Waste Characterization and Staging Facility (TWCSF).
- **SLAW** – Assumptions regarding the startup and operation of the supplemental low-activity waste (SLAW) facility.
- **Glass Formulation Model** – Identification of the glass formulation models used to predict the resulting LAW and HLW glass loading and compositions based on waste feed delivered to the WTP.

2.0 SCENARIOS/CASES

The scenarios selected and defined for SP8 are summarized in this section. In addition, Figure 1 and Table 2 show the interrelationships between the cases and the flowdown of assumptions for scenario development. Key assumptions for Scenarios 2 through 11 in Table 2 are represented as major changes from assumptions in the Baseline Case as shown in Scenario 1. Unless otherwise noted in Table 2, cost profiles will be performed for the scenario.

Figure 1. The Relationships of System Plan, Revision 8, Scenarios.

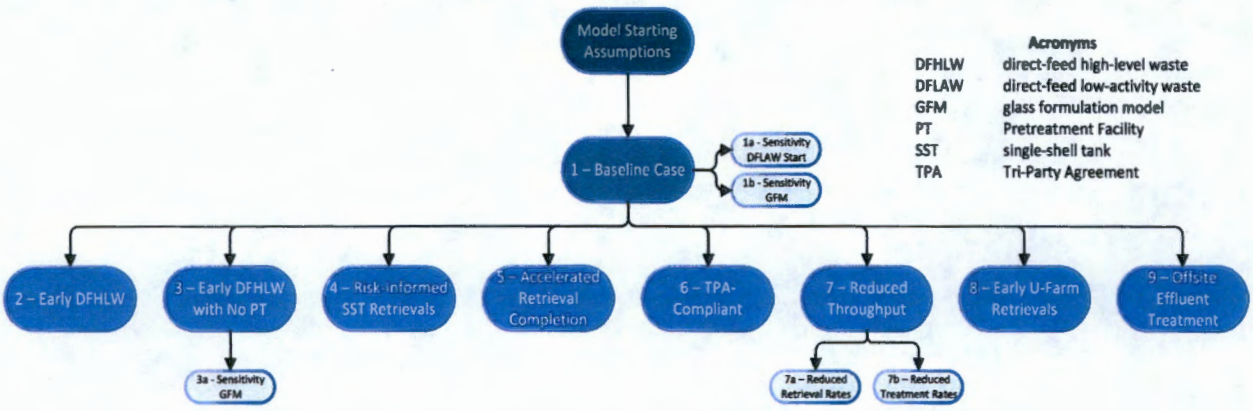

Table 2. System Plan, Revision 8, Scenarios Summary.

Scenario #	Scenario Name	Key Assumptions
Scenario 1	Baseline Case	• WTP PT/HLW/LAW aligned with 2:08-cv-05085-RMP, *State of Washington v. DOE* (Amended Consent Decree) • SST retrievals per current plan (SVF-1647, "SVF-1647 Rev 6 Calculation of SST Retrieval Volumes and Durations.xlsx") • DFLAW operations starting 12/31/2023 • DOE 2013 Glass Formulation Models (PNNL-22631, *Glass Property Models and Constraints for Estimating the Glass to be Produced at Hanford by Implementing Current Advanced Glass Formulation Efforts*)
Scenario 1a	Baseline Case Early DFLAW Sensitivity	• Key assumptions same as Scenario 1 – Baseline Case, except o DFLAW operations starting 12/31/2021 • No cost analysis
Scenario 1b	Baseline Case 2016 GFM Sensitivity	• Key assumptions same as Scenario 1 – Baseline Case, except o DOE 2016 Glass Formulation Models (reference TBD) • No cost analysis
Scenario 2	Early DFHLW Scenario	• DFHLW operations starting 12/31/2024, offgas effluent returned to tank farms (unevaporated) • No supplemental potential CH-TRU processing • Normal WTP operations beginning 12/31/2033

Table 2. System Plan, Revision 8, Scenarios Summary.

Scenario #	Scenario Name	Key Assumptions
Scenario 3	Early DFHLW with No PT Scenario	• DFHLW operations starting 12/31/2024 • No supplemental potential CH-TRU processing and no SLAW treatment • No WTP PT Facility • Management of HLW offgas in the TWCSF (evaporator) • DOE 2013 Glass Formulation Models
Scenario 3a	Early DFHLW with No PT 2016 GFM Sensitivity	• Key assumptions same as Scenario 3 – Early DFHLW with No PT, except o DOE 2016 Glass Formulation Models • No cost analysis
Scenario 4	Risk-Informed SST Retrievals Scenario	• Forty-Nine SSTs (including 11 tanks containing potential CH-TRU) not retrieved due to having less Ci than the residual left in SST 241-C-106 (2% of remaining SST Ci inventory in total)
Scenario 5	Accelerated Retrieval Completion Scenario	• New DSTs available June 2028, additional new DSTs every 5 years thereafter, as needed, to complete all SST retrievals by June 2047
Scenario 6	TPA-Compliant Scenario	• Calculate yearly throughput through WTP/SLAW to treat all waste by the TPA milestone date (2047) assuming Amended Consent Decree start dates • Calculate the retrievals/year required to retrieve all SSTs by the TPA milestone date (2040) as well as the number of new DSTs (starting in 2028) and yearly 242-A Evaporator waste volume reduction (WVR) that would be required • No cost analysis
Scenario 7	Reduced Throughput Scenario	• Evaluate the impacts of the combined effects of both reduced retrieval rates and reduced treatment rates. • Increase SST retrieval durations based on 241-C Tank Farm actuals (2.5x multiplier on Baseline Case durations except 241-A/AX Tank Farms) • Decrease WTP (PT, HLW, LAW) and SLAW TOE to 50%
Scenario 7a	Reduced Throughput – Reduced Retrieval Rates Only Sensitivity	• Key assumptions same as Scenario 7 – Reduced Throughput, except o Evaluate reduced retrieval rates only • No cost analysis
Scenario 7b	Reduced Throughput – Reduced Treatment Rates Only Sensitivity	• Key assumptions same as Scenario 7 – Reduced Throughput, except o Evaluate reduced treatment rates only • No cost analysis
Scenario 8	Early U-Farm Retrievals Scenario	• Retrieve 241-U Tank Farm SSTs as next farm after 241-A/AX Tank Farms instead of 241-S/SX Tank Farms

Table 2. System Plan, Revision 8, Scenarios Summary.

Scenario #	Scenario Name	Key Assumptions
Scenario 9	Offsite Effluent Treatment Scenario	• Send LAW/SLAW offgas effluent offsite for treatment rather than recycling – whole mission • Treated effluent disposed at the Integrated Disposal Facility (IDF) or elsewhere • EMF operates for whole mission
Scenario 10	Retrieval Contingency Scenario	• New DSTs available June 2028 with additional new DSTs every five years thereafter as needed to maintain the Baseline Case retrieval completion date (TBD) • Five-year delay to DFLAW, WTP PT, and HLW from Baseline Case
Scenario 11	DFHLW (Grand Challenge) Scenario	• Direct-feed HLW from TWCSF to WTP HLW Vitrification – whole mission • WTP HLW startup with WTP PT • WTP PT startup as liquids only facility – handles LAW feed and offgas from HLW/LAW vitrification • Reduced/eliminated SLAW capacity (due to not leaching) (TBD) • HLW solids washing (decant)/concentration in TWCSF

2.1 SCENARIO 1 – BASELINE CASE

Objective: Evaluate the RPP mission as it is currently planned/thought to proceed and derive estimated retrieval and treatment completion dates utilizing the bounding dates of the Amended Consent Decree with a sensitivity case that starts DFLAW processing on the more aggressive ORP target date. Demonstrate ability to be compliant with the Amended Consent Decree and the TPA excluding the two dates the case seeks to define.

	Baseline Case Key Model Assumptions
SST Retrievals	• 241-C-105 completed no later than 12/31/2017. • Use 241-A/AX Farm Project and Multi-Year Operating Plan (MYOP)-based schedule for retrieval early start dates. • 241-AX-102 and 241-AX-104 completed by 09/30/2018. Remaining 241-A/AX Tank Farms complete by 03/31/2024 (if possible, 241-A-103 within same time frame or as soon as practical based on DST space). • 241-A/AX Tank Farms' minimum retrieval duration shall be 1.5x that identified in SVF-1647. All remaining retrieval minimums as specified in SVF-1647. • Start retrieving 241-S/SX Tank Farms as the next retrievals after 241-A/AX Tank Farms with the goal of continuity of SST retrievals. • Two simultaneous retrievals each in East and West Area (four total). • Supernatant and slurry cross-site transfer lines available to support retrievals in 241-S/SX Tank Farms.
DST Operations	• 1.265 Mgal of emergency space. • 241-AY-102 sludge retrieved to 241-AP-102 no later than 03/04/2017. • Condition supernatant waste for LAWPS feed. • Management of cesium eluate within DST system. • Near-term transfers (and retrievals) shall be consistent with MYOP process assumptions. • Perform Group A mitigation for 241-AN-104 and 241-SY-103 after 241-A/AX retrievals and before beginning 241-S/SX retrievals. • Increase solids limit of 241-SY-102 and 241-SY-103 to 200 in. during retrievals in 241-S/SX Tank Farms.
242-A Evaporator	• Support SST retrievals. • 180-day continuous operational limit. • 90-day sampling time per campaign (60 days post-DFLAW hot start).

LAWPS	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day."
	• **Operational on 10/01/2023**
	  o Directly fed to WTP LAW
	  o Fed from 241-AP-107, cesium eluate to 241-AW-106
	  o Updated ion-exchange (IX) elution basis.
	• Augment WTP PT Facility for balance of mission.
	• Have sufficient capacity to maintain WTP LAW Vitrification production rates during DFLAW.
	• Quantify LAWPS contribution to LAW feed after WTP PT Facility startup.

WTP PT	The following assumptions support completion of PT Facility Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce high-level waste glass at an average rate of at least 4.2 Metric Tons of Glass (MTG)/day, and low-activity waste glass at an average rate of at least 21 MTG/day."
	• **Operational by 12/31/2033**
	  o Fed from TWCSF
	  o Feeds WTP LAW, WTP HLW, and SLAW
	  o Handles recycle of secondary liquid waste from LAW and HLW.

