



December 10, 2021

Comments submitted electronically: <https://nw.ecology.commentinput.com/?id=E9HVk>

Washington State Department of Ecology
3100 Port of Benton Boulevard
Richland, WA 99354

RE: Public Comment Period for WTP Dangerous Waste Permit, Chapter 6A Inspection Plan

To Whom It May Concern,

Thank you for the opportunity to submit comments on the Waste Treatment Plant Dangerous Waste Permit, Chapter 6A Inspection Plan.

Hanford Challenge is a non-profit, public interest, environmental, and worker advocacy organization located in Seattle, WA.¹ Hanford Challenge is an independent 501(c)(3) membership organization incorporated in the State of Washington with a mission to create a future for the Hanford Nuclear Site that secures human health and safety, advances accountability, and promotes a sustainable environmental legacy. Hanford Challenge has members who work at the Hanford Site. Other members of Hanford Challenge work and/or recreate near Hanford, where they may also be affected by hazardous materials emitted into the environment by Hanford. All members have a strong interest in ensuring the safe and effective cleanup of the nation's most toxic nuclear site for themselves and for current and future generations, and who are therefore affected by conditions that endanger human health and the environment.

Safe management, treatment and disposal of Hanford's high-level tank waste is perhaps the most important part of Hanford cleanup to get right. The Waste Treatment Plant's variety of facilities play a key role in safely and effectively immobilizing tank waste in glass. Clear and transparent communication is also key to ensure that any and all issues related to the WTP facilities are shared with the personnel, including inspectors, who will be charged with making sure these facilities are operating safely and preventing accidents and equipment failure.

Please take the following comments into consideration.

- **Overcoming Limitations of Remote Inspections:** The second concern is a question about the increase in remote inspections. We understand and appreciate measures to

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protect worker health and safety, and we would also like a better understanding of what issues might not be found in the absence of physical inspection. What are the high-radiation areas in the Low Activity Waste facility? What are the limitations to remote inspection and how will these be overcome?

- **Restricting Access to Inspection Areas:** How will access be restricted to the different inspection areas? It must be obvious to workers what areas are off-limits and hazardous for entry and what areas are safe to enter. In order to protect workers, how is access enforced so there are no inadvertent entries?
- **Leveraging Opportunities for Public Education and Engagement in Public Meetings:** We appreciated that a public meeting was held on Tues, November 9th, but were disappointed that more context was not included in the presentation. This could have been a great opportunity to leverage a meeting about an aspect of tank waste treatment and the Waste Treatment Plant and cover more ground to give more context about progress on the Waste Treatment Plant. By so strictly sticking to the inspection plan, and not providing more context, we feel that the opportunity for public engagement and education was lost.
- **Communicating Low Activity Waste Facility Pre-Flagged Issues:** A [draft review of the LAW Facility in 2014](#), and the [2014 LAW Facility Design and Operability Review and Recommendations, Appendix B](#), flagged some major issues with the Low Activity Waste Facility, which were downgraded in the [final report](#), which was issued in 2015. The plan as far as we have been able to track down, is to wait until startup to deal with problems as they come up. We're concerned that this approach may put inspectors and other workers at unnecessary risk. We'd like more information about why this approach is being taken and to what data inspectors will have access, to ensure they have the information needed to be on the lookout for these pre-flagged issues. The point of the inspections is to keep people safe and the facility in safe working order. Please share more information about what could be done before operations begin in order to resolve the issues flagged in the 2014 draft and final LAW reports.

These concerns are outlined below:

1. **LAW Vulnerabilities:**

The [2015 Low Activity Waste Design and Operability Report](#) identified approximately 362 “vulnerabilities” that were expected to result in unacceptable risk to the overall project mission.

ORP prepared a set of closure letters from 2015 to 2018 (per the attached table, which contains some excerpts). The “verified closure” letters often kick the issue down the road to startup and commissioning, or reject the issues all together based on future promises or because the Federal Project Director “accepted the risk” on the behalf of workers, taxpayers, and the environment. The attached table shows that these letters referred to

commissioning at least 111 times. The accepted risks were apparently not used to add time for schedule margin or to add contingency for cost overruns.

The risk is demonstrated further in the discrepancy between DOE statements and the objective schedule evidence. ORP management expressed a lackadaisical attitude towards making any corrections per page 15 of the February 7, 2019 TPA PMM Meeting Minutes. In these minutes DOE indicated they were happy with the current Bechtel team, happy with the chronic delays – and they were not working on them.

On June 14, 2019, DOE replied to the Department of Ecology (in Letter 19-ORP-0004) that the DFLAW treatment facility is on schedule to meet the startup milestone for the LAW facility. The ORP Field Office Manager further insisted (on page 4) that schedules change “through no fault” of DOE. As a result, it appears the DOE had no interest in looking for the root causes of the delays, or the root causes associated with the failed fast track design-build/phased permitting decision.

In short, DOE has yet to show that it has completed all necessary actions to actually resolve the hundreds of serious safety and design issues at the Low Activity Waste facility raised in a 2014 . The report, which was publicized in the national media (including the [Washington Post](#) and the [Los Angeles Times](#), states, “The review teams identified 362 significant design vulnerabilities that could limit LAW Facility functionality and operability for which mitigation is highly recommended prior to the start of radioactive operations and in many cases, prior to the start of commissioning. Unless resolved in a timely manner, these vulnerabilities are expected to result **in unacceptable risk** to the overall project mission.” [emphasis added]

The authors of the draft report included 37 top experts on a wide range of engineering and scientific topics. Team leaders included the Federal Project Director for Special Projects at the Waste Treatment and Immobilization Plant (WTP) in Richland, Washington, and the WTP Design and Operability Manager for Washington River Protection, Solutions in Richland, Washington. Others were listed with expertise in Radiological Control and Industrial Health, Electrical Distribution Systems, Instrumentation and Controls, Container Systems, Mechanical Systems, Ventilation Systems, and Process Support Systems.

The report identified “eight key programmatic deficiencies are as follows:

1. Inadequate Discipline in Design Execution and Control
2. Inadequate and Incomplete Control System Design Requirements
3. Inadequate Analysis or Understanding of Production Capability
4. Inadequate Implementation of As Low As Reasonably Achievable (ALARA) Principles
5. Transfer of Scope and Risk to the Commissioning Phase
6. Inadequate Definition and Implementation of Design Requirements for Waste Management
7. Inadequate Consideration of Industrial Safety and Hygiene Requirements

8. Inadequate Consideration of Success of Operations and Maintenance Activities”

“If left unresolved, the design vulnerabilities, coupled with the programmatic design process weaknesses, would likely continue to have a compounding impact on the functionality of individual LAW systems and the LAW Facility as a whole to the extent that the facility is unlikely to achieve operational status within the anticipated timescale or achieve an acceptable throughput,” said the report.

The team, for example, found that an O-ring designed to seal 1,250-degree gases would fail at 250 degrees. It also found a number of ventilation problems, potentially allowing radioactivity to migrate into safe areas of the plant. The experts warned that the plant's design would increase the difficulty of decontamination, if it ever became necessary.

Here are some more excerpts from the 2014 report that raise serious, and possible unresolved safety and design concerns that put public and worker health and safety at risk:

Introduction

“During the course of this review, the teams identified recurring fundamental deficiencies in the approach to design that appeared to be key contributors to the evolution of the vulnerabilities affecting design functionality. These design approach deficiencies are reported in Section 4.0.” p. 3.5

4.0 FUNDAMENTAL PROGRAMMATIC DEFICIENCIES CAUSING DESIGN AND OPERABILITY VULNERABILITIES

“The Design and Operability review teams observed recurring fundamental programmatic design process deficiencies that appear to be key contributors to or causes of the system specific design and operability vulnerabilities. The design and operability vulnerabilities in combination with the fundamental programmatic deficiencies are likely to have a compounding impact on the functionality of individual LAW facility systems and the LAW Facility as a whole.” p. 4.0

1. Inadequate Discipline in Design Execution and Control: It was evident for the systems reviewed that requirements for design execution and control were not being met at an acceptable level. Failure to effectively establish disciplined design processes results in procurement and installation of equipment that does not meet the desired functional requirements and technical specifications. If left unmitigated, there is a potential that the final design cannot be validated and verified. This may result in an inability to effectively declare readiness to operate, pass an operational readiness review (ORR), and achieve operational status.

2. Inadequate and Incomplete Control System Design Requirements: The requirements for the equipment and process control systems lack sufficient clarity of definition and documentation to ensure the functionality of the LAW Facility systems. The quality classification for the control system software does not appear to be consistent with the

hazards and functions that the system is intended to control. Further, the current approach used to document the identified instrument and control system functions results in a very large number of documents, thereby making configuration control of the systems nearly unmanageable. Prior reviews have identified similar concerns.

3. Inadequate Analysis or Understanding of Production Capability: The basis for the LAW Facility production capability is incomplete and/or not technically defensible. Therefore, reasonable projections of future plant performance and production are not reliable.

4. Inadequate Implementation of As Low As Reasonably Achievable (ALARA)

Principles: There are specific regulatory and contractual requirements associated with meeting goals and objectives intended to reduce worker exposures and the potential for spread of radioactive contamination within a nuclear facility to be As Low As Reasonably Achievable (ALARA). Due to a lack of task analyses to reasonably estimate worker exposure and models to predict contamination migration patterns, there is insufficient evidence that ALARA goals and objectives will be achieved. Given the nature of complex chemicals that will enter the LAW, this deficiency exists for chemical as well as radiological hazards.

5. Transfer of Scope and Risk to the Commissioning Phase: A number of activities were identified in which integrated testing or functional demonstrations of critical system components are deferred to the commissioning phase of the project. Therefore, additional cost and schedule risks are likely as a result of postponing functional design validation of some systems to commissioning.

6. Inadequate Definition and Implementation of Design Requirements for Waste Management: The design process has not adequately considered or implemented sufficient features necessary to ensure the capability and reliability of waste management systems to support the LAW mission.

7. Inadequate Consideration of Industrial Safety and Hygiene Requirements: There are specific safety and health regulatory and contractual requirements that must be met as part of the design and operational process. In addition hazard identification and control are key core functions of an effective ISMS Program. Fundamental weaknesses were identified in the hazard identification and mitigation process used to address chemical and physical hazards.

8. Inadequate Consideration of Success of Operations and Maintenance Activities: There was limited evidence that a thorough and systematic assessment of the facility design has been undertaken to ensure that operational and maintenance tasks required for the effective operation of the facility are safely executable, as the current design depends on hands-on operation and maintenance activities. There are questions about the safe and efficient performance of operators and maintenance technicians in environments with elevated temperature, chemical and radiological hazards and challenging ergonomics which are currently incompletely defined and have not been modeled or considered in sufficient detail.

4.1.2 Examples

Following are some representative examples of vulnerabilities that appear to be caused by inadequate discipline in design and execution control:

- The ventilation system failure modes and impacts for normal and off-normal conditions have not been identified. These conditions should include start-up

sequencing, reduced production modes, and defined maintenance modes as well as other conditions that are not considered "normal" operations.

- Exhaust fan sizing does not take into account design changes associated with higher incoming air temperatures. Fan performance is reduced with higher air temperatures and the flowrate will be reduced, resulting in potentially inadequate contamination confinement in some rooms.
- Uninterruptible power supplies (UPS) for critical components are undersized and do not meet capacity requirements during a loss of power event. Equipment rooms that house the UPS batteries are too small to accept the additional number of batteries needed to meet the requirements.
- Cooling times used in design analysis of the LAW container do not have a technically defensible basis. The cooling values provided to the review teams used non-prototypic tests as a basis for input to stress calculations to ensure the container integrity under thermal operating conditions. When a container full of molten glass is lifted, there is a chance that the container lifting flange will fail because it has not cooled enough to regain its strength.
- The Submerged Bed Scrubber (SBS) is a main component in the melter offgas system and is relied on to reduce the temperature of melter off gas stream and remove contaminants from the air stream. The design temperature requirement for off-gas stream coming directly off the melter was specified to be 1250°F. Therefore, the design of some SBS components, including an O-ring gasket used to seal the vessel, must be compatible with this temperature. However, the O-ring provided by the vendor will likely fail at temperatures above 250°F. This O-ring design was accepted by the WTP Project without evidence of documented analysis or basis.
- Electrical equipment in high temperature areas are not properly designed for the ambient conditions as required. Projected temperatures in several areas of the pour handling system exceed the specified design values of electrical components. This may lead to reduced electrical capacity, overheating of components, signal failure, electrical shorts, and interruption of operation.
- According to the PDSA for the LAW Facility, one of the most significant postulated chemical events involves the release of nitrogen oxides (NO_x). Current safety analysis indicates that the NO_x hazard is eliminated two hours after feed to the melter is terminated.

