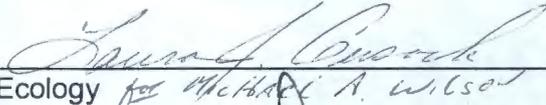


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| Change Number Draft M-45-04-05 | Federal Facility Agreement and Consent Order Change Control Form | Date Draft December 29, 2004 |
| Originator US DOE-ORP | | Phone 376-2247 |
| Class of Change <input type="checkbox"/> I – Signatories <input checked="" type="checkbox"/> II – Executive Manager <input type="checkbox"/> III – Project Manager | | |
| Change Title Extension of due dates for <u>Hanford Federal Facility Agreement and Consent Order (HFFACO)</u> Milestones M-45-03C and M-45-05A to June 30, 2005, M-45-13 and M-45-15 to March 31, 2006, and M-45-13-T01 and M-45-15-T01 to March 31, 2007. | | |
| Description/Justification of Change This change request extends the due dates for the following Milestones and Target Dates 90 days: <ul style="list-style-type: none"> • M-45-03C (Complete Full Scale Saltcake Waste Retrieval Technology for S-112), and M-45-05A (Complete Initial Waste Retrieval from S-102) until June 30, 2005. • M-45-13 (Interim Completion of Tank S-112 SST Waste Retrieval and Closure Demonstration Project) and M-45-15 (Interim Completion of Tank S-102 SST Waste Retrieval and Closure Demonstration Project) to March 31, 2006. • M-45-13-T01 (Final Completion of Tank S-112 SST Retrieval and Closure Demonstration Project) and the M-45-15-T01 (Final Completion of Tank S-102 SST Retrieval and Closure Demonstration Project) to March 31, 2007. <p>The proposed extensions described above are due to:</p> <p><u>Worker health and safety controls.</u></p> <ul style="list-style-type: none"> • Several events within the tank farms revealed weaknesses in the identification of hazards, hazard controls and field performance. As a result of these events and detailed analysis of their root causes, additional controls have been implemented to enhance the health and safety of the tank farm workers and environment. The primary additional controls that have delayed field performance are as follows: <ul style="list-style-type: none"> ○ Enhanced Radiological Control Practices ○ Tank Vapor Worker Protection <p><u>Tank waste chemistry.</u></p> <ul style="list-style-type: none"> • During the final planning steps for Tank S-102, waste gelling due to the phosphate concentration in the waste was identified as a potential issue. <ul style="list-style-type: none"> ○ If gelling occurred in the receiving double-shell tank (DST) (SY-102), additional safety issues could arise because of retention of flammable gas. In addition, significant equipment damage (plugging of the pump and or transfer lines) could occur which would further delay the overall retrieval schedule. ○ Additional unanticipated waste sample analyses were needed to develop mitigation strategies; these mitigation strategies will slow the S-102 retrieval rate. • S-112 dissolution has been slower than planned. <p><u>Equipment failure.</u></p> <ul style="list-style-type: none"> • During the retrieval activities on tank S-112, the Anti-Siphon Slurry Distributor (ASSD) in the receiving tank (SY-102) became plugged. The ASSD had to be replaced prior to initiating retrieval activities in S-102. • During retrieval activities on S-112, condensate was observed in the ventilation system. A demister was required to be installed in both the S-112 ventilation system, prior to resuming retrieval, and the S-102 ventilation system, prior to starting retrieval. <p>Extension to both S-112 and S-102 retrieval milestones and subsequent closure milestones is requested. Tanks S-102 and S-112 share portions of the same retrieval transfer lines and the same receiving double shell tank, thus simultaneous retrieval operations in tanks S-102 and S-112 are not possible. The current retrieval strategy, driven by the slower dissolution rate, is to allow one tank to soak and dissolve the solids, while active pumping is taking place in the other tank. This process allows for the most efficient use of equipment and personnel while trying to achieve retrieval commitments.</p> | | |
| Impact of Change This change request moves Milestones M-45-03C and M-45-05A to June 30, 2005 and M-45-13 and M-45-15 to March 31, 2006. This change also includes extension of M-45-13-T01 and M-45-15-T01 to March 31, 2007. | | |
| Affected Documents | | |

The HFFACO, as amended, including HFFACO Action Plan Appendix D, and Hanford site internal planning, management, and budget documents (e.g., DOE and DOE contractor Baselines, Baseline Change Control documents; Sitewide System Engineering Control documents; Project Management Plans; and the Hanford Site Integrated Priority List (IPL).