WTP HLW	The following assumptions support completion of HLW Construction Substantially Complete, HLW Hot Commissioning Complete, and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce high-level waste glass at an average rate of at least 4.2 Metric Tons of Glass (MTG)/day..." • **Construction Substantially Complete by 12/31/2030.** • **Operational on 12/31/2033.** • Ramp up: 12/31/**2033** 3.0 MTG/day 12/31/**2034** 4.0 MTG/day 09/30/**2036** 4.2 MTG/day 12/31/**2038** 5.25 MTG/day.
WTP LAW	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational on 12/31/2023.** • Ramp up (hot commissioning will not specifically be modeled): 12/31/**2023** 9.0 MTG/day 07/31/**2024** 18.0 MTG/day 07/31/**2025** 21.0 MTG/day. • Fed by LAWPS until 11/30/2033.
CH-TRU	• Potential CH-TRU waste processing operational after retrievals of 241-A/AX Tank Farms. **(Exact date to be determined based on budget constraint analysis, since budget is the only constraint that affects the start date.)**
LERF/ETF	• Upgrades to treat variable secondary liquid wastes (242-A Evaporator condensate, IDF leachate, Environmental Restoration and Disposal Facility (ERDF) leachate, EMF/WTP condensates, and caustic scrubber). • Fed with continuous piping. • Secondary solid waste (cast stone) to IDF.
EMF	• Concentrate target 1.1 SpG (volume ratio not to exceed 18:1…feed to bottoms). • Secondary liquid waste (plant wash, submerged bed scrubber [SBS], wet electrostatic precipitator [WESP]) concentrate will be recycled to WTP LAW Vitrification (85%) and tank farms (15%). • Corrosion control based on SRNL-STI-2015-00506, *SRNL Report for the Tank Waste Disposition Integrated Flowsheet: Corrosion Testing.* • Caustic scrubber by-pass directly to LERF/ETF. • Only operates during DFLAW.
WRFs	• Waste Receiving Facilities (WRFs) available six months before needed. **(Exact dates to be determined by modeling, based on DST space available to start retrievals in B and T Complexes.)** • Six 150 kgal tanks.
TWCSF	• Operational 06/30/2032 (18 months prior to hot commissioning of the WTP HLW Vitrification Facility). • Stage, mix, and sample waste to meet WTP PT waste acceptance criteria (WAC) (190-day sampling time) per 24590-WTP-ICD-MG-01-019, *ICD 19 – Interface Control Document for Waste Feed.* • Six 500 kgal tanks.
SLAW	• **SLAW start date, and the average and surge capacity required to ensure LAW is not limiting treatment, will be provided as a model output.**
Glass Formulation Model	• DOE 2013 LAW Glass Formulation Model. • DOE 2013 HLW Glass Formulation Model.

2.2 SCENARIO 1A – BASELINE CASE SENSITIVITY – EARLIER DIRECT-FEED LOW-ACTIVITY WASTE START

Objective: Determine the impact to the SP8 Baseline Case with DFLAW starting in 2021.

	Baseline Case Early DFLAW Sensitivity Key Assumptions (where different from the Baseline Case)
SST Retrievals	• Same as Baseline Case.
DST Operations	• Same as Baseline Case.
242-A Evaporator	• Same as Baseline Case.
LAWPS	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational on 10/01/2021** o Directly fed to WTP LAW o Fed from 241-AP-107, cesium eluate to 241-AW-106 o Updated IX elution basis. • Augment WTP PT Facility for balance of mission. • Have sufficient capacity to maintain WTP LAW Vitrification production rates during DFLAW. • Quantify LAWPS contribution to LAW feed after WTP PT Facility startup.
WTP PT	• Same as Baseline Case.
WTP HLW	• Same as Baseline Case.
WTP LAW	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational on 12/31/2021.** • Ramp up (hot commissioning will not specifically be modeled) 12/31/**2021** 9.0 MTG/day 07/31/**2022** 18.0 MTG/day 07/31/**2023** 21.0 MTG/day. • Fed by LAWPS until 11/30/2033.
CH-TRU	• Same as Baseline Case.
LERF/ETF	• Same as Baseline Case.
EMF	• Same as Baseline Case.
WRFs	• Same as Baseline Case.
TWCSF	• Same as Baseline Case.
SLAW	• Same as Baseline Case.
Glass Formulation Model	• Same as Baseline Case.

2.3 SCENARIO 1B – BASELINE CASE SENSITIVITY – 2016 GLASS FORMULATION MODEL

Objective: Determine the impact to the SP8 Baseline Case using the 2016 Glass Formulation Models.

	Baseline Case 2016 GFM Sensitivity Key Assumptions (where different from the Baseline Case)
SST Retrievals	• Same as Baseline Case.
DST Operations	• Same as Baseline Case.
242-A Evaporator	• Same as Baseline Case.
LAWPS	• Same as Baseline Case.
WTP PT	• Same as Baseline Case.
WTP HLW	• Same as Baseline Case.
WTP LAW	• Same as Baseline Case.
CH-TRU	• Same as Baseline Case.
LERF/ETF	• Same as Baseline Case.
EMF	• Same as Baseline Case.
WRFs	• Same as Baseline Case.
TWCSF	• Same as Baseline Case.
SLAW	• Same as Baseline Case.
Glass Formulation Model	• DOE 2016 LAW Glass Formulation Model. • DOE 2016 HLW Glass Formulation Model.

2.4 SCENARIO 2 – EARLY DIRECT-FEED HIGH-LEVEL WASTE

Objective: Calculate the time necessary to treat LAW streams and HLW streams in quantities as outlined in the Amended Consent Decree with the exception of DFHLW starting initial operations nine years earlier (2027) than outlined in the Amended Consent Decree. Demonstrate ability of SST/DST/WTP systems to maintain waste movement throughout the entire system, and account for any delays in waste movement through any portion of the entire system.

	Early DFHLW Scenario Key Assumptions (where different from the Baseline Case)
SST Retrievals	• Modify retrieval sequence to support DFHLW needs. • Retrieve as DST space allows during DFHLW. (DST space will be prioritized to support DFHLW treatment until WTP PT Facility startup, with SST retrievals being reduced or completely deferred to accommodate.)
DST Operations	• Support early DFHLW feed to TWCSF and management of HLW offgas effluent stream. • Send nominally 10 wt% solids HLW feed batches to the TWCSF. • Utilize LAWPS Cs eluate for mobilizing solids, when available. • The selection of HLW feed to be sent to the TWCSF shall be left to model discretion after the hot commissioning waste is sent from 241-AP-102 (target high Ci tanks first).
242-A Evaporator	• Provide necessary support to manage DFLAW and DFHLW returns to the DST system.

LAWPS	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day."
	• **Operational on 10/01/2023**
	  o Directly feed to WTP LAW
	  o Feed from 241-AP-107; cesium eluate to 241-AW-106
	  o Updated IX-elution basis.
	• Shut down permanently upon completion of DFLAW (11/30/2033).
	• Have sufficient capacity to maintain WTP LAW Vitrification Facility production rates during DFLAW.

WTP PT	• Same as Baseline Case

WTP HLW	The following assumptions support completion of HLW Construction Substantially Complete, HLW Hot Commissioning Complete, and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce high-level waste glass at an average rate of at least 4.2 Metric Tons of Glass (MTG)/day..."
	• Directly fed by TWCSF until 11/30/2033.
	• **Operational on 12/31/2024.**
	• Ramp up:
	  12/31/2024 3.0 MTG/day
	  12/31/2025 4.0 MTG/day
	  09/30/2027 4.2 MTG/day
	  12/31/2029 5.25 MTG/day.
	• Offgas effluent returned to the tank farms until 12/31/2033.

WTP LAW	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day."
	• **Operational 12/31/2023.**
	• Ramp up (hot commissioning will not specifically be modeled):
	  12/31/**2023** 9.0 MTG/day
	  07/31/**2024** 18.0 MTG/day
	  09/30/**2025** 21.0 MTG/day.
	• Fed by LAWPS until 11/30/2033.

CH-TRU	• No potential CH-TRU waste processing operations. (Potential CH-TRU SSTs will be retrieved to DSTs and treated at the WTP).
LERF/ETF	• Same as Baseline Case.
EMF	• Same as Baseline Case.
WRFs	• Same as Baseline Case.
TWCSF	• Operational 06/30/2022 (18 months prior to hot commissioning of the WTP HLW Vitrification Facility). • Concentrate waste during DFHLW (target 15-20 wt% solids, bulk SpG <1.5).
SLAW	• **SLAW start date and capacity may be modified if LAW immobilization is found to drive waste treatment rates.**
Glass Formulation Model	• Same as Baseline Case.

2.5 SCENARIO 3 – EARLY DIRECT-FEED HIGH-LEVEL WASTE WITH NO PRETREATMENT

Objective: Calculate the time necessary to treat LAW streams and HLW streams in quantities as outlined in the Amended Consent Decree for the duration of the mission; however, assume no WTP PT Facility is available and DFHLW starting initial operations nine years earlier (2027) than the Amended Consent Decree. Demonstrate ability of SST/DST/WTP systems to maintain waste movement throughout the entire system, and account for any delays in waste movement through any portion of the entire system.

	Early DFHLW with No PT Scenario Key Assumptions (where different from the Baseline Case)
SST Retrievals	• Five simultaneous retrievals each in East and West Area (10 total). • Modify retrieval sequence to support DFHLW needs.
DST Operations	• Support early DFHLW feed to TWCSF. • Send nominally 10 wt% solids HLW feed batches to the TWCSF. • Utilize LAWPS Cs eluate for mobilizing solids, when available. • The selection of HLW feed to be sent to the TWCSF shall be left to model discretion after the hot commissioning waste is sent from 241-AP-102 (target high Ci tanks first).
242-A Evaporator	• Same as Baseline Case.
LAWPS	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational on 10/01/2023** o Directly feed to WTP LAW Vitrification Facility o Feed from 241-AP-107; cesium eluate to 241-AW-106 o Updated IX-elution basis. • Provide feed to WTP LAW Vitrification Facility for the duration of the mission. • Have sufficient capacity to maintain WTP LAW Vitrification Facility production rates during DFLAW.
WTP PT	• No WTP PT Facility for the duration of the mission.
WTP HLW	The following assumptions support completion of HLW Construction Substantially Complete, HLW Hot Commissioning Complete, and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce high-level waste glass at an average rate of at least 4.2 Metric Tons of Glass (MTG)/day..." • **Operational on 12/31/2024.** • Ramp up: 12/31/**2024** 3.0 MTG/day 12/31/**2025** 4.0 MTG/day 09/30/**2027** 4.2 MTG/day 12/31/**2029** 5.25 MTG/day. • Offgas effluent returned to TWCSF for the duration of the mission. • Directly fed by TWCSF for the duration of the mission. • If LAW is found to limit mission, calculate the amount of Cs and associated HLW processing time that could be saved by using an alternate Cs treatment method.
WTP LAW	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational 12/31/2023.**

	• Ramp up (hot commissioning will not specifically be modeled): 12/31/**2023** 9.0 MTG/day 07/31/**2024** 18.0 MTG/day 09/30/**2025** 21.0 MTG/day. • Fed by LAWPS for the duration of the mission.
CH-TRU	• No potential CH-TRU waste processing operations. (Potential CH-TRU SSTs will be retrieved to DSTs and treated at the WTP.)
LERF/ETF	• Same as Baseline Case.
EMF	• Same as Baseline Case.
WRFs	• Same as Baseline Case.
TWCSF	• Operational 06/30/2022 (18 months prior to hot commissioning of the WTP HLW Vitrification Facility). • Directly feed to WTP HLW Vitrification Facility for duration of mission. • Concentrate waste feed (target 15-20 wt% solids, bulk SpG <1.5). • Receive and evaporate HLW offgas effluent (evaporator as clone of the WTP Feed Evaporation Process [FEP] system), blend concentrate with feed.
SLAW	• No SLAW treatment. If mission becomes LAW-limited, the potential improvement and required capacity of a SLAW capability will be calculated.
Glass Formulation Model	• Same as Baseline Case.