4.1.3 Conclusions

Failure to effectively establish disciplined design processes, which are relied on to systematically establish and maintain the design bases, results in procurement and installation of items that do not meet the desired functional requirements and technical specifications. There is a risk the final design cannot be validated and verified, resulting in an inability to effectively achieve and demonstrate readiness to operate. Additionally, future design changes may be difficult to implement if these cannot be confirmed to meet the design basis requirements.

INADEQUATE AND INCOMPLETE CONTROL SYSTEM DESIGN SPECIFICATION AND EXECUTION

Control systems lack adequate specification of quality assurance and functional requirements: During the course of this review, it was observed that the functional

requirements of the control systems were not clearly specified and did not include sufficient supporting basis such that the intended control intent could be validated. Further, the D&O team questions whether the quality level of the software is in full compliance with DOE 0 414.1 C) which may therefore lead to conditions where personnel and the environment are not adequately protected.

Design process does not adequately consider operational control: Review of the design and operational parameters of the LAW Facility found that there was not a clear understanding of how certain components of the ICN will support safe operation of the facility. Consequently, systems may not function as expected under normal and off-normal condition.

Inadequate control system design: The monitoring and control system design for the LAW Facility does not appear to have adequately considered available design input, requirements, or industry standards. This will result in systems not functioning as expected under normal and off-normal condition.

4.2.3 Conclusions

The collective evidence indicates that the LAW Facility control systems are lacking in quality assurance, requirements definition, requirements traceability, design processes, design elements, and clear documentation. Further, this lack of requirements definition and traceability to upper tier requirements prohibited a full assessments of future plant operability, because it is unclear what the control system requirement are, and the basis for those requirements.

Specifically:

- The LAW Facility functional requirements are not adequately defined and lack a basis traceable to upper-tier requirements.
- WTP has applied a questionable and likely inadequate software QA grading and classification process to the LAW Facility control systems (a unique WTP process). The inadequate software QA grading and classification process has resulted in a quality assurance implementation at a level lower than is required to support the ICN functions.
- WTP has not evaluated the hazards associated with the ICN, which monitors and controls the entire WTP. Lack of hazards evaluation has resulted in inadequate software quality assurance, functional requirements, and hazard controls. The hazards (as defined by 10 CFR 830) must be evaluated in order to successfully complete the design and achieve readiness.
- The LAW Facility control system documentation is inadequate, inconsistent, difficult to use, and is not consistent with industry standards (i.e., IEEE). The current LAW control system documentation issues must be corrected in order to successfully complete design and achieve readiness to operate. The current documentation could be replaced with a much simpler set consistent with industry standards.
- Resolution of identified specific control system issues prior to resolution of the underlying control system design processes would not be productive. Without the benefit of sound requirements, quality assurance and documentation system to inform

and frame the design, the LAW Facility control system is at risk of not being able to meet operational expectations or achieve readiness.

4.3 INADEQUATE ANALYSIS OR UNDERSTANDING OF PRODUCTION CAPABILITY

4.3.1 Summary

The WTP project has developed an operational research (OR) model that includes the LAW Facility, however, there was significant evidence to indicate that the inputs to this model were incomplete or lacking conservatism, resulting in an inaccurate and overly optimistic assessment of LAW Facility production capabilities.

The production capability of the LAW Facility is unknown but likely significantly less than specified or anticipated to successfully execute the waste treatment mission as evidenced by the following:

- Equipment reliability and maintenance not adequately considered or lacks a defensible basis: There were recurring instances where the design did not appear to adequately or completely consider the impacts of equipment reliability and maintenance on the production capabilities of the LAW Facility. The review identified that spurious instrumentation trips on the melter off gas system alone will likely result in a decrease in the LAW Facility production capability to below the required 70%.
- Inadequate inputs and bases used to model production capability: The OR model developed and maintained by WTP does not provide a realistic prediction of overall plant performance, on which ongoing design decisions and future predictions of mission and operability can be based because:
 - The current OR model for the LAW Facility uses input assumptions and supporting bases that are not considered to be supportable based on operating experiences from other facilities with analogous equipment and operating constraints.
 - The current OR model does not incorporate all the systems necessary to represent integrated facility operations.
 - The current OR model is not used to evaluate the full range of operating conditions that might reasonably be anticipated during long-term plant operations.
 - The current OR model does not attempt to evaluate losses, other than availability, such as quality and performance losses, which on a minimally automated facility like the LAW facility could be even more significant than the availability losses.
- Design process does not adequately consider throughput impacts: The interactions of systems and associated operations within the LAW Facility have not been adequately considered and may result in unanticipated interruptions in melter glass production operations.

4.3.2 Examples

Following are some representative examples of vulnerabilities that provide substantial evidence that the LAW facility production capability is not adequately analyzed or understood:

- The melter off gas treatment system equipment is required to meet environmental requirements prior to discharge to the environment. The off-gas treatment system equipment is complex. This complexity coupled with a lack of component redundancy and numerous safety and permit affecting controls is likely to impact the ability to sustain melter operations and meet production requirements because equipment failures are likely to be more frequent and take longer to repair than currently assumed.
- Maintenance of some melter primary off gas system equipment requires that a confinement barrier for radioactive material control be disconnected and opened. This will require that both melters temporarily cease production operations so that the system can be placed in a safe condition for maintenance. Further, the review team considers it possible that personnel entry to the melter off gas process cells for any reason could require that glass production from both melters be temporarily ceased and the cell vessels be de-inventoried in order to establish safe conditions for cell entry.
- For electrical safety reasons it is anticipated that the melter power will be disconnected and locked-out during some routine operations (such as replacement of air bubbler tubes used for agitation in the melters, maintenance of redundant power supplies etc.). There is no evidence that the melter safe condition lock-out and subsequent time periods required for melter cool down and reheat have been factored into the facility production capability. These activities could represent a significant production impact for this routine consumable item replacement.
- Hot molten LAW glass produced in the melter is poured into steel containers. These containers must be allowed to cool for a minimum period of time so that the container can be lifted to the next handling station without risk of distorting the container flange. If this container flange were to distort, the container could fall when lifted. The review team concluded that the current time specified for cooling the containers was insufficient and should be extended. If the cooling time for a container is extended consistent with existing WTP data, container production could be significantly reduced.
- Automation of complex facilities is relied upon to ensure consistent control of the facility processes and to minimize time for response to changes and off-normal conditions, thereby increasing efficiency and production capability. However, the current level of automation in the LAW Facility intentionally emphasizes manual operations. As a result, many functions that are typically fully automated, such as start-up sequences, valve lineups, and shut-down sequences rely upon operator interaction for control.
- The impact of the extent of these operator control and response actions on the production capabilities of the LAW Facility do not appear to have been adequately considered. In addition, the WTP contract requires that the operational research model assess activities such as the time required to perform mechanical handling operations, which are generally assumed within the model to be performed instantaneously without consideration of operator response times. These operator response times could significantly impact LAW Facility glass production rates.

4.3.3 Conclusions

The evidence observed indicates that the basis for the expected LAW Facility production capability is insupportable. Without the benefit of accurate predictive models to inform the design and the design process that emphasizes production capability as a key consideration, the LAW Facility glass production capacity presents a significant challenge to the Hanford Tank Farms mission.

4.4 INADEQUATE IMPLEMENTATION OF AS LOW AS REASONABLY ACHIEVABLE (ALARA) PRINCIPLES

4.4.1 Summary

Throughout the review it was apparent that ALARA principles, incorporated as part of the design process, had not been effectively implemented. Key observations that the LAW Facility design may not effectively achieve ALARA requirements include:

- **Contamination control not effectively analyzed and demonstrated:** There were recurring instances where contamination control methods, defined in the design bases, such as airflow through doorway and hatches, were not sufficiently considered and demonstrated to be effective, challenging the ability of the project to successfully meet ALARA requirements. This is of particular importance for the LAW Facility because the contamination levels expected to be encountered as part of the hands-on maintenance approach are currently unknown and unanalyzed. Additionally, it was not apparent that the design of SSCs has adequately considered the need for periodic decontamination or provided features to facilitate decontamination efforts (such as use of high gloss/nonstick surfaces, or minimization of joints/crevices that can accumulate contamination).
- **Personnel dose assessments are not sufficiently documented to support contact operations and maintenance:** Radiation doses to personnel are undetermined for Operations, Maintenance, and Waste Management activities. Total cumulative radiation dose for a representative or bounding set of operations and maintenance evolution have not yet been determined; therefore, it is not known whether contract ALARA dose requirements can be met with currently planned staffing levels.

4.4.2 Examples

Some representative examples of vulnerabilities associated with inadequate implementation of ALARA principles include:

- The LAW Facility confinement ventilation system is a complex low airflow system. Some rooms require multiple ventilation manipulations to maintain correct air flow direction. Entry and exit from potentially contaminated rooms requires that airflow be manually controlled to prevent reversal of air flows and disruption or shutdown of ventilation systems.
- The storage tanks for incoming waste and the associated rooms are expected to become highly contaminated and the potential exists for personnel to receive significant radiation exposure in the process cells. The anticipated dose levels in the cells have not been assessed and no assumptions identified for the time required for removal of inventory from the cells and flush to attain levels acceptable for personnel entry.
- The transfer of bogies (rail based carts used to transport containers) between rooms may be a problem due to contamination potentially being transferred from rooms with higher contamination to rooms with lower contamination. This issue is exacerbated by the inclusion of design features such as recessed rails and unfinished walls above 7'6" that will trap contamination and make decontamination more difficult.

- The current carbon dioxide (CO₂) system uses CO₂ blast pellets to decontaminate the glass waste container. The CO₂ system uses pressurized air in the decontamination process and ablated contaminants are contained and removed by the vacuum effluent removal system. Because the CO₂ system has not been tested as an integrated system, it is unknown as to how well the vacuum effluent system will capture the ablated contaminants, or whether the contamination will be spread in the general Finishing Line area.
- Maintenance in the process cells, upstream of the melter, and within the Pour Cave and Finishing Line may require personnel to be in contact with equipment that exhibits high radiation exposure rates because of the hands-on maintenance design.
- Packaged waste containers that exceed a facility-specified radioactive dose limit, which is often set relatively low to limit cumulative uptake, require special handling and/or shielding so that the waste container can be safely handled and disposed.

4.4.3 Conclusions

There are specific regulatory and contractual requirements associated with meeting ALARA goals and objectives. The review team found that these requirements may not be met, primarily because of uncertainties related to how work will be conducted, a lack of systematic analysis, and modeling to confirm how contamination will migrate.

The effectiveness of a low flow ventilation philosophy has never been demonstrated in this type of facility using a hands-on maintenance approach. The low airflow design may cause contamination to accumulate in some areas or progressively spread in other areas of the facility. There is no model available to evaluate contamination migration paths throughout the facility. Radiological conditions in the LAW Facility are considered likely to deteriorate over the life of the facility thereby exacerbating difficulties associated with performing contact operations and maintenance. Consideration of design controls to address the radiological dose and contamination hazards over the life of the LAW Facility appears incomplete.

4.6 INADEQUATE IMPLEMENTATION OF DESIGN REQUIREMENTS FOR WASTE MANAGEMENT

4.6.1 Summary

The review team identified that the design requirements for secondary radioactive waste management were incomplete, and adequate design features were not included to support efficient secondary waste management. The capabilities to perform size reduction, decontamination, storage, and export of secondary radioactive solid waste are considered insufficiently developed to support sustained LAW glass production operations. In addition, the forecasted secondary waste volumes appear to be underestimated based on other analogous facilities and processes.

4.7 INADEQUATE CONSIDERATION OF INDUSTRIAL SAFETY AND INDUSTRIAL HYGIENE REQUIREMENTS

4.7.1 Summary

Throughout the review process it was apparent that fundamental safety and health principles, incorporated as part of the design process of the LAW Facility, had not been effectively implemented. Key observations indicating inadequate consideration of industrial safety and hygiene requirements include:

- **Insufficient evidence of compliance with operational safety and health requirements in design:** During the course of this review, it was observed that there were recurring instances where safety and health requirements were not effectively incorporated into the design of the LAW Facility.
- **Inadequate implementation of the hazards analysis process for worker safety to address chemical hazards:** The identification of chemicals, other than chemicals associated with the melter off gas system has not been considered as part of the facility design process. In addition, exposure assessments conducted to date were not accurate and did not adequately reflect hazards associated with the LAW Facility.
- **Inadequate implementation of the hazards analysis process for worker safety to address thermal hazards:** There are two worker safety thermal hazards that are expected to be encountered when the facility is operational: 1) the potential for burns due to hot equipment and 2) the potential for heat stress due to elevated room/work environment temperatures and heat. The Review Team found that these hazards had not been appropriately evaluated.