Approvals

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|---|------------------|---|
|  Ecology for Michael A. Wilson | 1/10/05 Date | <input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved |
|  DOE - ORP | 12/29/04 Date | <input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved |

Description/Justification of Change (Continued)

As background, this change request is directly related to the Consent Decree in *State of Washington, Department of Ecology v. Department of Energy*, Case No. CT-99-5076-EFS (September 30, 1999). In the Third Amendment to Consent Decree (September 9, 2003), the parties agreed to hold the interim stabilization requirements of the Consent Decree in abeyance for tanks S-102 and S-112 in order to accelerate retrieval of these tanks. That amendment expressly incorporated the revised HFFACO retrieval milestones¹ into the decree, while expressly reserving Ecology's rights to take enforcement action if Energy failed to meet the revised milestones; among other things, Ecology could require that Energy complete interim stabilization of these tanks within 18 months of notifying Energy of its decision. Energy has determined that completion of these milestones as currently scheduled is at risk and, therefore, in accordance with the provisions of the HFFACO, is submitting this change request in order to preserve its rights under the HFFACO.

Status (as of December 27, 2004)

Tank 241-S-112: Installation of the Tank 241-S-112 tank waste retrieval system was completed on September 22, 2003. Retrieval operations began on September 28, 2003. Approximately 94 percent (578,000 gallons based on the Best Basis Inventory database) of the waste in Tank 241-S-112 has been retrieved. On December 13, 2004, tank 241-S-112 was evaluated and material balance calculations indicated the residual waste volume to contain 10,400 gallons of drainable interstitial liquids and a supernatant volume of less than 200 gallons. Waste retrieval activities are continuing with the objective to meet the retrieval requirements of the HFFACO. These retrieval activities include the addition of water to S-112 to allow the solids to dissolve and soften and then be pumped to the receiving double-shell tank SY-102.

Tank 241-S-102: Installation of the Tank 241-S-102 waste retrieval system was completed on March 4, 2004. Due to the slower dissolution rates encountered on tank S-112, concurrent retrieval of S-112 with S-102 was determined to be necessary to meet HFFACO milestones. This concurrent retrieval required the installation of a manifold jumper in the SA Valve Pit. The manifold installed in the SA Valve Pit to provide the ability to alternate between the retrieval operations of S-102 and S-112 was installed on December 4, 2004. The anti-siphon slurry distributor (ASSD), which was installed in Tank SY-102, was determined to be plugged in May

¹As established in Change Request No. M-45-03-01 (September 18, 2003).

of 2004. This device, which allows the distribution of solids under the surface in the receiving double-shell tank, is required for the S-102 retrieval. The plugged device was removed from the tank and replaced with a newly designed ASSD on December 4, 2004. Retrieval operations were initiated on December 17, 2004. However, it appears that the waste physical properties and the waste flow dynamics have not behaved as predicted from analytical laboratory waste analysis. Currently, we are experiencing pump screen plugging problems which are adversely affecting retrieval. Actions are currently being implemented to resolve this issue.

DOE ORP has expended an extensive amount of effort and will continue to deploy resources necessary to overcome the aforementioned challenges in order to meet the HFFACO and Consent Decree schedules. Nevertheless, it has now become evident, based on the initial results in Tank S-102, that these challenges will most likely have adverse impacts on our ability to complete the retrieval activities by March 31, 2005. Although DOE ORP has developed mitigation plans to complete retrieval as soon as technically and logistically possible, there still are uncertainties in the effectiveness of such actions. This change request is being submitted in accordance with HFFACO, Attachment 2, Action Plan, Section 12.3.2; Article XL, Good Cause for Extensions, Sections 120A, D, and E; and, Article XLVII, Force Majeure, Sections 145B and D. As provided in Section 12.3.2 of the Action Plan, the HFFACO requires that DOE submit a request for extension in writing that specifies:

- A. The timetable and deadline or schedule for which the extension is sought;
- B. The length of the extension sought;
- C. The good cause for the extension; and
- D. Any related time table and deadline or schedule that would be affected if the extension were granted.