2.6 SCENARIO 3A – EARLY DIRECT-FEED HIGH-LEVEL WASTE WITH NO PRETREATMENT SENSITIVITY – 2016 GLASS FORMULATION MODEL

Objective: Determine the impact to the SP8 Early DFHLW with No PT scenario using the 2016 Glass Formulation Models.

	Early DFHLW with No PT 2016 GFM Sensitivity Key Assumptions (where different from the Baseline Case)
SST Retrievals	• Five simultaneous retrievals each in East and West Area (10 total). • Modify retrieval sequence to support DFHLW needs.
DST Operations	• Support early DFHLW feed to TWCSF. • Send nominally 10 wt% solids HLW feed batches to the TWCSF. • Utilize LAWPS Cs eluate for mobilizing solids, when available. • The selection of HLW feed to be sent to the TWCSF shall be left to model discretion after the hot commissioning waste is sent from 241-AP-102 (target high Ci tanks first).
242-A Evaporator	• Same as Baseline Case.
LAWPS	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational on 10/1/2023** o Directly feed to WTP LAW o Feed from 241-AP-107; cesium eluate to 241-AW-106 o Updated IX elution basis. • Provide feed to WTP LAW Vitrification Facility for the duration of the mission. • Have sufficient capacity to maintain WTP LAW Vitrification production rates during DFLAW.
WTP PT	• No Pretreatment Facility for the duration of the mission.
WTP HLW	The following assumptions support completion of HLW Construction Substantially Complete, HLW Hot Commissioning Complete, and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce high-level waste glass at an average rate of at least 4.2 Metric Tons of Glass (MTG)/day..." • **Operational on 12/31/2024.** • Ramp up: 12/31/**2024** 3.0 MTG/day 12/31/**2025** 4.0 MTG/day 09/30/**2027** 4.2 MTG/day 12/31/**2029** 5.25 MTG/day. • Offgas effluent returned to TWCSF for the duration of the mission. • Directly fed by TWCSF for the duration of the mission. If LAW is found to limit mission, calculate the amount of Cs and associated HLW processing time that could be saved by using an alternate Cs treatment method.
WTP LAW	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational 12/31/2023.** • Ramp up (hot commissioning will not specifically be modeled): 12/31/**2023** 9.0 MTG/day 07/31/**2024** 18.0 MTG/day 09/30/**2025** 21.0 MTG/day. • Fed by LAWPS for the duration of the mission.

CH-TRU	• No potential CH-TRU waste processing operations. (Potential CH-TRU SSTs will be retrieved to DSTs and treated at the WTP.)
LERF/ETF	• Same as Baseline Case.
EMF	• Same as Baseline Case.
WRFs	• Same as Baseline Case.
TWCSF	• Operational 06/30/2022 (18 months prior to HLW hot commissioning). • Directly feed to WTP HLW Vitrification Facility for duration of mission. • Concentrate waste feed (target 15-20 wt% solids, bulk SpG <1.5). • Receive and evaporate HLW offgas effluent (evaporator as clone of WTP FEP system), blend concentrate with feed.
SLAW	• No supplemental LAW treatment. If mission becomes LAW limited, the potential improvement and required capacity of a SLAW capability will be calculated.
Glass Formulation Model	• DOE 2016 LAW Glass Formulation Model. • DOE 2016 HLW Glass Formulation Model.

2.7 SCENARIO 4 – RISK-INFORMED SINGLE-SHELL TANK RETRIEVALS

Objective: Evaluate the associated cost and mission completion benefits of retrieving 98% of the remaining Hanford SST waste radioactivity (Ci) without retrieving all of the SSTs.

	Risk-Informed SST Retrievals Scenario Key Model Assumptions (where different from the Baseline Case)
SST Retrievals	• Thirty-eight SSTs will not be retrieved. These SSTs have less than or equal to the same amount of radioactivity that has already been left as residual in a retrieved tank (241-C-106).
DST Operations	• Same as Baseline Case.
242-A Evaporator	• Same as Baseline Case.
LAWPS	• Same as Baseline Case.
WTP PT	• Same as Baseline Case.
WTP HLW	• Same as Baseline Case.
WTP LAW	• Same as Baseline Case.
CH-TRU	• The 11 SSTs planned for CH-TRU processing will not be retrieved. These SSTs have less than or equal to the same amount of radioactivity that has already been left as residual in a retrieved tank (241-C-106).
LERF/ETF	• Same as Baseline Case.
EMF	• Same as Baseline Case.
WRFs	• **Start date(s) may shift forward to coincide with adjusted need date(s) based on faster SST farm completion.**
TWCSF	• Same as Baseline Case.
SLAW	• Same as Baseline Case.
Glass Formulation Model	• Same as Baseline Case.

2.8 SCENARIO 5 – ACCELERATED RETRIEVAL COMPLETION

Objective: Determine the number of new DSTs and their associated timing to complete all SST retrievals by June 2047.

	Accelerated Retrieval Completion Scenario Key Model Assumptions (where different from the Baseline Case)
SST Retrievals	• Same as Baseline Case.
DST Operations	• New DSTs [4-8] in operation June 2028 (based on decision to build in June 2020 and 8-year lead-time). • Additional DSTs [4-8] to be placed in operation every 5 years after June 2028 based on retrieval needs to complete all retrievals by June 2047. • New DSTs will have an operating volume of 1.25 Mgal each.
242-A Evaporator	• Same as Baseline Case.
LAWPS	• Same as Baseline Case.
WTP PT	• Same as Baseline Case.
WTP HLW	• Same as Baseline Case.
WTP LAW	•Same as Baseline Case.
CH-TRU	• Same as Baseline Case.
LERF/ETF	• Same as Baseline Case.
EMF	• Same as Baseline Case.
WRFs	• **Start dates will be shifted to accommodate the need dates for this particular scenario.**
TWCSF	• Same as Baseline Case.
SLAW	• Same as Baseline Case.
Glass Formulation Model	• Same as Baseline Case.

2.9 SCENARIO 6 – TRI-PARTY AGREEMENT COMPLIANT

Objective: Calculate the required retrieval/treatment capacities that would be needed to meet the TPA milestones for retrieving all SST waste (12/31/2040) and treating all tank waste (12/31/2047). Note: The SST retrieval calculation and tank waste treatment calculation will be evaluated separately.

	TPA-Compliant Scenario Key Assumptions (where different from the Baseline Case)
SST Retrievals	• Calculate average yearly retrieval rate (# SSTs/year, original SST volume/year, and as-retrieved volume/year) required to retrieve all remaining SSTs by 12/31/2040. • Assume remaining SST retrievals start 01/01/2018 and 241-C Tank Farm is completed by then.
DST Operations	• Calculate DST space required to receive/store SST retrieval waste on a post-evaporation basis assuming no credit for treatment. • Calculate DST space required to receive/store SST retrieval waste on a pre-evaporation basis assuming no credit for treatment. • Calculate aforementioned DST space requirements with credit for Baseline Case treatment throughput. • Assume additional DSTs are available in 2028, with each new DST adding 1.25 Mgal of storage capacity. • DSTs will be built in packs of four new tanks, based on need.
242-A Evaporator	• Calculate average evaporator WVR required/year to evaporate the SST waste.
LAWPS	• Not analyzed.
WTP PT	• Calculate average yearly throughput (in MT sodium and solids) required to treat all waste by 12/31/2047 assuming the Baseline Case start date (no ramp up).
WTP HLW	• Calculate the average daily throughput (in MT glass) required to treat all waste by 12/31/2047, assuming a nominal glass loading and start date per the Baseline Case (no ramp up).
WTP LAW	• Calculate the average daily throughput (in MT glass) required to treat all waste by 12/31/2047, assuming a nominal glass loading and start date per the Baseline Case (no ramp up).
CH-TRU	• Not analyzed (the Baseline Case shows that potential CH-TRU SSTs can be retrieved by 2040).
LERF/ETF	• Not analyzed.
EMF	• Not analyzed.
WRFs	• Not analyzed (space credited in DST space analysis for SST retrievals).
TWCSF	• Not analyzed (space credited in DST space analysis for SST retrievals).
SLAW	• Not analyzed (LAW treatment will be provided as a combined LAW/SLAW capacity starting on 12/31/2021).
Glass Formulation Model	• Nominal loading from Baseline Case glass formulation model results will be used to calculate required treatment capacity.

2.10 SCENARIO 7 – REDUCED THROUGHPUT

Objective: Evaluate the impacts of lower-than-anticipated waste retrieval and treatment rates on the mission and identify potential contingencies.

	Reduced Throughput Scenario Key Model Assumptions (where different from the Baseline Case)
SST Retrievals	• Retrieval rates for SSTs after 241-A/AX Tank Farms will be reduced (by incorporating the use of a 2.5x multiplier to increase all SST retrieval durations proportional to their durations given in SVF-1647).
DST Operations	• Same as Baseline Case.
242-A Evaporator	• Same as Baseline Case.
LAWPS	• Same as Baseline Case.
WTP PT	• Throughput adjusted to achieve an integrated plant availability of 50% (basis – Savannah River Defense Waste Processing Facility actuals – HLW-OVP-95-0102, *High-Level Waste System Plan*, and SRR-LWP-2009-00001, *Liquid Waste System Plan*).
WTP HLW	• Ramp rates adjusted to reach a maximum 50% TOE: 12/31/**2033** 2.15 MTG/day 12/31/**2034** 2.85 MTG/day 12/31/**2036** 3.00 MTG/day 12/31/**2038** 3.75 MTG/day.
WTP LAW	• Ramp rates adjusted to reach a maximum 50% TOE: 12/31/**2021** 6.5 MTG/day 07/31/**2022** 13.0 MTG/day 07/31/**2023** 15.0 MTG/day.
CH-TRU	• Potential CH-TRU SST retrieval durations will be increased by the same multiplier used for other SST retrieval durations.
LERF/ETF	• Same as Baseline Case.
EMF	• Same as Baseline Case.
WRFs	• **Start date(s) may be delayed to coincide with adjusted need date(s) based on slower waste treatment and slower completion of retrievals in 241-S/SX Tank Farms.**
TWCSF	• Same as Baseline Case.
SLAW	• Rate adjusted to a maximum 50% TOE: 12/31/2034 45.0 MTG/day.
Glass Formulation Model	• Same as Baseline Case.

2.11 SCENARIO 7A – REDUCED THROUGHPUT SENSITIVITY – REDUCED RETRIEVAL RATES ONLY

Objective: Determine the impacts to the SP8 Reduced Throughput scenario when only the retrieval rates are reduced.