4.7.2 Examples

Some examples of vulnerabilities indicating inadequate consideration of Industrial Safety and Industrial Hygiene requirements include:

- The review team was not able to find any documentation that identified expected chemical compounds in the feed to the LAW Facility from the Pretreatment Facility. The WTP Project maintains a list of anions and cations, along with generic volatile organic compound information; however, no documentation was provided to the Review Team identifying the worst case, or bounding source term, for chemicals present in the waste feed. These compounds and/or list of chemicals need to be compared against worker protection limits to ensure engineering controls are adequate and workers are appropriately protected. In addition, no routine area monitoring for chemicals, other than those associated with the melter off gas system, was found to have been incorporated into the facility design process. This is of particular concern due to the worker protection issues that are associated with the Tank Farms operations and potential exposures to similar chemical vapors at the LAW Facility should incoming waste migrate from the containment piping (e.g., leaking valve, equipment maintenance).
- Ventilation is the primary means for controlling and mitigating exposure of personnel to chemical vapors. It does not appear that chemical dilution (immediate barrier to release), from a worker protection chemical perspective, was considered as part of the ventilation design.
- Breaker bars are required to provide mechanical advantage to open doors against the building depressions allowing personnel to exit a room during emergencies or other off-normal events. Although breaker bars are available for some areas they are not available for other similar areas, this may preclude egress in the event of an off normal or emergency condition. Operation of these devices under abnormal

conditions is likely to cause the ventilation system to shutdown, resulting in a potential loss of effective confinement.

- The potential for carbon fines to ignite in the carbon beds during normal operations or during carbon replacement activities has not been thoroughly analyzed as part of the hazards analysis process. Further, replacement of the carbon in the carbon beds involves workers crouching under the beds in a space 3 feet high. The workers will work in these conditions for an extended period of time since it will require about thirty (30) 55- gallon drums to collect the spent carbon. This design does not adequately implement suitable worker ergonomic features.
- Container lids used in the finishing line must be manually loaded in the lid holder mechanism. Each lid weighs 45 pounds and there are 35 lid-and-seal assemblies. Back injuries are common when routinely lifting heavy equipment. Given the number of lids needed to be loaded, an engineered means to perform this task is warranted.
- Three high voltage (13.8 kV) electrical supply power disconnects are all located in the same power supply compartment on the melter power supplies. This configuration makes performing zero energy checks to ensure that the system is safe for worker maintenance impossible unless all incoming power to each LAW Facility melter power supply is disconnected. In addition, there is inadequate space for worker access to the power supply cabinet.
- Existing exposure assessments for the LAW Facility were found to be inadequate and in need of revision to accurately address chemical hazards and controls when performing work. In addition, no administrative process exists that ensures results of the exposure assessments are incorporated into the Engineering design process (ensuring engineered solutions to the mitigation of hazards).

4.7.3 Conclusions

There are specific safety and health regulatory and contractual requirements that must be met as part of the design process. The review team found fundamental weaknesses in the hazard identification and mitigation process related to chemical and physical hazards. There is a significant potential that similar worker safety concerns related to chemical vapors in the Tank Farms may be present in the LAW Facility because the incoming feed to the LAW Facility originates from the Tank Farms. Thermal hazards need to be thoroughly addressed to ensure workers are appropriately protected from burns and heat stress. Finally, several examples were identified within the LAW Facility that will require retrofitting of installed equipment to meet 10 CFR 851 requirements.

4.8 INADEQUATE CONSIDERATION FOR SUCCESS OF OPERATIONS/MAINTENANCE ACTIVITIES

4.8.1 Summary

The review team observed that the current LAW Facility design was not consistent with the stated operational intent. Inadequate consideration of operations and maintenance conditions needed to successfully operate and maintain the facility will likely impact the ability to meet production targets, challenge safety and hazard exposure goals, and ultimately extend the LAW Facility mission.

Example: “Design process does not include adequate consideration of maintenance performance: The LAW Facility relies upon hands-on maintenance for equipment repair, calibration and replacement. Implementation of hands-on maintenance may require special

precautions to protect workers from chemical hazards, high temperature hazards, and to ensure radiological conditions are controlled to maintain worker safety. The impact of these special precautions on maintenance time durations or glass production do not appear to have been adequately considered.”

5.0 SYSTEM REVIEW SUMMARY

5.1 PRIMARY OFFGAS PROCESS (LOP), SECONDARY OFFGAS/VESSEL VENT PROCESS (LVP) AND AMMONIA REAGENT (AMR) SYSTEMS

Without mitigating actions, there is collective evidence from this review that the current design of the combined LOP /LVP systems is likely to chronically limit the overall production capability of the LAW Facility.

The summarized principal evidence is as follows:

- There were a total of forty six (46) vulnerabilities identified in these systems. Thirty four (34) of these are considered to require corrective action, including some significant reanalysis/redesign, prior to start-up testing. Figure 5-1 shows the ratio of high-, medium-, and low-impact vulnerabilities identified for the two systems. See Appendix B for a list of vulnerabilities and OFIs.

5.2 INSTRUMENTATION & CONTROL

Without mitigating actions, there is collective evidence from this review that the current design of the WTP Instrument & Control (I&C) system is likely to significantly delay startup and commissioning, increase the risk of safety and regulatory noncompliance and limit the throughput capability of the LAW Facility.

- There were a total of fourteen (14) vulnerabilities identified in this system. All are considered to require corrective action, including some significant reanalysis-/redesign, prior to start-up testing. Figure 5-2 shows the ratio of high- and medium- impact vulnerabilities identified for the system. See Appendix B for a list of vulnerabilities and OFIs.

5.3 CONFINEMENT VENTILATION SYSTEMS

The LAW Facility Confinement Ventilation System has been determined to be incapable of meeting its intended function unless corrective actions are taken. The extent and number of perturbations induced in the ventilation system as a result of routine operations are expected to result in an unstable system. The current ventilation system design may cause delays to facility startup and commissioning and impact facility operation during the life of the facility.

The summarized principal evidence is as follows:

- There were a total of seventy three (73) vulnerabilities identified in this system. Sixty six (66) of these require collective action, including some significant reanalysis/redesign, prior to start-up testing. Figure 5-3 shows the

ratio of high-, medium-, and low-impact vulnerabilities identified for the system.

- **LAW Facility HVAC hazard analysis:** A number of hazardous conditions associated with upset and accident scenarios in the LAW off-gas system were identified in the PDSA hazard analysis with high toxicological unmitigated consequences to the facility worker and chemical exposures above threshold limits for the co-located worker. There is a strong potential that currently unidentified HY AC controls will be needed to mitigate the hazards identified in the hazard analysis. A final hazards analysis of the LAW ventilation system needs to be performed. Normal and off-normal operations as well as accident conditions need to be evaluated and all HY AC controls need to be identified.

5.4 ELECTRICAL DISTRIBUTION SYSTEM

It should be noted that many of the vulnerabilities are related, and performing corrective actions on one can resolve multiple vulnerabilities. Many of the vulnerabilities identified in the review had been previously self-identified by BNI and for those issues where evidence is available that resolutions are in process, those issues are not addressed in this report.

The summarized principal evidence is as follows:

- There were a total of thirty seven (37) vulnerabilities identified in this system. Thirty one (31) of these are considered to require corrective action, including some significant reanalysis/redesign, prior to start-up testing. Figure 5-4 shows the ratio of high-, medium-, and low-impact vulnerabilities identified for the system.

5.5 RADIOLOGICAL CONTROL AND INDUSTRIAL SAFETY AND HYGIENE

5.5.1 RCISH Key Results/Consequences

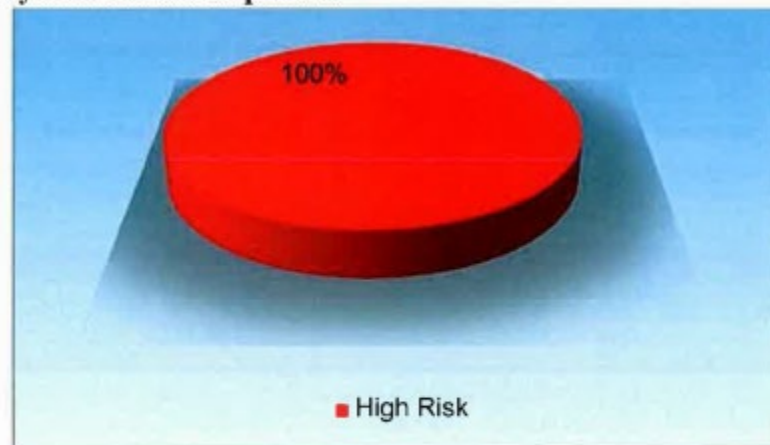


Figure 5-5. Unmitigated Vulnerabilities Identified for Radiological Control and Industrial Safety and Hygiene.

A total of eight (8) vulnerabilities were identified for the radiological control and industrial safety review area. Figure 5-5 shows that the vulnerabilities identified for the system were all considered high impact for which mitigation is recommended prior to cold commissioning and preferably prior to startup testing.

The review team identified specific issues with the radiological control approach all of which will require correction prior to startup testing. Listed below are summarized vulnerabilities:

- The potential for contamination to migrate to adjacent lower classification contamination zones are a key concern of the review team and the design of the low flow ventilation system further compounds this issue. This vulnerability was evident in a majority of the facility systems reviewed and includes examples such as:
 - The application of a special protective coating only to the seven and one half feet height level on many of the facility walls, will impact the ability to effectively decontaminate the facility,
 - Low flow ventilation increases the quantity of material that settles in the facility rather than being captured on the HEPA filters,
 - Potential contamination migration as equipment or material traverse from higher to lower contamination zones, and
 - The activity level of the glass suggests that the potential contamination levels will be higher than are currently being assumed in the design (anticipated alpha activity concentration for LAW incoming waste stream is >600,000 dpm/ml and beta activity concentration is >20,000,000 dpm/ml).
 - Inability to meet contamination control limits for container release. The container swabbing system smears a container over a 500 cm² surface area as opposed to the 100 cm² surface area regulatory limit for release to controlled areas. Currently no technical basis exists for the release criteria to meet regulatory requirements or the smear media planned to be used for surveying. A more rigorous swabbing regime is likely to challenge the facility throughput further.
 - The project is in the process of developing radiation dose rates for specific areas of the facility but there has been no targeted assessment to understand the ability to effectively perform hands-on maintenance activities for the higher risk tasks. Dose rates have recently been calculated for areas like the melter but these rates have not been applied to a conservative task analysis to understand if there are chronic exposure concerns.
 - Similarly there is no assessment of the implications of manual bagging operations of contaminated bubblers. For areas like the process cells, which are also manually maintained, there may be a more significant dose management challenge. Additionally the effort to de-inventory and decontaminate areas (like the process cells, pour cells, buffer stores etc.) to facilitate maintenance will have an unanalyzed impact on throughput and the radiation levels may restrict some maintenance evolutions even after deinventorying.
 - Issues identified in this review were similar to and consistent with those found during the HL W Design and Operability Review that concluded:
 - Administrative controls appear to be favored over engineered controls; and

- The confinement ventilation system design philosophy drives the need for frequent radiological cleanup to maintain radiological control and confinement, in excess of that normally anticipated at analogous facilities.

5.5.1.2 Industrial Safety and Hygiene

For Industrial Safety, the review team also identified four vulnerabilities of high significance that will require correction prior to startup testing. Listed below are summarized vulnerabilities:

- Insufficient evidence of compliance with operational safety and health requirements in the design process. Walk-throughs of the constructed facility found several locations where code requirements were overlooked as part of system design on individual pieces of equipment, and more importantly on the system as a whole. Examples include:
 - Thermal protection from burns due to potentially hot surfaces, motors, etc.,
 - Inadequate workspace ergonomics and engineered features to enable workers to safely and efficiently fill and empty the carbon bed media,
 - Inadequate access to maintain/operate elevated equipment e.g., ventilation dampers, cranes, etc.
 - Inadequate implementation of the hazards analysis process. Examples identified include:
 - Limited or no task analysis of planned hands on maintenance tasks to assess the viability of the existing design to support safe maintenance/operation.
 - Experience on vitrification facilities in the nuclear industry require remote maintenance there is no precedent or relevant experience for the LAW Facility approach so additional conservative analysis is warranted.
 - Lack of a defined chemical source term incoming to the LAW Facility.
 - Lack of identified chemical area monitoring, throughout the facility, to ensure workers are appropriately protected (greatest risk are work areas upstream of the melter).
 - Two completed WTP chemical exposure assessments used incorrect data, which only considered the off gas component and ignored the incoming waste feed. This waste is currently causing significant health concerns due to vapors at the Tank Farms and must be considered for WTP.
 - There is no evidence that worker heat stress potential has been considered in the design and there is no task analysis that considers the anticipated temperatures applied to a detailed task analysis.
 - The assessment for replacement of the melter implies Level A PPE will be required, yet Design Engineering has assumed that minimal PPE would be needed. This means that the current design may be incompatible with performance of tasks in this level of PPE.