This information is provided as follows:

- A. The timetable and deadline or schedule for which the extension is sought.

| Milestone | Brief Description | Due Date | New Proposed Date |
|------------------|---|-----------------|--------------------------|
| M-45-03C | Complete Full Scale Saltcake Waste Retrieval Technology for S-112 | March 31, 2005 | June 30, 2005. |
| M-45-05A | Complete Initial Waste Retrieval from S-102 | | |

- B. The length of the extension sought. The 90-day extension is requested to accommodate the safe retrieval activities needed to account for:
 - Enhanced work planning activities and current supplied air requirements
 - Lower dissolution rates in Tanks S-112 and S-102
 - Implementation of controls to prevent gelling
 - Replacement of the plugged ASSD in SY-102
 - Installation of demister in S-112 and S-102 ventilation systems
 - Resolution of current pump screen plugging issues

C. The good cause for the extension. Good cause for this request results from the interaction of several different events that implicate the Good Cause and Force Majeure provisions of the HFFACO. These events include the following:

1. Worker Health and Safety Issues: Article XL, Good Cause for Extensions, sections A (an event of Force Majeure) and E (any other event the parties agree constitutes good cause)

a) Enhanced Radiological Control Practices

On July 22, 2004, during the removal of an old, contaminated piece of equipment from the 244-CR vault, an employee received a radiation dose in excess of the administrative control limit. This and other events identified weaknesses in the hazard identification, hazard mitigation and performance of work aspects of the operations. As a result of the 244-CR Vault event, numerous actions were required by ORP prior to conducting work activities. Compensatory controls were established and documented in Management Directive MD-038. These controls addressed deficiencies identified in the work planning and execution of field activities. Field personnel and supervision were briefed and trained on these expectations and controls, and procedures were modified to implement these requirements.

As a result, a number of work packages were re-evaluated and re-prioritized as necessary, to upgrade work instructions. This action commenced with Work Planning Procedure changes from July 24-August 13, 2004. Once these changes were communicated to the work planners, changes were made to the applicable work packages supporting S-112 and S-102 retrieval activities over the next two months due to new walk-downs, hazard identification and control strategy verification, and work crew acceptance and training of the newly issued work packages.

Implementation of the enhanced radiological control practices resulted in an approximately 4 month delay in replacement of the SY-102 ASSD. Because retrieval of S-112 could not be started until the ASSD replacement was complete, completion of the S-112 and S-102 retrievals was also delayed by approximately 4 months. The delay was due to the time required to develop and implement the enhanced program (procedures and training). Once the enhanced program was developed and the implementing procedures were in place, the work packages were reviewed and modified accordingly to ensure the controls were properly incorporated. Implementation of tank vapor worker protection controls also contributed to the approximately 4 month delay in replacement of the ASSD.

b) Tank Vapor Worker Protection

As a result of concerns with tank vapors, ORP decided to implement requirements for more restrictive personnel protective equipment. On March 25, 2004, ORP announced plans to conduct an additional exhaustive review of tank farm health and safety practices. This is part of the ongoing multi-year effort to address vapor issues. Until this current review is complete, it was decided to take a conservative approach by putting any employee working in the tank farms on respirators. This additional step is being taken to address employee concerns while a more comprehensive review is conducted.

The controls employed to enhance protection of workers from exposure to tank vapors have resulted in schedule delays for two reasons. The first is the time needed to develop the infrastructure required to support operations using supplied breathing air. This includes, training of the operations and construction crews on use of the breathing air equipment, procurement of

sufficient equipment, installation of breathing air support systems in the farm, and development of the maintenance support to ensure reliable PPE performance. The second is the impact on worker productivity due to use of the supplied air. Productivity is affected by the time it takes to check-out/check-in the PPE, limited time an individual can remain on mask at one time, and the reduced mobility of the worker due to wearing the PPE.