	Reduced Throughput – Reduced Retrieval Rates Only Sensitivity Key Model Assumptions (where different from the Baseline Case)
SST Retrievals	• Retrieval rates for SSTs after A/AX farm will be reduced (by incorporating the use of a 2.5x multiplier to increase all SST retrieval durations proportional to their durations given in SVF-1647).
DST Operations	• Same as Baseline Case.
242-A Evaporator	• Same as Baseline Case.
LAWPS	• Same as Baseline Case.
WTP PT	• If the WTP PT Facility becomes limited by feed availability because of insufficient SST retrievals, it will be shut down for an extended period until the DSTs can be refilled with sufficient SST waste to sustain continued operations.
WTP HLW	• If the WTP HLW Vitrification Facility becomes limited by feed availability because of insufficient SST retrievals, it will be shut down for an extended period until the DSTs can be refilled with sufficient SST waste to sustain continued operations.
WTP LAW	• If the WTP LAW Vitrification Facility becomes limited by feed availability because of insufficient SST retrievals, it will be shut down for an extended period until the DSTs can be refilled with sufficient SST waste to sustain continued operations.
CH-TRU	• Potential CH-TRU SST retrieval durations will be increased by the same multiplier used for other SST retrieval durations.
LERF/ETF	• Same as Baseline Case.
EMF	• Same as Baseline Case.
WRFs	• **Start date(s) may be delayed to coincide with adjusted need date(s) based on slower completion of retrievals in S/SX Tank Farms.**
TWCSF	• Same as Baseline Case.
SLAW	• If the SLAW facility becomes limited by feed availability because of insufficient SST retrievals, it will be shut down for an extended period until the DSTs can be refilled with sufficient SST waste to sustain continued operations.
Glass Formulation Model	• Same as Baseline Case.

2.12 SCENARIO 7B – REDUCED THROUGHPUT SENSITIVITY – REDUCED TREATMENT RATES ONLY

Objective: Determine the impacts to the SP8 Reduced Throughput scenario when only the treatment rates are reduced.

	Reduced Throughput – Reduced Treatment Rates Only Sensitivity Key Model Assumptions (where different from the Baseline Case)
SST Retrievals	• Same as Baseline Case.
DST Operations	• Same as Baseline Case.
242-A Evaporator	• Same as Baseline Case.
LAWPS	• Same as Baseline Case.
WTP PT	• Throughput adjusted to achieve an integrated plant availability of 50% (basis – Savannah River DWPF actuals – HLW-OVP-95-0102 and SRR-LWP-2009-00001, Rev. 20).
WTP HLW	• Ramp rates adjusted to reach a maximum 50% TOE: 12/31/**2033** 2.15 MTG/day 12/31/**2034** 2.85 MTG/day 12/31/**2036** 3.00 MTG/day 12/31/**2038** 3.75 MTG/day.
WTP LAW	• Ramp rates adjusted to reach a maximum 50% TOE: 12/31/**2021** 6.5 MTG/day 07/31/**2022** 13.0 MTG/day 07/31/**2023** 15.0 MTG/day.
CH-TRU	• Same as Baseline Case.
LERF/ETF	• Same as Baseline Case.
EMF	• Same as Baseline Case.
WRFs	• Same as Baseline Case.
TWCSF	• Same as Baseline Case.
SLAW	• Rate adjusted to a maximum 50% TOE: 12/31/2034 45.0 MTG/day.
Glass Formulation Model	• Same as Baseline Case.

2.13 SCENARIO 8 – EARLY U-FARM RETRIEVALS

Objective: Determine impacts to overall SST retrieval completion metrics, DST space availability, glass loading, and associated treatment completion metrics when 241-U Tank Farm is retrieved as the next SSTs after the retrievals of 241-A/AX Tank Farms complete.

	Early U-Farm Retrieval Scenario Key Model Assumptions (where different from the Baseline Case)
SST Retrievals	• Start 241-U Tank Farm as the next retrievals after 241-A/AX Tank Farms with the goal of continuity of SST retrievals. • Supernatant and slurry cross-site transfer lines available to support retrievals of 241-U Tank Farm.
DST Operations	• Perform Group A mitigation for 241-AN-104 and 241-SY-103 after retrievals of 241-A/AX Tank Farms and before beginning retrievals of 241-U Tank Farm. • Increase solids limit of 241-SY-102 and 241-SY-103 to 200 in. during retrievals of 241-U Tank Farm.
242-A Evaporator	• Same as Baseline Case.
LAWPS	• Same as Baseline Case.
WTP PT	• Same as Baseline Case.
WTP HLW	• Same as Baseline Case.
WTP LAW	• Same as Baseline Case.
CH-TRU	• Same as Baseline Case.
LERF/ETF	• Same as Baseline Case.
EMF	• Same as Baseline Case.
WRFs	• **Start dates may be shifted based on need dates. (The DST space situation may differ from the Baseline Case based on the altered retrieval sequence.)**
TWCSF	• Same as Baseline Case.
SLAW	• Same as Baseline Case.
Glass Formulation Model	• Same as Baseline Case.

2.14 SCENARIO 9 – OFFSITE EFFLUENT TREATMENT

Objective: Evaluate the opportunity for treating of vitrification facility effluents offsite and disposing at the IDF, or other disposal site, to quantify the benefits to glass loading, DST space, and waste treatment throughput over the duration of the mission.

	Offsite Effluent Treatment Key Model Assumptions (where different from the Baseline Case)
SST Retrievals	• Same as Baseline Case.
DST Operations	• Same as Baseline Case.
242-A Evaporator	• Same as Baseline Case.
LAWPS	• Same as Baseline Case.
WTP PT	• Will not receive LAW offgas effluent. • Effluents normally sent to the LERF/ETF will continue to go there.
WTP HLW	• Same as Baseline Case.
WTP LAW	• SBS/WESP effluent will be routed to the EMF for the whole mission.
CH-TRU	• Same as Baseline Case.
LERF/ETF	• Same as Baseline Case.
EMF	• EMF will operate for the whole mission. • Secondary liquid waste concentrate will be sent offsite for treatment (no recycle/return to DSTs). Treated effluent will be disposed at IDF or other disposal facility.
WRFs	• Same as Baseline Case.
TWCSF	• Same as Baseline Case.
SLAW	• Same as Baseline Case; and • Secondary liquid effluent sent offsite for treatment (no internal recycle). Treated effluent disposed at IDF or other disposal facility.
Glass Formulation Model	• Same as Baseline Case.

2.15 SCENARIO 10 – RETRIEVAL CONTINGENCY

Objective: Determine the number of new DSTs and their associated timing to maintain the Baseline Case retrieval completion date (TBD based on modeling) assuming a five-year delay to DFLAW and WTP.

	Retrieval Contingency Scenario Key Model Assumptions (where different from the Baseline Case)
SST Retrievals	• Same as Baseline Case.
DST Operations	• New DSTs [4-8] in operation June 2028 (based on decision to build in June 2020 and 8-year lead-time). • **Additional DSTs [4-8] to be placed in operation every 5 years after June 2028 based on retrieval needs to meet the Baseline Case retrieval completion date (TBD).** • New DSTs will have an operating volume of 1.25 Mgal each.
242-A Evaporator	• Same as Baseline Case.
LAWPS	• **Operational on 10/01/2026.**
WTP PT	• **Operational by 12/31/2038.**
WTP HLW	• **Construction Substantially Complete by 12/31/2035.** • **Operational on 12/31/2038.** • Ramp up: 12/31/**2038** 3.0 MTG/day 12/31/**2039** 4.0 MTG/day 09/30/**2041** 4.2 MTG/day 12/31/**2043** 5.25 MTG/day.
WTP LAW	• **Operational on 12/31/2026.** • Ramp up (hot commissioning will not specifically be modeled): 12/31/**2026** 9.0 MTG/day 07/31/**2027** 18.0 MTG/day 07/31/**2028** 21.0 MTG/day.
CH-TRU	• Same as Baseline Case.
LERF/ETF	• Same as Baseline Case.
EMF	• Same as Baseline Case.
WRFs	• **Start dates will be shifted to accommodate the need dates for this particular scenario.**
TWCSF	• Operational 06/30/2037 (18 months prior to hot commissioning of the WTP HLW Vitrification Facility).
SLAW	• **Operational on:** **12/31/2039** 63.0 MTG/day. • **SLAW start date and capacity may be modified if LAW immobilization is found to drive waste treatment rates.**
Glass Formulation Model	• Same as Baseline Case.

2.16 SCENARIO 11 – DIRECT-FEED HIGH-LEVEL WASTE (GRAND CHALLENGE)

Objective: Reduce the schedule risk associated with the WTP PT Facility startup by providing a simplified PT flowsheet and a contingency to begin HLW vitrification. Evaluate reducing/eliminating the SLAW capacity by not leaching HLW solids. Additionally, provide greater decoupling of facilities, and simplify the TWCSF capability.

	DFHLW (Grand Challenge) Scenario Key Model Assumptions (where different from the Baseline Case)
SST Retrievals	• Same as Baseline Case.
DST Operations	• Same as Baseline Case; and, • Send nominally 10 wt% solids HLW feed batches to the TWCSF; • Utilize LAWPS Cs eluate for mobilizing solids, when available. • The selection of HLW feed to be sent to the TWCSF shall be left to model discretion after the hot commissioning waste is sent from 241-AP-102 (target high Ci tanks first).
242-A Evaporator	• Same as Baseline Case.
LAWPS	• Same as Baseline Case.
WTP PT	• Receives liquids only, supernate from DSTs and HLW melter offgas condensate from WTP HLW. • Feeds WTP LAW and SLAW. • Periodically returns filtered solids and Cs eluate to the TWCSF. • No caustic/oxidative leaching will be performed.
WTP HLW	• Fed directly from the TWCSF (whole mission).
WTP LAW	• Same as Baseline Case.
CH-TRU	• Same as Baseline Case.
LERF/ETF	• Same as Baseline Case.
EMF	• Same as Baseline Case.
WRFs	• Same as Baseline Case.
TWCSF	• Concentrate waste and feed directly to the WTP HLW Vitrification Facility (target 15-20 wt% solids, bulk SpG <1.5). • Receive Cs eluate and solids from WTP PT and blend with HLW feed. • Transfer decants and excess solutions to WTP PT.
SLAW	• **SLAW capacity may be reduced or eliminated based on the required demand estimated during modeling (TBD).**
Glass Formulation Model	• Same as Baseline Case.

3.0 SUCCESS CRITERIA

Many TPA milestones were modified and added during the negotiations that occurred from 2007 to 2009 and became effective under a series of TPA change control forms in conjunction with the Consent Decree in *State of Washington v. DOE*, Case No. 08-5085-FVS, as entered in federal court on October 25, 2010. That Consent Decree was recently amended as a result of a dispute and litigation between the parties resulting in many of the dates established by the 2010 Consent Decree being extended by the Court. (See Amended Consent Decree [March 11, 2016] and Second Amended Consent Decree [April 12, 2016], Case No. 2:08-CV-5085-RMP.)

Since the milestone dates in M-062-00 and other related TPA milestones were predicated on the milestones established in the 2010 Consent Decree, and those dates have been extended by the Court, DOE has determined that many of the existing interim milestones in M-062-00 and other series are at risk or cannot be met. The TPA milestones affected by the modified milestones in the 2016 Amended Consent Decree need to be adjusted accordingly.

DOE and Ecology have engaged in developing scenarios to be addressed in SP8, which is due to be issued in accordance with TPA Milestone M-062-40 by October 31, 2017. Many milestones used for success criteria in System Plans, Revision 6 and Revision 7, are either postponed or in the process of renegotiation. Both agencies will continue to amend the TPA using the processes and procedures outlined in the TPA. The analysis of these scenarios in SP8 will provide information useful for reevaluating, changing, or establishing new TPA milestones.