5.6 MELTER EQUIPMENT SUPPORT HANDLING SYSTEM

The LSH System design may limit the production capability of the LAW Facility for the

following reasons:

- The review team identified sixty one (61) vulnerabilities for the LSH System. Forty two (42) require remediation prior to startup testing. Figure 5-6 shows the ratio of high-, medium-, and low-impact vulnerabilities identified for the LSH System. The ability of the LSH system to provide the support necessary to assure sustained operation of the LAW Facility such that immobilized low activity waste (ILAW) throughput requirements can be met has not been demonstrated.

5.7 CONTAINER POUR HANDLING SYSTEM

The LAW Container Pour Handling (LPH) System supports the vitrification process by accepting empty containers from the LAW Container Receipt Handling (LRH) System, moving empty/filled containers into and out of the pour caves, placing containers under the melter pour spouts to be filled with glass, and allowing for preliminary container cooling prior to transporting filled containers to the LAW Container Finish Handling (LFH) System.

The current LPH system design may limit the overall production capability of the LAW Facility based on the following evidence:

- The review team identified 88 vulnerabilities, 55 of which require remediation prior to initiating production operations and preferably before startup testing. Fourteen of the fifty-five vulnerabilities require some level of significant redesign.

5.8 MELTER HANDLING SYSTEM

The dedicated LAW melter handling system (LMH) provides the mechanical handling equipment associated with the import of new Locally Shielded Melters (LSMs) and the export of failed or spent LSMs from the LAW Facility. Key components of the LMH System include the LSM rails and associated winch and pulley block arrangement.

Prolonged LAW Facility outages with attendant impacts to LAW production are anticipated in order to recover from existing shortcomings in LMH System design based on the following:

- The review team identified thirteen (13) vulnerabilities for the LMH System, twelve (12) of which require remediation prior to initiating production operations and preferably before startup testing. Figure 5-8 shows the percentages of high-, medium- and low impact vulnerabilities identified for the LMH System.

5.9 CONTAINER FINISHING HANDLING SYSTEM

The LAW LFH System receives filled containers from the LAW LPH System, provides glass sampling functionality, measures container fill level, inert fill addition, installs lid, decontaminates, swabs, and monitors contamination/radiation dose prior to transporting containers to the LAW Container Export Handling (LEH) System.

The LFH System cannot meet throughput requirements, unless significant changes are made. Decontamination issues, thermal issues, contamination control and product container

handling issues, if unmitigated, will render this system unable to support throughput requirements for the following reasons:

- The review team identified seventy (70) vulnerabilities, forty three (43) of which require remediation before CD-4 and preferably before startup testing. Sixteen of the forty-three vulnerabilities are high impact and require some level of significant redesign.

5.10 RADIOACTIVE SOLID WASTE HANDLING SYSTEM

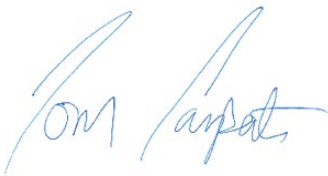
The purpose of the Radioactive Solid Waste Handling (RWH) System is to provide the mechanical handling equipment necessary to facilitate handling and packaging of secondary radioactive solid waste (RSW). Examples of RSW include failed equipment, consumable items, and maintenance wastes.

The functionality of the RWH system is not adequate to fully support life-cycle operations. Specifically, the RWH System may prevent the LAW Facility from achieving throughput requirements for the following reasons:

- The review team identified thirteen (13) vulnerabilities for the RWH System, nine (9) of which require resolution before startup testing. No high risk vulnerabilities were identified.”

The following attachment is a table that provides an overview of the proposed resolutions for the issues raised in 2014-2015 reports on the Low Activity Waste facility. This table flags either where U.S. DOE agreed to “accept as-is” the noncompliant condition, and/or agreed to wait until commissioning of the LAW facility to resolve the problem. We are including this table as part of our WTP Inspection Plan comments because many of these issues contain serious safety concerns and we want to ensure that they are not overlooked and are shared with inspectors.

Thank you for considering our comments.



Tom Carpenter, Executive Director

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LAW D&O "Verified" Closure Letter	Item Refers to Commissioning	Examples of Topics Mentioning Commissioning
15-WTP-0192 December 8, 2015	1	LAW Container Leak Tests to be performed early in startup and commissioning to mitigate issues. Previous tests had incorrect methodology.
16-WTP-0007	0	
16-WTP-0030	1	Control System software settings to be "tuned" during startup and commissioning .
16-WTP-0047	2	<p>BN1 states in the response that the (uninterruptible power supply) UPS SDD requires startup/commissioning testing of the "Safety" UPS to verify sufficient capacity...</p> <p>Demonstration of ILAW container loading activities during cold commissioning will support completion of Operational Readiness Reviews prior to the start of Hot Operations</p>
16-WTP-0066	2	<p>Activities will be completed prior to the start of commissioning to address replacement of a failed melter...</p> <p>Adequate mock-up/testing facilities are not available/planned to support high risk contact maintenance activities (such as pump/agitator replacement) and testing/run-in of mechanical equipment...work control process will be evaluated both by the contractor and DOE for ISMS phase 1 and phase 2 reviews prior to commissions.</p>
16-WTP-0089	5	<p>the ASME AG-1 code requires the airflow distribution testing to be performed (for each [C5V] housing) during commissioning, so the testing that passed at the suppliers facility will be confirmed once again in the actual installation</p> <p>HVAC- 52-4, C2, C3 and C5 HEPA Filter replacement strategy has not been developed for LAW commissioning.</p> <p>BNI Review of this vulnerability concluded that "HEPA filter qualification is being tracked under Technical Issue 2011-0001, Reference 24590-WTP-TIES-ENG-14-0004 Rev. 0.</p>

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LAW D&O "Verified" Closure Letter	Item Refers to Commissioning	Examples of Topics Mentioning Commissioning
		<p><i>The filter is currently being designed.</i> The plan for use of filters in commissioning would be developed and tracked under this effort."</p> <p>HVAC- 55-1, LAW C2V, C3V and C5V Cascade Low Air Flow HVAC System Causes Control Systems to be Complex... All systems do not need to be in place and on line before the ventilation system startup. If all the ventilation system needs to be tested then the controllers (shown above) and the related servers will have to be in place and online before the system can be tested. The ventilation system does have inputs from other systems for functionality such as CHW, PCW, LVP, LOP and ISA which are not limitations of the control system as the entire plant cannot be controlled by a single controller. Functionality of the system overall if wanting all inputs would require several other controllers to be available to support these inputs into the ventilation system.</p> <p>Additionally, changes to the ventilation control system or any of the other control systems has the potential to cause delays in startup and commissioning in order to verify changes to one system do not affect any of the other systems.</p> <p>The design for the LFH system is not in compliance with the requirements flow down as described in the Technical Baseline.</p> <p>It is not clear how requirements flow from the Mechanical Sequence Diagram or the Mechanical Handling Diagrams to the J3 Logic Diagrams, Function Diagrams and Sequential Function Diagrams.</p> <p>There is no way to verify that interlocks have been passed down to the J3 Logic Diagrams and no way to verify that they are implemented correctly...<i>Start-up and commissioning should include exhaustive testing of both success and failure paths and Off-Normal operations to "wring out errors and identify improvements in operations and operator/control interfaces before operations begin.</i></p>

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LAW D&O "Verified" Closure Letter	Item Refers to Commissioning	Examples of Topics Mentioning Commissioning
		<p>No safe access by personnel to delivery truck trailer (non-radiological safety and health)...Bechtel's response: "This is future work. To be completed during support to Startup 3EL4880062 [2016 anticipated work]."</p> <p>The reviewer obtained a print out of <i>the BNI project level 4 schedule</i> (attached version 417/2016) and verified that the activity for schedule ID 3EL4880062 is LAW- ZM support Startup & Commissioning Phase with an expected start date of 8/3/2016 and a finish date of 11/3/2016.</p>
16-WTP-0115	6	<p>"The C2/C3 DP monitors, as currently designed, will not work....The Foxboro instruments selected have a maximum span of -30"Wg to +30"Wg. The individual instruments are spanned to values much less than the maximum span...BNI Review of this vulnerability concluded that "BNI project engineering is <i>currently investigating</i> possible resolutions to this issue and have initiated a condition report (CR) to track for resolution. Tracking document number is 24590-WTP-GCA-MGT-15-00744."... The risk associated with this vulnerability is the zone pressure set points and alarm and interlock set points may have to be adjusted again as commissioning progresses [how can you adjust them if they will not work?] if the current set points prove to be too sensitive. This is expected to be addressed in instrument and control tuning.</p> <p>C5V Radial HEPA filter design does not include the ability to balance air flow through the filter housing...ASME AG-I code requires the airflow distribution testing to be performed (for each housing) during Commissioning..</p> <p>Adequacy of design to support control of integrated system equipment/components under various expected operating conditions (e.g. startup, shutdown, low flow, melter surges, etc) and abnormal operating conditions not demonstrated."... Additionally, all interlocks will be functionally tested as part or commissioning/start-up. Dynamic responses of the offgas system will be observed as part of this testing."</p>

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LAW D&O "Verified" Closure Letter	Item Refers to Commissioning	Examples of Topics Mentioning Commissioning
		<p>"Lack of functional testing of LOP equipment performance at vendors... Remaining testing is the MACT performance testing to be conducted as part of the contractual requirements. These testing is scheduled in the baseline schedule <i>commissioning phase.</i>"</p> <p>The inspection platforms cannot be located as close as possible to the empty container being inspected... "<i>This is future work.</i> To be completed during support to Startup 3EL4880062 [2016 anticipated work]."</p> <p>The reviewer obtained a print out of the BNI project level 4 schedule (attached version 4/7/2016) and verified that the activity for schedule ID 3EL4880062 is "LAW- ZM support <i>Startup & Commissioning Phase</i>" with an expected start date of 8/3/2016 and a finish date of 11/3/2016.</p> <p>Potential for Contamination to Migrate Due to Adjacent Contamination Zones and Low Flow Ventilation Design... It does appear worth-while to document the projected process for the design to support completion of Commissioning</p>
16-WTP-0133	3	<p>LAW production container volume weight, and center of gravity calculation, 24590-LAW-MOC-LRH-00004, does not include overpack condition...Operational approaches will be developed and demonstrated during commissioning operations, as required.</p> <p>Length and travel of Container Present Sensor of Lidding and Decontamination Bogies may not be adequate for detecting an Overpack...Operational approaches will be developed and demonstrated during commissioning operations, as required.</p> <p>"There is no indication of the location and size of the area available on the Load Dock for staging non-acceptable containers, which may be a challenge in this busy area."... "This is future work. To be completed during support to Startup 3EL4880062 [2016 anticipated work]" The reviewer obtained a print out of the BNI project level 4 schedule (attached version 4/7/2016) and verified that</p>

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LAW D&O “Verified” Closure Letter	Item Refers to Commissioning	Examples of Topics Mentioning Commissioning
		the activity for schedule ID 3EL4880062 is "LAW - ZM support Startup & Commissioning Pha" with an expected start date of 8/3/2016 and a finish date of 9/3/2016.
16-WTP-0158	9	<p>The D&O basis, from ROR-HVAC-02 explains that "a depression of -0.0703'WG is very close to zero and leaves little margin for upsets caused by normal plant operation. It seems with routine opening and closing of hatches and doors during normal plant operation will result in system upsets that could exceed the 0.073"WG available and the C2 areas could go positive...Under the current philosophy it is anticipated that the <i>controllers will compete</i> to maintain the prescribed differential pressures. The probability for this competition can be reduced or prevented through <i>rigorous tuning</i>. Identification of this competition is expected through system performance tracking or verification of flow via flow detectors already installed...Closure of this vulnerability is based on BNI response and <i>required component tuning during start up and commissioning is adequate.</i></p> <p>There is a danger that the Motoman® decontamination robot and PLC control go obsolete before the 40 year life of the WTP project is over. Further, KTECH, the robot vendor may go out of business or get bought out by another company. ... Summary: Commissioning Plan 24590-VVTP-PL-COPS..15-005, Rev A has been prepared in draft. This draft will be updated and finalized per BNI contract requirements 12 months prior to the start of WTP Cold Commissioning. In this plan (and prior developed commissioning planning) the strategy for commissioning the finishing line including the C02 decontamination line is to complete finish line in parallel with melter commissioning and early on in the commissioning schedule.</p> <p>The design provides no method of verifying compliance with Waste Affecting Criteria regarding temperature before the container is exported for transport to the disposal facility... This evolution will be demonstrated during cold commissioning of the WTP LAW facility which will address any operational considerations to include <i>additional temperature measurement requirements.</i></p>