Implementation of the tank vapor worker protection controls contributed to an approximately 2 month delay in installation of the S-112 demister and, as mentioned above, also contributed to the approximately 4 month delay in replacement of the SY-102 ASSD.

2. Tank Waste Chemistry: Article XL, Good Cause for Extensions, sections A (an event of Force Majeure) and E (any other event the parties agree constitutes good cause).

a) The Slow Dissolution Rate

The initial process control plan, dated May 5, 2003, for S-112 retrieval stated that: "Core sample analysis results and dissolution modeling predications using Environmental Simulation Program indicate that the tank S-112 saltcake is highly soluble and dissolves readily in water. Dissolution is expected to produce nearly saturated solutions within minutes of contact between the saltcake and water." The S-112 retrieval process planning assumed that liquid would be removed at a specific gravity of 1.35, which is equivalent to 90% of saturation. The planning process also assumed that this condition would be reached very rapidly, such that the limiting factor on retrieval rate was the pumping rate and not the rate of dissolution. At 100% operating efficiency, the S-112 retrieval could be accomplished in approximately 14 days.

Initially, saltcake dissolution in S-112 occurred rapidly; however, after approximately 30% of the waste was retrieved, the dissolution of S-112 waste occurred much more slowly than expected. It was known that dissolution of sodium nitrate rich saltcake is highly endothermic (a cooling reaction). The effect of this endothermic cooling of S-112 waste on saltcake dissolution rates was underestimated. The cooling of S-112 waste during dissolution resulted in a substantial decrease in the dissolution kinetics. As saturation was approached, dissolution slowed further.

Because of double-shell tank space limitations, it was important to operate the retrieval process at near saturation conditions (1.35 SpG); therefore, the retrieval operation was adjusted to soaking for a few days and recirculating liquid until the target SpG was achieved. This added approximately 140 days to the S-112 operating schedule in addition to the delays resulting from the installation of the ASSD (as described above) and the demister (see paragraph 3b). Because the same phenomena are applicable to S-102, a similar schedule impact is predicted for S-102.

b) S-102 Waste Gelling

Tank S-102 waste has a relatively high phosphate inventory (relatively high levels of phosphate). It has long been known that the needle-like crystals of sodium phosphate dodecahydrate can cause gels that result in high viscosity, non-settling suspensions which can plug transfer lines and create unpumpable wastes in tanks. During preparation of the initial waste compatibility assessment for S-102 retrieval, the phosphate concentration of the retrieved waste was determined to be high enough to warrant further evaluation. Laboratory work was performed to evaluate the potential for gel formation and establish operating parameters to prevent its formation.

During retrieval of S-102, the phosphate concentration will increase as retrieval progresses. Initially, the highly soluble sodium nitrate suppresses phosphate solubility. Once the more soluble species are removed, the phosphate concentration can increase to above the current tank farm waste compatibility control limit of 0.1 Molar. Solutions at these higher phosphate concentrations and low total ionic strength have the potential to form gels when contacted with high ionic strength solutions found in many double-shell tanks.

After identifying that waste gels may be generated during S-102 retrieval, ORP was required by nuclear safety regulations to conduct an evaluation for potential safety issues. From this evaluation it was determined that generation of gel was not acceptable from a safety perspective due to concerns about flammable gas retention. In order to remain compliant with the safety basis, it is necessary to prevent gel formation. As a result, the operating plan for S-102 was adjusted to prevent conditions that may lead to waste gel formation.

Adjustments to the operating plan include increased monitoring of the receiver tank (SY-102) which includes grab sampling and control of the S-102 retrieved waste specific gravity in the range of 1.25-1.29 SpG. The lower SpG (reduced from 1.35) will result in increased retrieval time (more volume to be pumped) and more time required for cross-site transfers (again more volume to be pumped). Additional time will need to be added to the retrieval schedule to accommodate the retrieval work stoppages needed to perform grab samples.