This revision of the System Plan will meet requirements of the TPA outlined for the document as described in Sections 4.0 and 5.0. The previous schedule-based success criteria are no longer required by the language of M-062-40. However, the dates have been included in development of the scenarios in SP8. Scenario 6 is a focused TPA-compliant case. Additionally, the Amended Consent Decree dates are identified in the various scenarios, notably Scenario 1 – Baseline Case, which is intended to be compliant with the 2016 Amended Consent Decree. Following renegotiations of milestones, the schedule-based success criteria will likely be reintroduced in the next revision of the System Plan developed for Milestone M-062-40.

4.0 CONTINGENCY PLANNING AND SENSITIVITY ANALYSIS

The M-062-40 milestone requires that the System Plan consider contingency measures to address certain risks as well as include sensitivity analyses of selected key assumptions. While the language of the milestone does not require that the contingency planning be based on cases or their sensitivity analyses, a number of the cases selected for SP8 were defined with contingency planning in mind (refer to Table 3~~Table 3~~). Of the scenarios, eight cases support contingency planning and three include sensitivity analyses.

Additionally, the risk management process used by the DOE Office of River Protection (ORP) includes contingency planning and incorporates key issues and uncertainties for discussion in each system plan. The results from these cases might identify new issues and uncertainties that may affect the risks and/or mitigating actions addressed in ORP's risk management process.

Table 3. Relationship to Contingency Planning and Sensitivity Analysis.

Scenario	Supports Contingency Planning		Supports Sensitivity Analysis
	Address Risks/ Uncertainties	Implement Initiatives to Reduce Risk or Improve Mission	
Scenario 1 – Baseline Case			✓
Scenario 2 – Early DFHLW		✓	
Scenario 3 – Early DFHLW with No PT	✓		✓
Scenario 4 – Risk-Informed SST Retrievals		✓	
Scenario 5 – Accelerated Retrieval Completion		✓	
Scenario 6 – TPA-Compliant		✓	
Scenario 7 – Reduced Throughput	✓		✓
Scenario 8 – Early U-Farm Retrievals		✓	
Scenario 9 – Offsite Effluent Treatment		✓	
Scenario 10 – Retrieval Contingency		✓	
Scenario 11 – DFHLW (Grand Challenge)	✓		

5.0 METHODOLOGY

The primary purpose of the System Plan is to describe to Ecology the disposition of all tank waste managed by ORP, including the retrieval of all tanks not addressed specifically by the Consent Decree, and the completion of the treatment mission. In addition, information on optimizations, technologies, and capabilities are updated every three years with and without consideration of difficulties, expenses, and impact on the overall cleanup mission. In regards to scenario evaluation, the System Plan will present for each scenario:

1. A system description for each system utilized in the planning;
2. A planning basis;
3. Descriptions of key issues, assumptions, and vulnerabilities and how they are addressed;
4. A sensitivity analysis of key assumption(s), if applicable;
5. Estimated cost and schedule impacts (for a limited subset of scenarios);
6. The identification of new equipment, technology, or actions needed;
7. The identification of issues, techniques, or technologies that need further evaluation in order to accelerate retrievals and treatment; and,
8. The impacts on closure activities.

Each System Plan is based upon a detailed set of key assumptions and success criteria, as previously defined. The primary set of assumptions defined for SP8 include those defined in the Baseline Case. Scenarios were developed from this foundation, and general assumptions, or distinguishing features, are identified for each scenario in Section 2.0.

During a series of meetings (Table 4~~Table 4~~) with Ecology, ORP, and WRPS, 12 scenarios were defined. One case was combined with Scenario 1 – Baseline Case by detailing additional output information. The 11 remaining scenarios identified in Section 2.0, were prioritized as a team. The prioritization was reviewed multiple times before a final decision was made. Priority group C (Table 1) will likely not be completed because of resource constraints. The goal is to complete priority groups A and B. If resources are constrained, cases will be eliminated from the bottom of group B first. Each scenario lists the objective/purpose, key assumptions (as compared to the Baseline Case), and any sensitivity analysis to be performed. Once this document is released, the assumptions are then further detailed by the System Planning and Modeling group of WRPS with a Subject Matter Expert and Modeler in an Information Request Form and, subsequently, incorporated into the model with a Model Scenario Request. The model results are analyzed and presented in the final version of SP8.

Table 4. Meeting Record. (4 Pages)

Date	Attendees	Comments
April 25, 2016	Kaylin Burnett, ORP Jim Alzheimer, Ecology Dan McDonald, Ecology Tom Crawford, WRPS Peter Empey, WRPS Sean Reaksecker, WRPS Samantha Tilanus, WRPS	The purpose of the meeting was to discuss the proposed meeting schedule, logistics, the System Plan requirements from the TPA, and what the final scenario selection will look like in order to meet milestone requirements.
May 2, 2016	Kaylin Burnett, ORP Albert Kruger, ORP Wendell Wrzesinski, ORP Jim Alzheimer, Ecology Dan McDonald, Ecology Stuart Arm, WRPS Tom Crawford, WRPS Peter Empey, WRPS Natalie Kirch, WRPS Sean Reaksecker, WRPS	The purpose of the meeting was to discuss the flowsheets and glass models such as waste feed delivery planning and waste loading.
May 9, 2016	Kaylin Burnett, ORP Billie Mauss, ORP Jim Alzheimer, Ecology Jeff Lyon, Ecology Dan McDonald, Ecology Tom Crawford, WRPS Sean Reaksecker, WRPS Samantha Tilanus, WRPS	The purpose of the meeting was to discuss the key modeling that has been performed since System Plan, Rev. 7.
May 16, 2016	Kaylin Burnett, ORP Jim Alzheimer, Ecology Dan McDonald, Ecology Tom Crawford, WRPS Peter Empey, WRPS Natalie Kirch, WRPS Sean Reaksecker, WRPS Samantha Tilanus, WRPS	The purpose of the meeting was to discuss the draft ORP "Baseline Case" model assumptions.
May 23, 2016	Kaylin Burnett, ORP Jim Alzheimer, Ecology Dan McDonald, Ecology Tom Crawford, WRPS Peter Empey, WRPS	The purpose of the meeting was to discuss the draft ORP "DFHLW" case model assumptions.

Table 4. Meeting Record. (4 Pages)

Date	Attendees	Comments
	Sean Reaksecker, WRPS Alec Schubick, WRPS Samantha Tilanus, WRPS	
May 26, 2016	Kaylin Burnett, ORP Reggie Eakins, Jr., ORP Jim Alzheimer, Ecology Jeff Lyon, Ecology Dan McDonald, Ecology Linda Bergmann, WRPS Tom Crawford, WRPS Sean Reaksecker, WRPS Samantha Tilanus, WRPS	The purpose of this meeting was to discuss the draft ORP "Reduced Throughput" case and draft "Offsite Effluent" case model assumptions.
June 2, 2016	Kaylin Burnett, ORP Reggie Eakins, Jr., ORP Billie Mauss, ORP Jim Alzheimer, Ecology Jeff Lyon, Ecology Jeanne Bernards, WRPS Tom Crawford, WRPS Brian Esparza, WRPS Sean Reaksecker, WRPS Samantha Tilanus, WRPS	The purpose of the meeting was to discuss the draft ORP "Risk-Based Retrieval" case model assumptions.
June 6, 2016	Kaylin Burnett, ORP Billie Mauss, ORP Jim Alzheimer, Ecology Jeff Lyon, Ecology Dan McDonald, Ecology Tom Crawford, WRPS Sean Reaksecker, WRPS Samantha Tilanus, WRPS	The purpose of the meeting was to discuss the first two draft Ecology cases' model assumptions.
June 9, 2016	Kaylin Burnett, ORP Jeff Lyon, Ecology Linda Bergmann, WRPS Tom Crawford, WRPS Brian Esparza, WRPS Sean Reaksecker, WRPS Samantha Tilanus, WRPS	The purpose of the meeting was to discuss the first three possible draft Ecology cases' model assumptions, including early U-Farm retrieval. Updates to previous cases were discussed such as the "Risk-Based Retrieval" case.

Table 4. Meeting Record. (4 Pages)

Date	Attendees	Comments
June 13, 2016	Kaylin Burnett, ORP Reggie Eakins, Jr., ORP Billie Mauss, ORP Jim Alzheimer, Ecology Dan McDonald, Ecology Tom Crawford, WRPS Brian Esparza, WRPS Sean Reaksecker, WRPS Samantha Tilanus, WRPS Dave Reinemann, WTP	The purpose of the meeting was to discuss the draft WTP Ecology cases' model assumptions. A draft hand-calculated "TPA-Compliant" case was also discussed.
June 20, 2016	Kaylin Burnett, ORP Billie Mauss, ORP Jim Alzheimer, Ecology Dan McDonald, Ecology Tom Crawford, WRPS Brian Esparza, WRPS Sean Reaksecker, WRPS Samantha Tilanus, WRPS Dave Reinemann, WTP	The purpose of the meeting was to continue the discussion on the draft WTP Ecology cases' model assumptions. The DRAFT Appendix B model starting assumptions were also discussed.
June 27, 2016	Kaylin Burnett, ORP Billie Mauss, ORP Jim Alzheimer, Ecology Jeff Lyon, Ecology Dan McDonald, Ecology Brian Esparza, WRPS Annamaria Praga, WRPS Sean Reaksecker, WRPS Samantha Tilanus, WRPS Dave Reinemann, WTP	The purpose of the meeting was to review the draft cases to-date and prioritize them.
July 7, 2016	Ryan Beach, ORP Kaylin Burnett, ORP Jeff Lyon, Ecology Dan McDonald, Ecology Tom Crawford, WRPS Brian Esparza, WRPS Samantha Tilanus, WRPS Tony Waldo, II, WRPS Dave Reinemann, WTP	The purpose of the meeting was to review the prioritization and managements' thoughts from both ORP and Ecology.

Table 4. Meeting Record. (4 Pages)

Date	Attendees	Comments
July 11, 2016	Billie Mauss, ORP Jeff Lyon, Ecology Dan McDonald, Ecology Tom Crawford, WRPS Sean Reaksecker, WRPS Samantha Tilanus, WRPS Tony Waldo, II, WRPS	The purpose of the meeting was to take one last look at the cases and the prioritization.
July 28, 2016	Ryan Beach, ORP Kaylin Burnett, ORP Jim Alzheimer, Ecology Jeff Lyon, Ecology Dan McDonald, Ecology Linda Bergmann, WRPS Tom Crawford, WRPS Samantha Tilanus, WRPS Dave Reinemann, WTP	The purpose of the meeting was to get a status update and obtain signatures on meeting packages 10 through 14. The DRAFT Selected Scenarios Document (RPP-RPT-59581) was discussed, as well as some open action items.
August 4, 2016	Jeff Lyon, Ecology Dan McDonald, Ecology Sean Reaksecker, WRPS Samantha Tilanus, WRPS Tony Waldo, II, WRPS Dave Reinemann, WTP	The purpose of the meeting was to get a status update and obtain updates on the DRAFT Selected Scenarios Document (RPP-RPT-59581).