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LAW D&O "Verified" Closure Letter	Item Refers to Commissioning	Examples of Topics Mentioning Commissioning
		<p>"The LAW container lid seal is vulnerable to damage as observed in DOE surveillance report 09-WTP-077... Additional integrated testing to be performed as part of commissioning."</p> <p>"There several requirements of the lidding jib crane specification (24590-WIP- 3PS-MJKJ-T0003) that were not tested during FAT and are not covered by a test acceptance criteria in the LFH System Description (24590-LAW-3YD-LFH-00001). The items/functions not tested can impact commissioning or future production when called on to perform. Of the item tested, the FAT does not validate the performance requirements adequately."... BNI documentation 24590-WTP-PIER-MGT-1 3-0483 shows that they <i>have a planned</i> to address this vulnerability.</p> <p>The robot is programmed to swab the curved bottom, vertical sides, and tops of the ILAW containers, but no provisions (i.e., alternate swabbing patterns and programs) have been developed to swab a lower container over pack. The inability of the swabbing robot to handle a lower container over pack could cause significant production delays. [See Note LFH-SWAB-1-6]... LAW D&O Recommendation: Create and test swabbing programs for the lower container over packs prior to commissioning activities... <i>Issues specific to development of swabbing test procedures associated with overpack containers are not pertinent [when the dose rate is 14.7 mrem per hour?].</i></p> <p>LAW production container volume, weight, and center of gravity calculation, 24590-LAW-M0C-LRH-00004, does not include over pack condition. An abnormal condition could occur if the container cannot be decontaminated and overpacking is required to be added to the container, [See Note LFH-TOOL-2-1]... Operational approaches will be developed and demonstrated during commissioning operations, as required.</p> <p>Equipment and attachment points are not determined for recovery of the Process Area Bridge Crane to its maintenance position. From the LAW D&O report states, "The System Description talks to "recovery features" but no specific method or equipment is identified."...</p>

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LAW D&O "Verified" Closure Letter	Item Refers to Commissioning	Examples of Topics Mentioning Commissioning
		<p>In 3EL4880062 the activity name is LAW- ZM Support Startup &Commissioning Phase 1 (FY 2016)...BNI documentation shows that they address vulnerability LRWH-O-03-V-01 with a <i>planned to get it done</i> before the baseline due date.</p> <p>"Commissioning major pieces of equipment is a difficult and usually lengthy effort. LAW Facility Systems are often complex, with many interacting components. Installed plant equipment that has not been through the commissioning process or otherwise turned over to operations will <i>very likely require rework</i>, delaying the completion of the Facility System startup and commissioning. Current startup and commissioning plans <i>begin after construction</i> is complete, which will place all component rework on the critical path to startup/commissioning. "... <i>BNI plans to address this issue on time if they can.</i></p>
16-WTP-0194	2	<p>The OR Model Design Document (MDD) and the Flowsheet Bases, Assumptions, and Requirements document do not contain the same process steps and times for the LEH system. The OR MDD does not contain RAM information for the cameras mounted on the LEH- CRN-00003. [See Note OR-6]</p> <p>Incorrect data input into the OR Model will result in facility availability estimates that are not accurate... OR model documentation updates will be accomplished following procurement and testing of transporter prototype as part of WTP <i>commissioning testing</i>.</p> <p>The existing refractory vendor has ceased production. Refractory production for a new melter will require 1 1/2 years lead time plus waiting-list time once a new vendor has been selected... Activity number 1D9055 identified in the DFLAW program integrated schedule provides for DOE to develop a melter assembly approach. This activity is currently scheduled for FY17 and will be needed prior to the initiation of LAW cold commissioning currently scheduled for FY20.</p>
16-WTP-0216	6	<p>The complex abatement system design with numerous safety and permit affecting controls is likely to impact ability to sustain operations and meet throughput requirements. Abatement</p>

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LAW D&O "Verified" Closure Letter	Item Refers to Commissioning	Examples of Topics Mentioning Commissioning
		<p>system equipment/unit operation selection decisions made early in project (circa 2001) based on preliminary and evolving process information (flowsheet). Abatement system results in postulated safety events with Hg off-site consequences that otherwise would not exist (e.g. carbon bed fire event)...Failure to pass MACT/DRE testing during commissioning or during operations could lead to prolonged project delays (months)...Negotiations with Ecology <i>will result</i> in development of the environmental performance test (EPT) plan to meet the requirements of MACT including DRE testing.</p> <p>"Durability of Park/Export Stand thermal insulation material over a 40-year operating life is not documented... Modify the existing Park/Export Stands prior to commissioning to provide a way to facilitate the replacement of the insulation material blocks."... The SDD cites an assessment/evaluation of the design as a method of verification that the design meets requirements. BNI does not plan to develop any further documentation with regard to the environmental conditions associated with the park/export stands.</p> <p>"There is a risk that liquids, tools, or various debris fall accidentally into an open container standing on the conveyors in Room L-0117 (and may remain unnoticed)...This is future work... The reviewer obtained a print out of the BNI project level 5 schedule (attached version 41712016) and noted that the activity for schedule ID 3EL4880062 is "LAW-ZM Support Startup & Commissioning Phase" with an expected start date of 8/3/2016 and a finish date of 11/312016. Due to the lack of detail in the schedule ID, the reviewer requested via Review Comment Record (RCR) a more detailed response than that provided in CCN 276214. BNI provided the following response in the RCR following a meeting with the reviewer: "BNI does not intend to incorporate the design change proposed as an Opportunity for Improvement by the D&O team. The current design would not be a candidate for a change as it currently meets safety and functional requirements.</p>

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LAW D&O "Verified" Closure Letter	Item Refers to Commissioning	Examples of Topics Mentioning Commissioning
		<p>Heat-up / Cool-down rates for the melter glass pool have not been calculated for the actual case while doing System LSH maintenance evolutions... WTP commissioning operations are planned to demonstrate evolutions required to be performed to support LAW operations.</p> <p>Conduct of Operations Principles have not been adequately factored into the facility. No single shortcoming will lead to an Incident but taken as a whole the Operator is not being placed in a position that is success oriented... WTP operations will be conducted in accordance with Conduct of Operations principles. Conduct of Operations principles will be demonstrated during the performance of commissioning operations prior to the Initiation of hot operations.</p> <p>Lack of a simulation , mockup, training facility increases the risk of error In performing new and/or complicated evolutions. The complexity, work environment, PPE, and extensive hands on nature of the work warrants a simulator or mockup facility to dry run evolutions and accommodate training... WTP commissioning operations are planned to demonstrate evolutions required to be performed to support LAW operations.</p>
16-WTP-0245	5	<p>The complex abatement system design with numerous safety and permit affecting controls Is likely to impact ability to sustain operations and meet throughput requirements... Pilot testing Indicates the highest known potential for experiencing a carbon bed fire occurs, as indicated by carbon bed temperature increases, during MACT/DRE testing when high concentrations of organic are intentionally introduced to the melter feed. Other operating periods with higher fire risk Is after replacement of the carbon bed material and during transition from an idled melter to steady state operation...Operations of the necessary safety and permit effecting equipment and control systems will be demonstrated during the Environmental Demonstration Test (EPT) performed during cold commissioning.</p> <p>The D&O basis explains that the "The Vendor's submittal does not provide evidence that the selected insulation material will maintain its insulating properties and protect the floor for over 40 years in the conditions of its application inside the Transfer Corridor 1-8025B." The D&O</p>

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LAW D&O "Verified" Closure Letter	Item Refers to Commissioning	Examples of Topics Mentioning Commissioning
		<p>report further provided as opportunities for improvement, "Resume contacts with Pittsburgh Coming Corp and obtain documented evidence of the durability of the selected insulation material over 40 years at 460F. Modify the existing Park/Export Stands prior to commissioning to provide a way to facilitate the replacement of the insulation material blocks."... although there may be some risk in the insulation material not lasting the 40 year life, there have not been any means of insulation degradation identified that would bring into question the ability of the FOAMGLAS® blocks to perform their function. The ability to inspect, maintain, and replace as necessary help to mitigate the risk mentioned above.</p> <p>"There is a risk that liquids, tools, or various debris fall accidentally into an open container standing on the conveyors in Room L-0117 (and may remain unnoticed). It may be necessary to provide a cover/shield over the staging conveyor area to eliminate the chances of material falling into containers that have already been inspected."... BNI provided the following response in the RCR following a meeting with the reviewer.</p> <p>"BNI does not intend to incorporate the design change proposed as an Opportunity for Improvement by the D&O team...<i>Model review</i> and walkdown of the room L-0117 concludes there is no reasonable avenue for introduction of free liquid or pyrophoric/explosive materials into the canisters once received within the facility. [No prevention method was identified for the future, either].</p> <p>Maximum heat up rate is derived from expected limit to prevent foaming problems. As a consequence, system LSH maintenance evolutions will have uncertain durations.</p> <p>L A W D&O Recommendation: OFI LSH-F-17-0F1-04: Perform pilot melter tests that simulate actual conditions during melter consumable change out: melter idle and simulated C5V and C3V airflows to the plenum space from a bubbler hole. Scale up the results for the full- scale LAW Melter using Computational Fluid Dynamics simulations...WTP commissioning operations are planned to demonstrate evolutions required to be performed to support LAW operations.</p>

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LAW D&O “Verified” Closure Letter	Item Refers to Commissioning	Examples of Topics Mentioning Commissioning
		<p>No single shortcoming will lead to an incident but taken as a whole the Operator Is not being placed in a position that is success oriented. The equipment and facility logistics have not been developed with a Conduct of Operations perspective lending the situation to a condition where Operator error is more probable with the resultant equipment damage and delays... Conduct of Operations principles <i>will be demonstrated</i> during the performance of commissioning operations prior to the initiation of hot operations. [operator success will be un-demonstrated starting with cold, hazardous chemicals].</p> <p>Lack of a simulation, mockup, training facility increases the risk of error In performing new and/or complicated evolutions. The complexity, work environment, PPE, and extensive hands on nature of the work warrants a simulator or mockup facility to dry run evolutions and accommodate training...WTP commissioning operations <i>are planned</i> to demonstrate evolutions required to be performed to support LAW operations. These Include hands on demonstration of activities such as bubbler change out which require work to be completed in an adverse environment and require the use of PPE. Demonstrations will be subject to an Operational Readiness Review during <i>cold commissioning</i> prior to starting hot operations.</p>
17-WTP-0057	4	<p>Vulnerability LOP/LVP-11 Description: The impact of solids accumulation and the effectiveness of their removal within the SBS and SBS Condensate Vessel is not demonstrated other than over limited pilot scale test durations...DOE agrees with BNI’s response. <i>During system performance testing as defined in the commissioning plan which is drafted</i> and to be delivered to DOE next year the strategy for commissioning the SBS as part of the off gas system is defined and the performance criteria and removal capability of solids will be demonstrated If the performance criteria is not met changes in system operations may be necessary to achieve the desired results. Furthermore DOE through its authority in approval of the commissioning plan and its oversight ensures adequate testing as this is the only method for evaluating full scale results.</p>

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LAW D&O “Verified” Closure Letter	Item Refers to Commissioning	Examples of Topics Mentioning Commissioning
		<p>"The eyes of the inspector standing on top an inspection stepped platform will be at 130 above the floor of the Load Dock when the top of the container will be at 108 above the same floor This distance doesn't allow any view of the inside of the container through the 15" diameter container opening... "This is future work... The reviewer obtained a print out of the BNI project level 4 schedule (attached version 4/7/2016) and verified that the activity for schedule ID 3EL4880062 is LAW - ZM support Startup & Commissioning Phase with an expected start date of 8/3/2016 and a finish date of 11/3/2016. [Did the correction happen?]</p> <p>The access to the container top opening by the inspector is challenged as the platforms will be located between positions P1 and P2 of the Receipt Conveyors which increases the distance between the inspector and the container vertical axis... This is future work... To be completed during support to Startup 3EL4880062 [2016 anticipated work] The reviewer obtained a print out of the BINI project level 4 schedule (attached version 4/7/2016) and verified that the activity for schedule ID 3EL4880062 is LAW - ZM support Startup & Commissioning Phase with an expected start date of 8/3/2016 and a finish date of 11/3/2016... BNI does not intend to incorporate the design change proposed... Operational procedures <i>may identify</i> other tools (e.g. inspection mirrors) to facilitate the inspection process. BNI Engineering determines this Vulnerability to be very low risk to existing design and project schedule because of the existing design features and the Operational capacity to supplement with additional tools as deemed necessary." [Risk extended to startup]</p> <p>There is no indication of the location and size of the area available on the Load Dock for staging non-acceptable containers which may be a challenge in this busy area... This is future work To be completed during support to Startup 3EL4880062 [2016 anticipated work]i" The reviewer obtained a print out of the BNI project level 4 schedule (attached version 4/7/2016) and verified that the activity for schedule ID 3EL4880062 is “LAW - ZM support Startup & Commissioning Pha” with an expected start date of 8/3/2016 and a finish date of 9/3/2016... BNI does not</p>

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		<p>intend to incorporate the Opportunity for Improvement... It is anticipated that LAW Containers will be inspected for compliance with Engineering/Procurement specifications prior to shipment to the WTP site thus reducing probability of discovering non-acceptable containers during receipt... [What is the basis for the "anticipation?" How many vessels have actually arrived correctly designed/constructed previously? How many were unsatisfactory before?]</p>
17-WTP-0112	8	<p>Incompatibility of campaign strategies... Melters idled for another reason, such as. work on LOP or LVP, can't be used to "campaign" System LSH consumables... ORP acknowledges that maintenance procedures have yet to be written. Coordination of maintenance activities is not fully understood and may not be until startup and commissioning. ORP acknowledges and accepts the risk that simultaneous maintenance operations may not be able to be performed in campaigns. The commissioning work control process will prioritize and schedule competing work activities. [Issue closed to a promise of future action.]</p> <p>Access to the top of the CCB needs to be provided while it is on the melter, import station, or export station for routine and recovery operations... In response, BNI addressed LSH-F-20-V-01 by attachment 3 to CCN 276214 as, "During cold commissioning access needs will be addressed and commercial ladders etc. will be purchased according to specific needs, frequency and storage capabilities."</p> <p>... The reviewer review Schedule ID 5HLC3J1A0370. Schedule ID 5HLC3J1A0370 stated, "Activity Name: LAW-ops-Develop Systems Procedures-Part 5, Current ME Start: 23-Sep-19, Current ME Finish: 12-June-20, Baseline Start: 23-Sep-19, and Baseline Finish: 12-Jun-20." [Closed to future unfinished work.]</p> <p>Designated space for storage and local maintenance of contaminated equipment and tools in the melter gallery needs to be defined and maintained consistent with operational travel routes. Storage of lifting equipment needs to be provided in the truck bay and the melter gallery... In response, BNI addressed LSH-F-20-V-03 by attachment 3 to CCN 276214 as, "During cold</p>

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		<p>commissioning storage needs for ancillary equipment and tools will be developed." At the time of the review, the reviewer agrees with this path addressing vulnerability LSH-F-20-V-03 with a <i>plan Schedule ID 5HLC3JIA0370</i>.</p> <p>Some maintenance activities on the Process Crane must be performed using the crane maintenance platform at the east end of the melter gallery, trapping the CCB Handler Crane, resulting in no crane coverage of the melter gallery while servicing the Process Crane.... <i>ORP acknowledges that maintenance procedures have yet to be written. <u>Coordination of maintenance activities is not fully understood and may not be until startup and commissioning.</u> ORP acknowledges and accepts the risk that simultaneous maintenance operations may not be able to be performed in campaigns. The commissioning work control process will prioritize and schedule competing work activities. [How does this affect the Operations Research Model and predicted throughput?]</i></p> <p>"Melter consumables will frequently require placement (e.g. 36 bubblers per melter per year, 2 film cooler wash nozzles per melter per year, etc. }. Currently, there is <u>not an adequate number of consumable spares</u> available to support commissioning and startup."... The reviewer comments about this D&O: Having the WTP Operations and Maintenance Group to address this issue is a reasonable approach. <i>The risk is not that great of a factor and can be addressed by a schedule ID.</i> [There was no analysis of the lead time needed to obtain spares, yet closed to future work]</p> <p>Plant operation on a 24 hour per day, 7 days per week schedule is in jeopardy if maintenance failure modes and incidents are not known and understood... In response, BNI addressed LSH-M-16-V-01 by attachment 3 to CCN 276214 as, "The Project OR model collects critical failure modes and consequences."... In WTP Contract No. DE-AC27-01RV14136 section C stated, "Item Number. 2.5, Deliverable: Operational Research Assessment, and Contract Due Date: 12/19/2008, 6/19/2010, February 2012, May of (310) 2014 and December of 2017 and after completion of cold commissioning and completion of hot commissioning." In CCN</p>

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		<p>276214, BNI considered this vulnerability as a Category 5 (Not Credible). At the time of the review, the reviewer agrees with this path addressing vulnerability LSH-M-16-V-01. [Of note is that there have been multiple observations that the WTP OR model does not contain all of the systems or data needed to accurately assess down times] Issue ignored.</p> <p>Hazard Analyses and ALARA Reviews are inadequately addressed for spent consumable handling. Spent bubblers are enclosed within a plastic sleeve at the export/bagging station. The described bagging operation is a hands--on activity including <i>'pig-tailing' the bottom end of the plastic sleeve while the component is suspended from the crane</i>. These activities will require personnel to work under a suspended load and to be in very close proximity to the portion of the bubbler that was in the melt pool and now has a coating of ILAW glass. This is not consistent with ALARA principles... ORP acknowledges that the ALARA review for LSH are documented and the equipment in the facility will be maintained with both hands--on and remote maintenance techniques. ORP acknowledges and accepts the risk that maintenance procedures have yet to be written and will be addressed during startup and commissioning. [Closed to future action].</p> <p>Inadequate Lift Capability in Consumables Import/Export Area... ORP acknowledges and <i>accepts the risk</i> that several lifting options may need to be available for disposal box lid lifting operations. Shortcomings in lifting options presents minimal risk and will be addressed during startup and commissioning. [No risk analysis provided. Closed to future action.]</p>
17-WTP-0154	8	<p>Lidding Bogie interlocks listed in the Mechanical Sequence Diagram (MSD) 24590-LAW-MI-LFH-00001 are not sufficient to protect the equipment from damage A thorough LFH devices interlock document design review and testing to assure Lidding Bogle will work properly is required... Agree that Start-up and commissioning <u>should</u> include exhaustive testing of both success and failure paths and Off-Normal operations to wring out errors and identify improvements in operations and operator/control interfaces before operations begin This comment is very generic in nature</p>

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		<p>with a generic concern that the system is not enough to protect the damage without any specific deficiency example. [Closed to a vague future effort with less than a specific look].</p> <p>Inadequate material of construction... The coil airline connecting the hard pickup assembly to the facility air is not high temperature material The hose material cannot be operated reliability at temperatures above 180-200 deg F The air supply hose will only see high temperature when the shard pickup assembly is at its lowered position and the air supply is turned off <i>However this condition will occur often enough to cause premature airline failure...</i> In CCN 276214 BNI considered this vulnerability as a Category 5 (No Credible) At time of the review this vulnerability is a minor issue That can be addressed during start up and Commissioning If changes are needed.</p> <p>At time, of the review the reviewer agrees with BNI's path addressing this vulnerability LFH-SSS-1-V001. [Superficial review did not even evaluate the risks or availability of other materials. Put the risk off for others to experience]</p> <p>"While drawing 24590-LAW-DD-S13T-00029 is showing the back of the Elevators Insulated with 6" of insulation nothing appears to be Insulating the sides of the Elevator Per calculation 24590-LAW-M4C-C5V-00001 Figure 38, sheet 107 the Elevator metal temperatures will be a minimum of 150 F."... BNI responded "Reviewers concern is noted. The pour cave elevator rooms such as L-8012 are not occupied for normal operations They will be accessed for maintenance or recovery operations during commissioning and remedial actions will be investigated at the time if necessary.</p> <p>Elevated surface temperatures of running equipment is a common hazard in Industrial facilities and would typically be mitigated with an orientation-type training prior to allowing entry In the facility or with signage... The ORP reviewer concluded that the potential for elevated temperatures of facility equipment during operations <i>is a reasonable hazard</i>. [Industrial Safety/OSHA was not consulted – nor was there a review of how personnel well be prevented from occupying the room. Are the procedures established?]</p>

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		<p>"Tests need to be done on a thermally hot melter to ensure problems as a result of thermal growth are considered and especially for any component replacement to ensure Industrial hazards are considered before doing it on a radioactively hot melter... Modification can be addressed on an as needed basis during cold commissioning This would have little impact on the schedule. [Based on what analysis?]</p> <p>No plans have been developed for cleaning glass spall and drips from the melter shielded enclosure, melter port consumable seating surfaces, bubbler air supply ports, CCB lid/interior gamma gate or bagging station surfaces... ORP acknowledges and accepts the risk that if this situation occurs it will be addressed during startup and commissioning. [Glass is a source of radioactive dose. Were the impacts evaluated? Added to the risk register? Added to the schedule contingency?]</p> <p>The design of the bubbler air supply port requires a neoprene gasket/O-ring between the bubbler and the melter air supply port To ensure this rubber gasket/O-ring does not gall or roll during installation in the bubbler air supply port ""Apply Super-O-Lube silicone grease to gasket prior to installing into the melter." The last opportunity to apply a lubricant is prior to insertion into the CCB when the bubbler is in the Consumable Import Cart or as it is lowered into the Import Station However requirements for installation of the gasket and appl of the silicone grease have not been specified... ORP acknowledges and accepts the risk that criteria and specifications for bubbler change-out and installation have yet to be written and will be addressed during startup and commissioning.</p> <p>During consumable changeout both the clean and spent CCBs have the potential to become pressurized vessels. The +/- vessel pressures introduce the potential for the spread of contamination CCB equipment damage and/or operations production impact... ORP acknowledges and accepts the risk that the consumable changeout box may become a pressurized vessel during bubbler changeout operations. Tests have been conducted which show there is a vacuum with minimal</p>

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		<p>deflection after the bubbler cools. [No discussion for before the bubbler cools.] Additional requirements or modifications will be addressed during cold commissioning on an as needed basis.</p> <p>Two air supply bottles are mounted on the top of each bubbler. Disposal restrictions require that such items be rendered incapable of holding pressure There are no provisions for preparing the bottles for disposal... Detailed operating procedures is part of operations to-go scope... [This time there was not even a reference to a schedule item to complete the work] ORP acknowledges and accepts the risk that procedures will be developed during startup and commissioning for proper disposal of air bottles on spent bubblers after bubbler change out.</p>
17-WTP-0176	9	<p>Risk of contamination backflow in a Swabbing/ Finishing Line...The resulting risk is considered low and will be realized during startup and commissioning as the ventilation system is balanced <i>and actual configuration is understood.</i></p> <p>HVAC-12-3: 15 doors have been identified to have less than 100 fpm velocity through C2/C3... The resulting risk is considered low and will be realized during startup and commissioning as the ventilation system is balanced and actual configuration is understood... [No action was taken to determine if any of a study’s recommendations was carried out]</p> <p>No airflow parameter identified for the open doors between 03 and 05 zones... The resulting risk is considered low and will be realized during startup and commissioning as the ventilation system is balanced and actual configuration is understood... [No action was taken to determine if any of a study’s recommendations was carried out]</p> <p>Airflow through open doors and hatches between C3 and C5 areas not evaluated... The resulting risk is considered low and will be realized during startup and commissioning as the</p>

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		<p>ventilation system is balanced and actual configuration is understood... [No action was taken to determine if any of a study’s recommendations was carried out]</p> <p>Airflow through the canister import hatch has not been evaluated... . The resulting risk is considered low and will be realized during startup and commissioning as the ventilation system is balanced and actual configuration is understood... [No action was taken to determine if any of a study’s recommendations was carried out]</p> <p>Airflow through the finishing line with doors and hatches in the open position has not been evaluated... The resulting risk is considered low and will be realized during startup and commissioning as the ventilation system is balanced and actual configuration is understood ORP review of the study including independent expert review as documented in ORP letter 17-WTP-0078 concludes the actions completed are adequate to disposition this vulnerability. [However, this is only a model review – and the model contains limitations and assumptions.] The independent expert concluded that “CONTAM is restricted to time and arrangement independent results This combined with the scenario implementation - restricting the study to discrete scenarios - serves to limit the applicability of this study to a first order guidance document. <i>Detailed design confirmation especially once time sequencing and actual component performance are imposed will be necessary.</i> ORP’s reliance on the 17-ORP-0078 appears premature.</p> <p>Basis/definition of acceptable gear oil leakage rates and process impacts is not evident... Maintenance plans have yet to be developed... ORP acknowledges and accepts the risk that maintenance procedures have yet to be developed and will be addressed during startup and commissioning. Proper fill of oil levels for the agitators will be addressed during the startup and commissioning phase as prescribed per the operations manual. ORP also concurs that excessively filling the agitators with oil would contribute an insignificant amount of organics to the feed vessel and does not warrant establishing acceptance limits for oil leakage. It should be emphasized that not overfilling the reservoirs precludes any oil leakage.</p>

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		<p>Vendor’s calculation for bogie bumper selection is based on incorrect gross weight and bogie speeds... As an opportunity for improvement the D&O team suggested "Re-run the LFH Bogie Bumper Selection Calculator for the corrected weights and operating speeds to verify that the bumpers mounted on the fabricated and installed bogies are adequate prior to commissioning... BNI Review of this vulnerability concluded that the present analysis is bounding with the use of speeds in excess of the design speed since energy is proportional to velocity squared the smaller discrepancy in mass is more than compensated for in the conservative velocity used. No specific design criteria was listed in the procurement specification therefore the resulting deceleration felt by the bogie has no pass/fail criteria.</p> <p>Opportunities for Improvement The review team recommends DOE issue a contract to perform a facility power study using SKM Power Tools for Windows so that operations has useful input files to use in the facility during commissioning and operations. DOE has informed the review team that the Hanford Site standard software may be changing to ETAP, if that change takes place this vulnerability will go away. However at the time of the review a discrepancy between software products used for the WTP project and at the Hanford Site exists therefore this will remain listed as a low consequence vulnerability... No requirement exists in the WTP contract to use SKM software The migration from ETAP to SKM would be expensive and also necessitate significant baseline changes to the electrical system In addition the Hanford contractors are considering transitioning from SKM to ETAP software which would eliminate the integration issues ETAP and SKM both are credited software and have similar installation basis but many other DOE facilities are using ETAP. Keeping WTP with ETAP is probably more cost effective than report the calculations to the SKM model... Conclusion ROR-ELEC-4 Vulnerability #2 is acknowledged but not accepted.</p>
17-WTP-0199	2	<p>The effects from other unit operations on the startup and shutdown of caustic scrubber have not been fully analyzed/determined... Subsequent to the D&O vulnerability LOP / LVP Equipment Technical Manual, Wet Electrostatic Precipitator, 24590-LAW-PERC-PENG-1 5-</p>