6.0 REFERENCES

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PNNL-XXXXX, 2016, 2016 glass model reference pending release.

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SRR-LWP-2009-00001, 2016, *Liquid Waste System Plan*, Rev. 20, Savannah River Remediation, LLC, Aiken, South Carolina.

SVF-1647, 2015, "SVF-1647 Rev 6 Calculation of SST Retrieval Volumes and Durations.xlsx," Rev. 6, Washington River Protection Solutions, LLC, Richland, Washington.

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ATTACHMENT A – SCENARIO COMPARISON

Scenario / System	Scenario 1 – Baseline Case Key Model Assumptions	Scenario 1a – Baseline Case Early DFHLW Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 1b – Baseline Case 2016 GFM Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 2 – Early DFHLW Scenario Key Assumptions (where different from the Baseline Case)	Scenario 3 – Early DFHLW with No PT Scenario Key Assumptions (where different from the Baseline Case)	Scenario 3a – Early DFHLW with No PT 2016 GFM Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 4 – Risk-Informed SST Retrievals Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 5 – Accelerated Retrieval Completion Scenario Key Model Assumptions (where different from the Baseline Case)
SST Retrievals	• 241-C-105 completed no later than 12/31/2017. • Use 241-A/AX Farm Project and Multi-Year Operating Plan (MYOP)-based schedule for retrieval early start dates. • 241-AX-102 and 241-AX-104 completed by 09/30/2018. Remaining 241-A/AX Tank Farms complete by 03/31/2024 (if possible, 241-A-103 within same time frame or as soon as practical based on DST space). • 241-A/AX Tank Farms' minimum retrieval duration shall be 1.5x that identified in SVF-1647. All remaining retrieval minimums as specified in SVF-1647. • Start retrieving 241-S/SX Tank Farms as the next retrievals after 241-A/AX Tank Farms with the goal of continuity of SST retrievals. • Two simultaneous retrievals each in East and West Area (four total). • Supernatant and slurry cross-site transfer lines available to support retrievals in 241-S/SX Tank Farms.	• Same as Baseline Case.	• Same as Baseline Case.	• Modify retrieval sequence to support DFHLW needs. • Retrieve as DST space allows during DFHLW. (DST space will be prioritized to support DFHLW treatment until WTP PT Facility startup, with SST retrievals being reduced or completely deferred to accommodate.)	• Five simultaneous retrievals each in East and West Area (10 total). • Modify retrieval sequence to support DFHLW needs.	• Five simultaneous retrievals each in East and West Area (10 total). • Modify retrieval sequence to support DFHLW needs.	• Thirty-eight SSTs will not be retrieved. These SSTs have less than or equal to the same amount of radioactivity that has already been left as residual in a retrieved tank (241-C-106).	• Same as Baseline Case.
DST Operations	• 1.265 Mgal of emergency space. • 241-AY-102 sludge retrieved to 241-AP-102 no later than 03/04/2017. • Condition supernatant waste for Low-Activity Waste Pretreatment System (LAWPS) feed. • Management of cesium eluate within DST system. • Near-term transfers (and retrievals) shall be consistent with MYOP process assumptions. • Perform Group A mitigation for 241-AN-104 and 241-SY-103 after 241-A/AX retrievals and before beginning 241-S/SX retrievals. • Increase solids limit of 241-SY-102 and 241-SY-103 to 200 in. during retrievals in 241-S/SX Tank Farms.	• Same as Baseline Case.	• Same as Baseline Case.	• Support early DFHLW feed to TWCSF and management of HLW offgas effluent stream. • Send nominally 10 wt% solids HLW feed batches to the TWCSF. • Utilize LAWPS Cs eluate for mobilizing solids, when available. • The selection of HLW feed to be sent to the TWCSF shall be left to model discretion after the hot commissioning waste is sent from 241-AP-102 (target high Ci tanks first).	• Support early DFHLW feed to TWCSF. • Send nominally 10 wt% solids HLW feed batches to the TWCSF. • Utilize LAWPS Cs eluate for mobilizing solids, when available. • The selection of HLW feed to be sent to the TWCSF shall be left to model discretion after the hot commissioning waste is sent from 241-AP-102 (target high Ci tanks first).	• Support early DFHLW feed to TWCSF. • Send nominally 10 wt% solids HLW feed batches to the TWCSF. • Utilize LAWPS Cs eluate for mobilizing solids, when available. • The selection of HLW feed to be sent to the TWCSF shall be left to model discretion after the hot commissioning waste is sent from 241-AP-102 (target high Ci tanks first).	• Same as Baseline Case.	• New DSTs [4-8] in operation June 2028 (based on decision to build in June 2020 and 8-year lead-time). • Additional DSTs [4-8] to be placed in operation every 5 years after June 2028 based on retrieval needs to complete all retrievals by June 2047. • New DSTs will have an operating volume of 1.25 Mgal each.
242-A Evaporator	• Support SST retrievals. • 180-day continuous operational limit. • 90-day sampling time per campaign (60 days post-DFLAW hot start).	• Same as Baseline Case.	• Same as Baseline Case.	• Provide necessary support to manage DFLAW and DFHLW returns to the DST system.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.

Scenario / System	Scenario 1 – Baseline Case Key Model Assumptions	Scenario 1a – Baseline Case Early DFHLW Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 1b – Baseline Case 2016 GFM Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 2 – Early DFHLW Scenario Key Assumptions (where different from the Baseline Case)	Scenario 3 – Early DFHLW with No PT Scenario Key Assumptions (where different from the Baseline Case)	Scenario 3a – Early DFHLW with No PT 2016 GFM Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 4 – Risk-Informed SST Retrievals Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 5 – Accelerated Retrieval Completion Scenario Key Model Assumptions (where different from the Baseline Case)
LAWPS	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational on 10/01/2023** o Directly fed to WTP LAW o Fed from 241-AP-107, cesium eluate to 241-AW-106 o Updated ion-exchange (IX) elution basis. • Augment WTP PT Facility for balance of mission. • Have sufficient capacity to maintain WTP LAW Vitrification production rates during DFLAW. • Quantify LAWPS contribution to LAW feed after WTP PT Facility startup.	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational on 10/01/2021** o Directly fed to WTP LAW o Fed from 241-AP-107, cesium eluate to 241-AW-106 o Updated IX elution basis. • Augment WTP PT Facility for balance of mission. • Have sufficient capacity to maintain WTP LAW Vitrification production rates during DFLAW. • Quantify LAWPS contribution to LAW feed after WTP PT Facility startup.	• Same as Baseline Case.	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational on 10/01/2023** o Directly feed to WTP LAW o Feed from 241-AP-107; cesium eluate to 241-AW-106 o Updated IX-elution basis. • Shut down permanently upon completion of DFLAW (11/30/2033). • Have sufficient capacity to maintain WTP LAW Vitrification Facility production rates during DFLAW.	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational on 10/01/2023** o Directly feed to WTP LAW Vitrification Facility o Feed from 241-AP-107; cesium eluate to 241-AW-106 o Updated IX-elution basis. • Provide feed to WTP LAW Vitrification Facility for the duration of the mission. • Have sufficient capacity to maintain WTP LAW Vitrification Facility production rates during DFLAW.	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational on 10/1/2023** o Directly feed to WTP LAW o Feed from 241-AP-107; cesium eluate to 241-AW-106 o Updated IX elution basis. • Provide feed to WTP LAW Vitrification Facility for the duration of the mission. • Have sufficient capacity to maintain WTP LAW Vitrification production rates during DFLAW.	• Same as Baseline Case.	• Same as Baseline Case.
WTP PT	The following assumptions support completion of PT Facility Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce high-level waste glass at an average rate of at least 4.2 Metric Tons of Glass (MTG)/day, and low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational by 12/31/2033** o Fed from TWCSF o Feeds WTP LAW, WTP HLW, and SLAW o Handles recycle of secondary liquid waste from LAW and HLW.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• No WTP PT Facility for the duration of the mission.	• No Pretreatment Facility for the duration of the mission.	• Same as Baseline Case.	• Same as Baseline Case.

Scenario System	Scenario 1 – Baseline Case Key Model Assumptions	Scenario 1a – Baseline Case Early DFHLW Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 1b – Baseline Case 2016 GFM Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 2 – Early DFHLW Scenario Key Assumptions (where different from the Baseline Case)	Scenario 3 – Early DFHLW with No PT Scenario Key Assumptions (where different from the Baseline Case)	Scenario 3a – Early DFHLW with No PT 2016 GFM Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 4 – Risk-Informed SST Retrievals Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 5 – Accelerated Retrieval Completion Scenario Key Model Assumptions (where different from the Baseline Case)
WTP HLW	The following assumptions support completion of HLW Construction Substantially Complete, HLW Hot Commissioning Complete, and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce high-level waste glass at an average rate of at least 4.2 Metric Tons of Glass (MTG)/day..." • **Construction Substantially Complete by 12/31/2030.** • **Operational on 12/31/2033.** • Ramp up: 12/31/**2033** 3.0 MTG/day 12/31/**2034** 4.0 MTG/day 09/30/**2036** 4.2 MTG/day 12/31/**2038** 5.25 MTG/day.	• Same as Baseline Case.	• Same as Baseline Case.	The following assumptions support completion of HLW Construction Substantially Complete, HLW Hot Commissioning Complete, and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce high-level waste glass at an average rate of at least 4.2 Metric Tons of Glass (MTG)/day..." • Directly fed by TWCSF until 11/30/2033. • **Operational on 12/31/2024.** • Ramp up: 12/31/2024 3.0 MTG/day 12/31/2025 4.0 MTG/day 09/30/2027 4.2 MTG/day 12/31/2029 5.25 MTG/day. • Offgas effluent returned to the tank farms until 12/31/2033.	The following assumptions support completion of HLW Construction Substantially Complete, HLW Hot Commissioning Complete, and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce high-level waste glass at an average rate of at least 4.2 Metric Tons of Glass (MTG)/day..." • **Operational on 12/31/2024.** • Ramp up: 12/31/**2024** 3.0 MTG/day 12/31/**2025** 4.0 MTG/day 09/30/**2027** 4.2 MTG/day 12/31/**2029** 5.25 MTG/day. • Offgas effluent returned to TWCSF for the duration of the mission. • Directly fed by TWCSF for the duration of the mission. • If LAW is found to limit mission, calculate the amount of Cs and associated HLW processing time that could be saved by using an alternate Cs treatment method.	The following assumptions support completion of HLW Construction Substantially Complete, HLW Hot Commissioning Complete, and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce high-level waste glass at an average rate of at least 4.2 Metric Tons of Glass (MTG)/day..." • **Operational on 12/31/2024.** • Ramp up: 12/31/**2024** 3.0 MTG/day 12/31/**2025** 4.0 MTG/day 09/30/**2027** 4.2 MTG/day 12/31/**2029** 5.25 MTG/day. • Offgas effluent returned to TWCSF for the duration of the mission. • Directly fed by TWCSF for the duration of the mission. • If LAW is found to limit mission, calculate the amount of Cs and associated HLW processing time that could be saved by using an alternate Cs treatment method.	• Same as Baseline Case.	• Same as Baseline Case.