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		<p>00015, was completed. The caustic scrubber technical manual provides parameters for startup and shutdown of the caustic scrubber. These will be incorporated into the off-gas system operating procedures as they are developed and will be further refined during startup and commissioning.</p> <p>The criterion for the consumable cooling rate and time while being raised into a CCB has not been determined... ORP has reviewed 24590-101-TSA-W000-23-09F Pilot Melter Bubbler Consumable Changeout Box Test Results Report and concurs that maximized efficiency between loose glass vs bubbler change-out duration will be addressed during startup and commissioning... The LAW FPD has reviewed this report, <i>is aware of the risk</i>, and concurs with the closure of this vulnerability on design.</p>
17-WTP-0214	12	<p>"Adjusting of subchange dampers along with opening and closing doors causes changes in C5V flow."... The resulting risk is considered low and will be realized during startup and commissioning as the ventilation system is balanced and actual configuration is understood... ORP review of the study, including independent expert review as documented in ORP letter 17-WT-P-0078, concludes the actions completed are adequate to disposition this vulnerability... ORP review of the study including independent expert review as documented in ORP letter 17-WTP-0078 concludes the actions completed are adequate to disposition this vulnerability. [However, this is only a model review – and the model contains limitations and assumptions.] The independent expert concluded that “CONTAM is restricted to time and arrangement independent results This combined with the scenario implementation - restricting the study to discrete scenarios - serves to limit the applicability of this study to a first order guidance document. <i>Detailed design confirmation especially once time sequencing and actual component performance are imposed will be necessary.</i> ORP’s reliance on the 17-ORP-0078 appears premature. [page 2]</p>

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		<p>"Off-normal operations analysis not performed." [page 3]... the resulting risk is considered low and will be realized during startup and commissioning as the ventilation system is balanced and actual configuration is understood. ORP review of the study including independent expert review as documented in ORP letter 17-WTP-0078 concludes the actions completed are adequate to disposition this vulnerability. [However, this is only a model review – and the model contains limitations and assumptions.] The independent expert concluded that "CONTAM is restricted to time and arrangement independent results This combined with the scenario implementation - <u>restricting the study to discrete scenarios - serves to limit the applicability of this study to a first order guidance document.</u> Detailed design confirmation especially once time sequencing and actual component performance are imposed will be necessary. ORP's reliance on the 17-ORP-0078 appears premature.</p> <p>"Loss of site power operation analysis not performed."...[page 4] The resulting risk is considered low and will be realized during startup and commissioning as the ventilation system is balanced and actual configuration is understood. ORP review of the study, including independent expert review as documented in ORP letter 17-WTP-0078, concludes the actions completed are adequate to disposition this vulnerability. ORP Reliance on 17-WTP-0078 is premature. The model neglects "non-ideal" performance.</p> <p>Container decontamination and recovery of a contaminated container may be problematic... [page 8] Container decontamination will be demonstrated by integrated testing during startup and commissioning... Closure of the vulnerability base on BNI response is adequate. The LAW FPD has reviewed this report, is aware of the risk, and concurs with the closure of this vulnerability on design.</p> <p>Operation of the Carbon Dioxide (CO₂) pelletizer and C5V vacuum pickup system may be problematic...[page 10] The Vendor is recommending that no spare parts be provided for the pelletizer to support startup and commissioning... Trend 06-03055 was previously generated to identify the scope and cost for performing additional integrated testing of the LAW decon</p>

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		<p>system equipment to address concerns from the [March 2007] DOE Technical Readiness Assessment. The trend was cancelled based on recommendation of the WTP Technical Steering Group <i>to perform additional testing as part of facility startup</i>. Activities listed above indicate that the baseline schedule Commissioning start in Nov 2020... LFH capabilities will be demonstrated by integrated testing during startup and commissioning... The LAW FPD has reviewed this report, is aware of the risk, and concurs with the closure of this vulnerability on design.</p> <p>"Maintenance on Bogies in Swabbing and Export Rooms may be problematic due to contamination potentially pulled from Container Lidding Areas."...[page 17] "The commissioning (and operational procedure development activities) were subsequently re-sequenced; thus de-coupling the subject schedule activity. Schedule ID 3EL4880062 no longer aligned with Engineering support to Commissioning for the subject system and was therefore not an indication of closure of these vulnerabilities. It is reasonable to conclude that operations procedures <i>will be</i> developed for maintenance and/or recovery of bogies within the finish line... The ORP reviewer has considered the response provided by BNI in conjunction with the original D&O statements and agrees that BNI will have to develop appropriate procedures <i>in the future</i> to ensure safe and reliable operations and maintenance. However, these details have not yet been developed.</p> <p>"Absence of Finishing Line Bogie <u>maintenance hoist</u> may result in problematic bogie maintenance."...[page 19] "The commissioning (and operational procedure development activities) were subsequently re-sequenced; thus de-coupling the subject schedule activity... BNI will have to develop appropriate procedures in the future to ensure safe and reliable operations and maintenance.</p> <p>"Lidding and Decontamination Bogies need to be disconnected from Power Cables and Carrier prior to maintenance which makes their transfer back to their respective process area problematic."...[page 20] BNI responded as follows, "The commissioning (and operational</p>

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		<p>procedure development activities) were subsequently re-sequenced; thus de-coupling the subject schedule activity...BNI will have to develop appropriate procedures in the future to ensure safe and reliable operations and maintenance. However, these details have not yet been developed.</p> <p>'Contamination on the surface of the Container Lower Overpacks may be physically pressed and imbedded in the lower surface of the container at 8 locations. [page 30-31] The indentations will increase complexity of the decontamination process since 'indentations' are being decontaminated rather than a smooth cylinder. Thermal distortion of the Lower Overpack may cause binding of the container and Overpack."... according to the vendors evaluation, interference between the overpack and the canister <i>should not</i> occur. However, observations during commissioning will need to validate that conclusion. Although the <i>SDD no longer contains the requirement to measure the overpack temperature</i>, the reviewer agrees that any interference issues will be revealed during commissioning and modifications to the overpack <i>could happen</i> with relative ease at that time. It is noted that although the tolerance evaluation performed by the vendor does show that interference <i>should not</i> be a problem, in some cases clearances are minimal and thus risk of interference is not negligible.</p> <p>"The factory acceptance testing of the LRH conveyor system does not seem to meet all the requirements of the conveyor specifications...[page 33] it appears BNI could not verify FAT test meets spec requirements...FAT testing to be reverified during start up and commissioning." BNI has concluded to initiate a CR to further investigate and document this vulnerability. CR 17-01592. This LAW D&O vulnerability is considered closed and the issues identified will be addressed under the contractor's corrective action management program (CR 17-01592).</p> <p>Empty LAW container handling by the LSH-CRN-00001 crane will have to be done by either moving the containers around each other or by moving the containers in controlled, sequential order...[page 35] "The LSH-CRN-00001 crane does not have enough lift clearance to lift a</p>

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		<p>LAW container over another container on an over-the-road truck. Due to the length of the procured pendant cable, use of the pendant to control the crane and move canisters from a truck will be difficult." ... "Procedures have not yet been developed that are approved for operational use. These are being developed in accordance with the level 5 schedule." The reviewer determined the vulnerability does not constitute a condition adverse to quality <i>at this time</i>... Furthermore, to address the training concern, the WTP Contract No. DE-AC27-01 RV14136, section C states: Standard 5: Commissioning - The purpose of this standard is to describe the requirements and deliverables for the startup testing and commissioning of the WTP. Startup testing begins following turnover of systems from construction, including component and system level tests that will be performed in a planned sequence at each facility, and precedes cold commissioning of the facility. The Startup and Commissioning process begins with Startup testing followed by Commissioning testing, which includes testing during Cold Commissioning making production runs using agreed upon simulant waste, then Hot Commissioning using actual tank waste, and continues through to turnover to the future Operations Contractor. Commissioning is supported by testing, operations, maintenance, procedure development, and training required to support the scope contained in this standard This LAW D&O vulnerability is considered closed. [No ALARA review?]</p> <p>"From a load lifting perspective, the LSH-CRN-00001 appears to be over-specified as a Class D (Heavy Service) crane for empty container handling. [page 36] However, from a motor jog/start stop perspective, the crane may require a Class D rating. Excessive numbers of starts, stops, and motion reversals is hard duty for motors, motor starter contacts, and motor brakes and may lead to early failure of the motors, starters, and brakes. Maintenance on the motors and motor brakes will require a scissor lift to be rented and delivered to the site. If the repairs cannot be completed in two or three days, the LAW Facility will have to be shut down due to a lack of empty LAW containers... Man-lifts are provided throughout the WTP facility ensuring available access for maintenance." ... The reviewer determined the vulnerability does not constitute a condition adverse to quality <i>at this time</i> and the BNI response above properly</p>

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		<p>addresses the D&O comment on crane maintenance and duty/rating. Furthermore to address the training concern, the WTP Contract No. DE-AC27-01 RVI4I 36, section C states: Standard 5: Commissioning - The purpose of this standard is to describe the requirements and deliverables for the startup testing and commissioning of the WTP. Startup testing begins following turnover of systems from construction, including component and system level tests that will be performed in a planned sequence at each facility, and precedes cold commissioning of the facility. The Startup and Commissioning process begins with Startup testing followed by Commissioning testing, which includes testing during Cold Commissioning making production runs using agreed upon simulant waste, then Hot Commissioning using actual tank waste, and continues through to turnover to the future Operations Contractor. Commissioning is supported by testing, operations, maintenance, procedure development, and training required to support the scope contained in this standard This LAW D&O vulnerability is considered closed. [No verification that the man lifts are equivalent in capability to the scissor lifts identified by the review team?]</p>
17-WTP-0235	15	<p>Rollup doors are used in several places in the facility. Rollup doors are larger than personnel doors and are not solid doors. They have the potential to allow greater infiltration into the airspace than a standard personnel door. [page 7] This amount of infiltration has not been quantified. The BNI response says that rollup door infiltration has been accounted for in the infiltration calculation. While it is true that infiltration into C5 areas has been accounted for in the calculation, <i>none of it is attributed to the rollup door.</i> ... The magnitude of this issue will not be known and will not be known until commissioning;... In the event that the infiltration is greater than anticipated, it is believed that a more secure seal for the door edges could be devised and installed in order to bring the infiltration back in line with expected system performance.... DOE <i>accepts the risk</i> that infiltration through these rollup doors will present challenges with the C5V ventilation system.</p>

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		<p>"The 40 year design life of the LFP Vessels is in question due to the lack of credible data to accurately predict the erosion wear for SA-240, 316L material." [page 12] The D&O basis explains that "The basis for the assumption that for the LFP Vessels, that the velocity inside the vessels with glass formers will be less than 1/2 the agitator tip speed is derived from the results of a Non-NQA-1 Computational Fluid Dynamic (CFO) software performed by the agitator vendor. With this <u>unverified assumption</u> accepted, all that is currently required for verification is to confirm the agitator shaft RPM and blade dimensions during startup testing and commissioning.... The method for verifying the assumption that the velocity at the vessel wall is 1/2 the agitator speed has not been adequately captured. ... BNI decided to initiate a Condition Report (24590-WTP-GCA-MGT-17-01834) to address the matter. At the time of this closure document, the CR was still in screening status... The ORP Reviewer confirmed that 24590-WTP-GCA-MGT-17-01302 is active in the BNI CAMP system. Based on BNI action to address this via the CR process, this D&O vulnerability can be closed. ... The LAW FPD has reviewed this report, <u>recognizes the risk</u> in closing the item based on <i>future resolution</i> [contrary to QA] of a CR and concurs with the closure of this vulnerability on design.</p> <p>"The operating envelope has not been defined to ensure the requirement for mixing homogeneity can be met during normal plant operations." ... [pages 14-15] It is not apparent where BNI vetted these recommendations based on the LAW D&O responses. However there is flexibility to address such issues should they arise in commissioning.... The ORP reviewer has reviewed the response provided by BNI in conjunction with the original D&O statements and agrees that BNI <i>will have to</i> evaluate the function of the single speed agitator as well as the use of radar detection for level indication during start up and cold commissioning.... The LAW FPO has reviewed this report, understands the risk in closing this item based on <i>future work to be performed</i> [a violation of QA], and concurs with the closure of this vulnerability on design.</p>

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		<p>Operation of the Carbon Dioxide (CO₂) pelletizer and C5V vacuum pickup system may be problematic. The shrouds and operation of the upper and lower decontamination power manipulators may be problematic. ...[pages 19-20] The Vendor is recommending that no spare parts be provided for the pelletizer to support startup and commissioning. ... While the duct is Q quality and is not likely to fail, there is a flex coupling on the fan that is still suspect. BNI is looking into the life expectancy of the flex coupling. <i>As long as</i> the flex coupling is adequately maintained, the hazard should be minimal. BNI has generated CR 24590-WTP-GCA-MGT-17-01874 to track this hazard to resolution. This CR will adequately disposition his D&O issue. ... The LAW FPO has reviewed this report, <i>is aware of the risk</i>, and concurs with the closure of this vulnerability on design.</p> <p>The <u>Lidding Jib Crane</u> (LFH-CRN-00003 / 00006) [pages 21-22] should be interlocked with the Sealing Jib Crane (LFH- CRN-00004 / 00007) to allow movement of the Lidding Crane only if it will not collide with the Sealing Crane. ... Start-up and commissioning should include exhaustive testing of both success and failure paths and off-normal operations to "wring out" errors and identify improvements in operations and operator/control interfaces before operations begin. ... BNI's response: This is <i>future work</i> to be completed during support to startup 3EL4880062. <i>Credit is given to skilled operators</i> trained and adhering to operating instructions where they are told of the hazards associated with bogie location and doors acting as guillotine. ... Conclusion: From the review of the J3, SDD, PISW, and MSD document, it shows this LFH-IC-1-V003 is well documented, and interlock functions are sufficient, and has no need to be over engineering to provide all possible interlocks, that does not justify for any additional interlocks to prevent any potential lidding and sealing jib movement interferences. In addition, the operator will be trained to operate the crane. The local and remote controls and displays are sufficient for safe operations. The comment is acknowledged and no further interlocks is considered necessary. [NOTE: this disposition sheet is not signed by the engineer or by the DOE FPD. A second version, without a report number (pages 23-25) addresses the same topic. Omitted signatures and report numbers are quality assurance issued.</p>

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		<p>The <u>Sealing Jib Crane</u> (LFH-CRN-00004 / 00007)-should be interlocked with the Lidding Jib Crane (LFH-CRN- 00003 / 00006) to allow movement of the Sealing Crane only if it will not collide with the Lidding Crane. [pages 26-27] Device specific interlocks should be complete enough to keep the equipment from damaging itself or other systems, structure or components regardless of whether they are operated locally or remotely; manually or automatically. ... If the requirements are incorrect, the requirements documents should be updated. If the implementation is incorrect, it should be corrected. Add a reference in the MSDs to the J3 Logic Diagrams where the interlock is implemented. Start-up and commissioning should include exhaustive testing of both success and failure paths and off-normal operations to "wring out errors and identify improvements in operations and operator/control interfaces before operations begin. ...</p> <p>Conclusion: From the review of the J3, SDD, PISW, and MSD document, it shows this LFH-IC-1-V004 concern is well documented, and interlock functions are sufficient, and has no need to be over engineering to provide all possible interlocks, that does not justify for any additional interlocks to prevent any potential lidding and sealing jib movement interferences. In addition, the operator will be trained to operate the crane. The local and remote controls and displays are sufficient for safe operations. The comment is acknowledged and no further interlocks is considered necessary. [NOTE: this disposition sheet is not signed by the engineer or by the DOE FPD. A second version, without a report number (pages 28-30) addresses the same topic. Omitted signatures and report numbers are quality assurance issues.</p> <p>Interlocks on the Decon Shield Door listed in the Mechanical Sequence Diagram 24590-LAW-M1-LFH-00001 are not sufficient to protect against HVAC flow disruptions or the spread contamination. [Pages 31-32] Conclusion: From the review of the J3, SDD, PISW, and MSD document, it shows this LFH-IC-1-V005 <i>concern is well documented</i>, and interlock functions are sufficient, and has no need to be over engineering to provide all possible interlocks, that <i>does not justify for searching</i> any additional interlocks to prevent any potential contamination it may cause. In addition, the operator will be trained to operate the crane. The local and remote</p>

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		<p>controls and displays are sufficient for safe operations. The comment is acknowledged and no further interlocks is considered necessary...[Wonder if the D&O review team was asked if they concurred?] [NOTE: this disposition sheet is not signed by the engineer or by the DOE FPD.] A second version, without a report number (pages 33-35) addresses the same topic. Omitted signatures and report numbers are quality assurance issues. Signed attachments are not the same as a signed report.</p> <p>Interlocks on the Decontamination Power Manipulators and the Decontamination Turntable listed in the Mechanical Sequence Diagram 24590-LAW-M1-LFH-00001, are not sufficient to prevent the equipment from damage. [Pages 37-38] ... Start-up and commissioning should include exhaustive testing of both success and failure paths and off-normal operations to "wring out" errors and identify improvements in operations and operator/control interfaces before operations begin. The K965-002 will become Revision 0, once the Factory acceptance Test (FAT) is completed, although the only document copy can be found in the BNI iDoc system is Revision G. ...From the review of the 24590-CM-POA-HDYR-00002-03-00001 document, it shows this LFH-IC-1-V006 concern has been well designed, tested and documented, and interlock functions are sufficient, and has no need to be over engineering to provide all possible interlocks, that does not justify for searching any additional interlocks to prevent any potential damage which the D&O did not even identify. The comment is acknowledged and no further interlock is considered necessary. [NOTE: this disposition sheet is not signed by the engineer or by the DOE FPD.] A second version, without a report number (pages 39-41) addresses the same topic. Omitted signatures and report numbers are quality assurance issues. Signed attachments are not the same as a signed report.</p> <p>Interlocks on the Swabbing Bogie (LFH-TRLY-00015 / 00005) listed in the Mechanical Sequence Diagram 24590- LAW-M1-LFH-00001, are not sufficient to prevent the equipment from damage....[pages 42-43] Start-up and commissioning should include exhaustive testing of both success and failure paths and off-normal operations to "wring out" errors and identify</p>

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		<p>improvements in operations and operator/control interfaces before operations begin. ... Conclusion: From the reviews discussed above, it shows this LFH-IC-1-V007 concern has been well designed, tested and documented, and interlock functions are sufficient, and has no need to be over engineering to provide all possible interlocks, that does not justify for searching any additional interlocks to prevent any potential damage which the D&O did not even identify. The comment is acknowledged and no further interlock is considered necessary. [NOTE: this disposition sheet is not signed by the engineer or by the DOE FPD.] A second version, without a report number (pages 44-46) addresses the same topic. Omitted signatures and report numbers are quality assurance issues. Signed attachments are not the same as a signed report.</p> <p>There is no clear flow down of requirements from higher level documents to the Logic Diagrams. The J3 logic Diagrams attempt to correct this, but that puts them in violation of an upper-level requirement...[pages 447-48]. Start-up and commissioning should include exhaustive testing of both success and failure paths and off-normal operations to "wring out" errors and identify improvements in operations and operator/control interfaces before operations begin. ... Conclusion: It has no need to be over engineering to provide all possible solution for the requirements traceability, and documentation until the management decision is concluded. The comment is acknowledged and no further interlock is considered necessary. [NOTE: this disposition sheet is not signed by the engineer or by the DOE FPD.] A second version, without a report number (pages 49-51) addresses the same topic. Omitted signatures and report numbers are quality assurance issues. Signed attachments are not the same as a signed report.</p> <p>"The analysis indicates air moving over the robot arm to the gripper to create convective cooling is required to maintain temperature sensitive instruments below critical temperatures. The velocity of the air at the surface of the container was not analyzed to determine the potential for spreading contamination and adversely affecting the quality of the swabs. Temperature of the compressed air lines has not been adequately analyzed to determine if the</p>

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		<p>aluminum wrap is effective at maintaining the compressed air lines below critical temperatures. [pages 55-56]... At this time, the reviewer concludes that the updated CFD analysis has shown that canister temperatures will be significantly less than previously predicted and the resultant effect to swabbing sensors will more than likely be minimal. However, the new analysis did not focus on that area of the finishing line so this is purely a judgment based on limited temperature data that is available. If the temperature effect on the swabbing equipment is determined to be detrimental, 24590-CM-POA-HDYR-00002-21-00002 identified methods to mitigate the temperature affects if necessary. Given the stage of project completion, DOE accepts the risk and recognizes that mitigation activities (if needed) would be implemented during startup and commissioning.</p> <p>"Intrusive maintenance performed on the LOP system (including the condensate receipt vessel) will require both melters to be in idle with the cold cap burned off. [Page 58] Other non-intrusive maintenance requiring a process cell entry could also result in idling both melters." ... BNI is still in the process of developing operating and maintenance procedures. Procedures will be developed prior to operating the melters and offgas system. These procedures will be further refined during startup and commissioning to maximize glass production. ... DOE recognizes the potential impact to glass production if both melters are idled and the cross-over line between the melters is opened. However, it is <i>believed</i> there are ways to work around this issue and minimize the impact to glass production. DOE accepts the risk. The LAW FPD has reviewed this report, <i>understands</i> the remaining risk, and concurs with the closure of this vulnerability on design.</p> <p>"Heat-up and cool-down temperature profiles for TCO skid not considered in OR model." [The OR model is used to determine contractual compliance with the requirement for 70% operating availability.] [page 61] ... The TCO skid will be started up and shut down several times during startup and commissioning. These heat-up and cool-down cycles will affect production during startup and shutdown. However, once the facility is operational, startup and shutdown cycles will be minimal since continuous operation is <i>anticipated [assumed]</i>. The</p>

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		<p>impact of these startup and shutdown cycles is anticipated to be minimal as well. The TCO skid is in place. <u>Replacing it at this point would be cost prohibitive</u>. DOE <i>anticipates</i> the impact to glass production due to heat-up and cool-down cycles of the TCO skid to be limited. DOE accepts the risk to glass production due to heat-up and cool-down of the TCO skid.... The LAW FPO has reviewed this report, understands the remaining risk, and concurs with the closure of this vulnerability on design.</p> <p>There are many inconsistencies between the requirements documents such as the Mechanical Sequence Diagram and the implementation of these requirements on the Logic Diagrams. Since there is no narrative or cross-walk between the requirements and the logic diagrams it is difficult to review, and will be difficult to verify and validate that the requirements are met. ... "Start-up and commissioning should include exhaustive testing of both success and failure paths and Off-Normal operations to "wring out" errors and identify improvements in operations and operator/control interfaces before operations begin. ... Conclusion: From the review of the document, it shows this LPH-IC-1-V001 will not add additional benefits with a major benefits. The control software are tracked and documented to J3 and PISW document and are field V&V'd and tested to verify the requirements are fulfilled and accurate. The comment is <i>acknowledged and no further documentation is considered necessary</i>. NOTE: this disposition sheet is not signed by the engineer or by the DOE FPD. A second version, without a report number (pages 72-74) addresses the same topic. Omitted signatures and report numbers are quality assurance issues. Signed attachments are not the same as a signed report.</p> <p>Insufficient priority, resources and funding have been given to the LSH maintenance program to ensure successful plant commissioning and startup. [pages 90-93] ... Currently, the mechanical flow diagram drawings are cancelled; however, they are <i>in the process of</i> being reissued, 24590-LAW-MS-LSH-XXXXXxxx. The mechanical flow diagrams provide a description, in flow diagram format, of the sequential operational steps within system LSH. Note that this information, albeit in a different format, already exists in the System Design Description. <i>Currently, the OR model does not contain detailed activities for all LSH</i></p>

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		<p><i>equipment. Frequencies and durations of activities would be a WTP input to the OR model if the project determined it necessary for incorporation. ORP Comments: ORP has reviewed and concurs with BNI's responses. ... The LAW FPD has reviewed this report, is aware of the risk, and concurs with the closure of this vulnerability on design.</i></p> <p><i>[Note – the DOE reviewer associated with the unsigned forms in this letter was found in May 2018 (via unsatisfactory examination) to have weaknesses in understanding the hazards in the BOF Facility, the Building 89 function and purpose, the credited safety functions for LOP, backup versus emergency power, uninterruptible power supply loads, DOE standards of classification for the public, co-located worker, and facility worker, facility walkthrough, understanding of misroutes, and safety basis class. These weaknesses were not documented until after the completion of the LAW D&O “verification” of closure actions were completed. Have these items been revisited?]</i></p>
18-WTP-0007 January 17, 2018	1	Bechtel’s <i>plan</i> is to conduct <i>demonstration testing</i> early in the startup and commissioning phase. ...