Scenario / System	Scenario 1 – Baseline Case Key Model Assumptions	Scenario 1a – Baseline Case Early DFHLW Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 1b – Baseline Case 2016 GFM Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 2 – Early DFHLW Scenario Key Assumptions (where different from the Baseline Case)	Scenario 3 – Early DFHLW with No PT Scenario Key Assumptions (where different from the Baseline Case)	Scenario 3a – Early DFHLW with No PT 2016 GFM Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 4 – Risk-Informed SST Retrievals Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 5 – Accelerated Retrieval Completion Scenario Key Model Assumptions (where different from the Baseline Case)
WTP LAW	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational on 12/31/2023.** • Ramp up (hot commissioning will not specifically be modeled): 12/31/**2023** 9.0 MTG/day 07/31/**2024** 18.0 MTG/day 07/31/**2025** 21.0 MTG/day. • Fed by LAWPS until 11/30/2033.	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational on 12/31/2021.** • Ramp up (hot commissioning will not specifically be modeled) 12/31/**2021** 9.0 MTG/day 07/31/**2022** 18.0 MTG/day 07/31/**2023** 21.0 MTG/day. • Fed by LAWPS until 11/30/2033.	• Same as Baseline Case.	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational 12/31/2023.** • Ramp up (hot commissioning will not specifically be modeled): 12/31/**2023** 9.0 MTG/day 07/31/**2024** 18.0 MTG/day 09/30/**2025** 21.0 MTG/day. • Fed by LAWPS until 11/30/2033.	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational 12/31/2023.** • Ramp up (hot commissioning will not specifically be modeled): 12/31/**2023** 9.0 MTG/day 07/31/**2024** 18.0 MTG/day 09/30/**2025** 21.0 MTG/day. • Fed by LAWPS for the duration of the mission.	The following assumptions support completion of LAW Hot Commissioning and Achieve Initial Plant Operations for the WTP as defined in the Amended Consent Decree, "Initial Plant Operations under this Decree is defined as, over a rolling period of at least 3 months leading to the milestone date [12/31/2036], operating the WTP to produce…low-activity waste glass at an average rate of at least 21 MTG/day." • **Operational 12/31/2023.** • Ramp up (hot commissioning will not specifically be modeled): 12/31/**2023** 9.0 MTG/day 07/31/**2024** 18.0 MTG/day 09/30/**2025** 21.0 MTG/day. • Fed by LAWPS for the duration of the mission.	• Same as Baseline Case.	• Same as Baseline Case.
CH-TRU	• Potential CH-TRU waste processing operational after retrievals of 241-A/AX Tank Farms. **(Exact date to be determined based on budget constraint analysis, since budget is the only constraint that affects the start date.)**	• Same as Baseline Case.	• Same as Baseline Case.	• No potential CH-TRU waste processing operations. (Potential CH-TRU SSTs will be retrieved to DSTs and treated at the WTP).	• No potential CH-TRU waste processing operations. (Potential CH-TRU SSTs will be retrieved to DSTs and treated at the WTP.)	• No potential CH-TRU waste processing operations. (Potential CH-TRU SSTs will be retrieved to DSTs and treated at the WTP.)	• The 11 SSTs planned for CH-TRU processing will not be retrieved. These SSTs have less than or equal to the same amount of radioactivity that has already been left as residual in a retrieved tank (241-C-106).	• Same as Baseline Case.
LERF/ETF	• Upgrades to treat variable secondary liquid wastes (242-A Evaporator condensate, IDF leachate, Environmental Restoration and Disposal Facility (ERDF) leachate, EMF/WTP condensates, and caustic scrubber). • Fed with continuous piping. • Secondary solid waste (cast stone) to IDF.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.

Scenario / System	Scenario 1 – Baseline Case Key Model Assumptions	Scenario 1a – Baseline Case Early DFHLW Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 1b – Baseline Case 2016 GFM Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 2 – Early DFHLW Scenario Key Assumptions (where different from the Baseline Case)	Scenario 3 – Early DFHLW with No PT Scenario Key Assumptions (where different from the Baseline Case)	Scenario 3a – Early DFHLW with No PT 2016 GFM Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 4 – Risk-Informed SST Retrievals Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 5 – Accelerated Retrieval Completion Scenario Key Model Assumptions (where different from the Baseline Case)
EMF	• Concentrate target 1.1 SpG (volume ratio not to exceed 18:1…feed to bottoms). • Secondary liquid waste (plant wash, submerged bed scrubber [SBS], wet electrostatic precipitator [WESP]) concentrate will be recycled to WTP LAW Vitrification (85%) and tank farms (15%). • Corrosion control based on SRNL-STI-2015-00506, *SRNL Report for the Tank Waste Disposition Integrated Flowsheet: Corrosion Testing*. • Caustic scrubber by-pass directly to Liquid Effluent Retention Facility (LERF)/Effluent Treatment Facility (ETF). • Only operates during DFLAW.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.
WRFs	• Waste Receiving Facilities (WRFs) available six months before needed. **(Exact dates to be determined by modeling, based on DST space available to start retrievals in B and T Complexes.)** • Six 150 kgal tanks.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• **Start date(s) may shift forward to coincide with adjusted need date(s) based on faster SST farm completion.**	• **Start dates will be shifted to accommodate the need dates for this particular scenario.**
TWCSF	• Operational 06/30/2032 (18 months prior to hot commissioning of the WTP HLW Vitrification Facility). • Stage, mix, and sample waste to meet WTP PT waste acceptance criteria (WAC) (190-day sampling time) per 24590-WTP-ICD-MG-01-019, *ICD 19 – Interface Control Document for Waste Feed*. • Six 500 kgal tanks.	• Same as Baseline Case.	• Same as Baseline Case.	• Operational 06/30/2022 (18 months prior to hot commissioning of the WTP HLW Vitrification Facility). • Directly feed to WTP HLW Vitrification Facility for duration of mission. • Concentrate waste feed (target 15-20 wt% solids, bulk SpG <1.5). • Receive and evaporate HLW offgas effluent (evaporator as clone of the WTP Feed Evaporation Process [FEP] system), blend concentrate with feed.	• Operational 06/30/2022 (18 months prior to hot commissioning of the WTP HLW Vitrification Facility). • Directly feed to WTP HLW Vitrification Facility for duration of mission. • Concentrate waste feed (target 15-20 wt% solids, bulk SpG <1.5). • Receive and evaporate HLW offgas effluent (evaporator as clone of the WTP Feed Evaporation Process [FEP] system), blend concentrate with feed.	• Operational 06/30/2022 (18 months prior to HLW hot commissioning). • Directly feed to WTP HLW Vitrification Facility for duration of mission. • Concentrate waste feed (target 15-20 wt% solids, bulk SpG <1.5). • Receive and evaporate HLW offgas effluent (evaporator as clone of WTP FEP system), blend concentrate with feed.	• Same as Baseline Case.	• Same as Baseline Case.
SLAW	• **SLAW start date, and the average and surge capacity required to ensure LAW is not limiting treatment, will be provided as a model output.**	• Same as Baseline Case.	• Same as Baseline Case.	• No SLAW treatment. If mission becomes LAW-limited, the potential improvement and required capacity of a SLAW capability will be calculated.	• No SLAW treatment. If mission becomes LAW-limited, the potential improvement and required capacity of a SLAW capability will be calculated.	• No supplemental LAW treatment. If mission becomes LAW limited, the potential improvement and required capacity of a SLAW capability will be calculated.	• Same as Baseline Case.	• Same as Baseline Case.

Scenario / System	Scenario 1 – Baseline Case Key Model Assumptions	Scenario 1a – Baseline Case Early DFHLW Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 1b – Baseline Case 2016 GFM Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 2 – Early DFHLW Scenario Key Assumptions (where different from the Baseline Case)	Scenario 3 – Early DFHLW with No PT Scenario Key Assumptions (where different from the Baseline Case)	Scenario 3a – Early DFHLW with No PT 2016 GFM Sensitivity Key Assumptions (where different from the Baseline Case)	Scenario 4 – Risk-Informed SST Retrievals Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 5 – Accelerated Retrieval Completion Scenario Key Model Assumptions (where different from the Baseline Case)
Glass Formulation Model	• DOE 2013 LAW Glass Formulation Model. • DOE 2013 HLW Glass Formulation Model.	• Same as Baseline Case.	• DOE 2016 LAW Glass Formulation Model. • DOE 2016 HLW Glass Formulation Model.	• Same as Baseline Case.	• Same as Baseline Case.	• DOE 2016 LAW Glass Formulation Model. • DOE 2016 HLW Glass Formulation Model.	• Same as Baseline Case.	• Same as Baseline Case.

Scenario / System	Scenario 6 – TPA-Compliant Scenario Key Assumptions (where different from the Baseline Case)	Scenario 7 – Reduced Throughput Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 7a – Reduced Throughput – Reduced Retrieval Rates Only Sensitivity Key Model Assumptions (where different from the Baseline Case)	Scenario 7b – Reduced Throughput – Reduced Treatment Rates Only Sensitivity Key Model Assumptions (where different from the Baseline Case)	Scenario 8 – Early U-Farm Retrieval Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 9 – Offsite Effluent Treatment Key Model Assumptions (where different from the Baseline Case)	Scenario 10 – Retrieval Contingency Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 11 – DFHLW (Grand Challenge) Scenario Key Model Assumptions (where different from the Baseline Case)
SST Retrievals	• Calculate average yearly retrieval rate (# SSTs/year, original SST volume/year, and as-retrieved volume/year) required to retrieve all remaining SSTs by 12/31/2040. • Assume remaining SST retrievals start 01/01/2018 and 241-C Tank Farm is completed by then.	• Retrieval rates for SSTs after 241-A/AX Tank Farms will be reduced (by incorporating the use of a 2.5x multiplier to increase all SST retrieval durations proportional to their durations given in SVF-1647).	• Retrieval rates for SSTs after A/AX farm will be reduced (by incorporating the use of a 2.5x multiplier to increase all SST retrieval durations proportional to their durations given in SVF-1647).	• Same as Baseline Case.	• Start 241-U Tank Farm as the next retrievals after 241-A/AX Tank Farms with the goal of continuity of SST retrievals. • Supernatant and slurry cross-site transfer lines available to support retrievals of 241-U Tank Farm.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.
DST Operations	• Calculate DST space required to receive/store SST retrieval waste on a post-evaporation basis assuming no credit for treatment. • Calculate DST space required to receive/store SST retrieval waste on a pre-evaporation basis assuming no credit for treatment. • Calculate aforementioned DST space requirements with credit for Baseline Case treatment throughput. • Assume additional DSTs are available in 2028, with each new DST adding 1.25 Mgal of storage capacity. • DSTs will be built on a module-premise (packs of four new tanks at a time), based on need.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Perform Group A mitigation for 241-AN-104 and 241-SY-103 after retrievals of 241-A/AX Tank Farms and before beginning retrievals of 241-U Tank Farm. • Increase solids limit of 241-SY-102 and 241-SY-103 to 200 in. during retrievals of 241-U Tank Farm.	• Same as Baseline Case.	• New DSTs [4-8] in operation June 2028 (based on decision to build in June 2020 and 8-year lead-time). • **Additional DSTs [4-8] to be placed in operation every 5 years after June 2028 based on retrieval needs to meet the Baseline Case retrieval completion date (TBD).** • New DSTs will have an operating volume of 1.25 Mgal each.	• Same as Baseline Case; and, • Send nominally 10 wt% solids HLW feed batches to the TWCSF; • Utilize LAWPS Cs eluate for mobilizing solids, when available. • The selection of HLW feed to be sent to the TWCSF shall be left to model discretion after the hot commissioning waste is sent from 241-AP-102 (target high Ci tanks first).
242-A Evaporator	• Calculate average evaporator WVR required/year to evaporate the SST waste.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.

System \ Scenario	Scenario 6 – TPA-Compliant Scenario Key Assumptions (where different from the Baseline Case)	Scenario 7 – Reduced Throughput Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 7a – Reduced Throughput – Reduced Retrieval Rates Only Sensitivity Key Model Assumptions (where different from the Baseline Case)	Scenario 7b – Reduced Throughput – Reduced Treatment Rates Only Sensitivity Key Model Assumptions (where different from the Baseline Case)	Scenario 8 – Early U-Farm Retrieval Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 9 – Offsite Effluent Treatment Key Model Assumptions (where different from the Baseline Case)	Scenario 10 – Retrieval Contingency Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 11 – DFHLW (Grand Challenge) Scenario Key Model Assumptions (where different from the Baseline Case)
LAWPS	• Not analyzed.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• **Operational on 10/01/2026.**	• Same as Baseline Case.
WTP PT	• Calculate average yearly throughput (in MT sodium and solids) required to treat all waste by 12/31/2047 assuming the Baseline Case start date (no ramp up).	• Throughput adjusted to achieve an integrated plant availability of 50% (basis – Savannah River Defense Waste Processing Facility actuals – HLW-OVP-95-0102, *High-Level Waste System Plan*, and SRR-LWP-2009-00001, *Liquid Waste System Plan*).	• If the WTP PT Facility becomes limited by feed availability because of insufficient SST retrievals, it will be shut down for an extended period until the DSTs can be refilled with sufficient SST waste to sustain continued operations.	• Throughput adjusted to achieve an integrated plant availability of 50% (basis – Savannah River DWPF actuals – HLW-OVP-95-0102 and SRR-LWP-2009-00001, Rev. 20).	• Same as Baseline Case.	• Will not receive LAW offgas effluent. • Effluents normally sent to the LERF/ETF will continue to go there.	• **Operational by 12/31/2038.**	• Receives liquids only, supernate from DSTs and HLW melter offgas condensate from WTP HLW. • Feeds WTP LAW and SLAW. • Periodically returns filtered solids and Cs eluate to the TWCSF. • No caustic/oxidative leaching will be performed.

Scenario / System	Scenario 6 – TPA-Compliant Scenario Key Assumptions (where different from the Baseline Case)	Scenario 7 – Reduced Throughput Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 7a – Reduced Throughput – Reduced Retrieval Rates Only Sensitivity Key Model Assumptions (where different from the Baseline Case)	Scenario 7b – Reduced Throughput – Reduced Treatment Rates Only Sensitivity Key Model Assumptions (where different from the Baseline Case)	Scenario 8 – Early U-Farm Retrieval Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 9 – Offsite Effluent Treatment Key Model Assumptions (where different from the Baseline Case)	Scenario 10 – Retrieval Contingency Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 11 – DFHLW (Grand Challenge) Scenario Key Model Assumptions (where different from the Baseline Case)
WTP HLW	• Calculate the average daily throughput (in MT glass) required to treat all waste by 12/31/2047, assuming a nominal glass loading and start date per the Baseline Case (no ramp up).	• Ramp rates adjusted to reach a maximum 50% TOE: 12/31/**2033** 2.15 MTG/day 12/31/**2034** 2.85 MTG/day 12/31/**2036** 3.00 MTG/day 12/31/**2038** 3.75 MTG/day.	• If the WTP HLW Vitrification Facility becomes limited by feed availability because of insufficient SST retrievals, it will be shut down for an extended period until the DSTs can be refilled with sufficient SST waste to sustain continued operations.	• Ramp rates adjusted to reach a maximum 50% TOE: 12/31/**2033** 2.15 MTG/day 12/31/**2034** 2.85 MTG/day 12/31/**2036** 3.00 MTG/day 12/31/**2038** 3.75 MTG/day.	• Same as Baseline Case.	• Same as Baseline Case.	• **Construction Substantially Complete by 12/31/2035.** • **Operational on 12/31/2038.** • Ramp up: 12/31/**2038** 3.0 MTG/day 12/31/**2039** 4.0 MTG/day 09/30/**2041** 4.2 MTG/day 12/31/**2043** 5.25 MTG/day.	• Fed directly from the TWCSF (whole mission).

Scenario / System	Scenario 6 – TPA-Compliant Scenario Key Assumptions (where different from the Baseline Case)	Scenario 7 – Reduced Throughput Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 7a – Reduced Throughput – Reduced Retrieval Rates Only Sensitivity Key Model Assumptions (where different from the Baseline Case)	Scenario 7b – Reduced Throughput – Reduced Treatment Rates Only Sensitivity Key Model Assumptions (where different from the Baseline Case)	Scenario 8 – Early U-Farm Retrieval Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 9 – Offsite Effluent Treatment Key Model Assumptions (where different from the Baseline Case)	Scenario 10 – Retrieval Contingency Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 11 – DFHLW (Grand Challenge) Scenario Key Model Assumptions (where different from the Baseline Case)
WTP LAW	• Calculate the average daily throughput (in MT glass) required to treat all waste by 12/31/2047, assuming a nominal glass loading and start date per the Baseline Case (no ramp up).	• Ramp rates adjusted to reach a maximum 50% TOE: 12/31/**2021** 6.5 MTG/day 07/31/**2022** 13.0 MTG/day 07/31/**2023** 15.0 MTG/day.	• If the WTP LAW Vitrification Facility becomes limited by feed availability because of insufficient SST retrievals, it will be shut down for an extended period until the DSTs can be refilled with sufficient SST waste to sustain continued operations.	• Ramp rates adjusted to reach a maximum 50% TOE: 12/31/**2021** 6.5 MTG/day 07/31/**2022** 13.0 MTG/day 07/31/**2023** 15.0 MTG/day.	• Same as Baseline Case.	• SBS/WESP effluent will be routed to the EMF for the whole mission.	• **Operational on 12/31/2026.** • Ramp up (hot commissioning will not specifically be modeled): 12/31/**2026** 9.0 MTG/day 07/31/**2027** 18.0 MTG/day 07/31/**2028** 21.0 MTG/day.	• Same as Baseline Case.
CH-TRU	• Not analyzed (the Baseline Case shows that potential CH-TRU SSTs can be retrieved by 2040).	• Potential CH-TRU SST retrieval durations will be increased by the same multiplier used for other SST retrieval durations.	• Potential CH-TRU SST retrieval durations will be increased by the same multiplier used for other SST retrieval durations.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.
LERF/ETF	• Not analyzed.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.

Scenario / System	Scenario 6 – TPA-Compliant Scenario Key Assumptions (where different from the Baseline Case)	Scenario 7 – Reduced Throughput Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 7a – Reduced Throughput – Reduced Retrieval Rates Only Sensitivity Key Model Assumptions (where different from the Baseline Case)	Scenario 7b – Reduced Throughput – Reduced Treatment Rates Only Sensitivity Key Model Assumptions (where different from the Baseline Case)	Scenario 8 – Early U-Farm Retrieval Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 9 – Offsite Effluent Treatment Key Model Assumptions (where different from the Baseline Case)	Scenario 10 – Retrieval Contingency Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 11 – DFHLW (Grand Challenge) Scenario Key Model Assumptions (where different from the Baseline Case)
EMF	• Not analyzed.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• EMF will operate for the whole mission. • Secondary liquid waste concentrate will be sent offsite for treatment (no recycle/return to DSTs). Treated effluent will be disposed at IDF or other disposal facility.	• Same as Baseline Case.	• Same as Baseline Case.
WRFs	• Not analyzed (space credited in DST space analysis for SST retrievals).	• **Start date(s) may be delayed to coincide with adjusted need date(s) based on slower waste treatment and slower completion of retrievals in 241-S/SX Tank Farms.**	• **Start date(s) may be delayed to coincide with adjusted need date(s) based on slower completion of retrievals in S/SX Tank Farms.**	• Same as Baseline Case.	• **Start dates may be shifted based on need dates. (The DST space situation may differ from the Baseline Case based on the altered retrieval sequence.)**	• Same as Baseline Case.	• **Start dates will be shifted to accommodate the need dates for this particular scenario.**	• Same as Baseline Case.
TWCSF	• Not analyzed (space credited in DST space analysis for SST retrievals).	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Operational 06/30/2037 (18 months prior to hot commissioning of the WTP HLW Vitrification Facility).	• Concentrate waste and feed directly to the WTP HLW Vitrification Facility (target 15-20 wt% solids, bulk SpG <1.5). • Receive Cs eluate and solids from WTP PT and blend with HLW feed. • Transfer decants and excess solutions to WTP PT.
SLAW	• Not analyzed (LAW treatment will be provided as a combined LAW/SLAW capacity starting on 12/31/**2021**).	• Rate adjusted to a maximum 50% TOE: 12/31/**2034** 45.0 MTG/day.	• If the SLAW facility becomes limited by feed availability because of insufficient SST retrievals, it will be shut down for an extended period until the DSTs can be refilled with sufficient SST waste to sustain continued operations.	• Rate adjusted to a maximum 50% TOE: 12/31/**2034** 45.0 MTG/day.	• Same as Baseline Case.	• Same as Baseline Case; and • Secondary liquid effluent sent offsite for treatment (no internal recycle). Treated effluent disposed at IDF or other disposal facility.	• **Operational on: 12/31/2039** 63.0 MTG/day. • **SLAW start date and capacity may be modified if LAW immobilization is found to drive waste treatment rates.**	• **SLAW capacity may be reduced or eliminated based on the required demand estimated during modeling (TBD).**

Scenario / System	Scenario 6 – TPA-Compliant Scenario Key Assumptions (where different from the Baseline Case)	Scenario 7 – Reduced Throughput Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 7a – Reduced Throughput – Reduced Retrieval Rates Only Sensitivity Key Model Assumptions (where different from the Baseline Case)	Scenario 7b – Reduced Throughput – Reduced Treatment Rates Only Sensitivity Key Model Assumptions (where different from the Baseline Case)	Scenario 8 – Early U-Farm Retrieval Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 9 – Offsite Effluent Treatment Key Model Assumptions (where different from the Baseline Case)	Scenario 10 – Retrieval Contingency Scenario Key Model Assumptions (where different from the Baseline Case)	Scenario 11 – DFHLW (Grand Challenge) Scenario Key Model Assumptions (where different from the Baseline Case)
Glass Formulation Model	• Nominal loading from Baseline Case glass formulation model results will be used to calculate required treatment capacity.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.	• Same as Baseline Case.