3. Equipment Failures: Article XL, Good Cause for Extensions, sections A (an event of force majeure) and E (any other event the parties agree constitutes good cause); Article XLVIIB (unanticipated breakage or accident to machinery, equipment or lines of pipe despite reasonably diligent maintenance).

a) Plugging and Replacement of ASSD in SY-102

The Anti-Siphon Slurry Distributor (ASSD) is used to inject the waste retrieved from S-112 and S-102 below the SY-102 waste surface. The purpose of sub-surface injection is to ensure adequate mixing of the retrieved waste with the SY-102 contents to maintain waste chemistry within limits and to ensure solids remain away from the floating suction of the SY-102 transfer pump. The design of the ASSD incorporates a vacuum break which prevents siphoning (backflow) from SY-102 to S-102 or S-112 when the retrieval pump is stopped.

The ASSD in SY-102 was originally installed to support the SY-101 Surface Level Rise Remediation Project. Subsequent to completion of this project, the ASSD was used to receive S/SX Farm Interim Stabilization waste and the S-112 retrieval waste. In May 2004, the ASSD was found to be plugged and not suitable for use for retrieval of S-102. Removal of the ASSD and replacement with a newly designed distributor that is less susceptible to plugging was initiated in July 2004. As discussed above, implementation of breathing air requirements and enhanced radiological control practices contributed to the approximately 4 month delay to the field work for the installation of the ASSD in December of 2004.

b) Installation of demisters in S-102 and S-112 retrieval systems

The Washington State Department of Health Notice of Construction for both S-112 and S-102 retrieval activities requires active filtered ventilation of the tank headspace. This is accomplished using HEPA filtered exhausters connected to the tank by metal ductwork. On February 26, 2004, a leak of condensate was discovered in one of the ductwork joints of the S-112 exhauster. Further investigation revealed that the pre-filter for the exhauster was also saturated with condensate. To correct this equipment failure, and comply with a Notice of

Construction condition required by the Washington Department of Health, the ductwork was sealed and insulated, a demister was installed, and the filters were replaced and tested prior to restart of the exhaust system. A delay of 3 months resulted for the installation of the S-112 demister due to the time needed to design and procure the demister equipment and delays encountered in performance of the fieldwork due to new respiratory protection requirements. Since the S-102 retrieval system design required the S-112 retrieval to be complete in order to use the transfer line to SY-102, the S-102 start-up and completion dates were also delayed by approximately 3 months. A demister was added to the S-102 exhaust system during the same time period as the S-112 demister installation.

D. Any related time table and deadline or schedule that would be affected if the extension were granted.

The only related impacts are to the following milestones related to the closure activities of tanks S-112 and S-102.

| Milestone | Brief Description | Due Date | New Proposed Date |
|--------------------|---|-------------------|--------------------------|
| M-45-13 | Interim Completion of Tank S-112 SST Waste Retrieval and Closure Demonstration Project. | December 31, 2005 | March 31, 2006 |
| M-45-15 | Interim Completion of Tank S-102 SST Waste Retrieval and Closure Demonstration Project. | | |
| M-45-13-T01 | Final Completion of Tank S-112 SST Retrieval and Closure Demonstration Project | December 30, 2006 | March 31, 2007 |
| M-45-15-T01 | Final Completion of Tank S-102 SST Retrieval and Closure Demonstration Project.. | | |

Modifications to the M-45 milestone incorporated into the HFFACO by approval of this M-45-04-XX Change Request are shown here as either shaded additions, or ~~striketrough~~ deletions.

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| <p>M-045-03C</p> | <p>Complete full scale saltcake waste retrieval technology demonstration at Single-Shell Tank S-112. Waste shall be retrieved to the DST System to the limits of the technology (or technologies) selected. Selected saltcake retrieval technology (or technologies) must seek to improve upon the past-practice sluicing baseline in the areas of expected retrieval efficiency, leak loss potential, and suitability for use in potentially leaking tanks.</p> <p>Goals of this demonstration shall include the retrieval to safe storage of approximately 550 curies of mobile, long-lived radioisotopes and 99% of tank contents by volume (per DOE Best-Basis Inventory data, 8/01/2000).</p> | <p>03/31/2005 06/30/2005</p> |
| <p>M-045-05A</p> | <p>Complete initial waste retrieval from Tank S-102.</p> <p>The S-102 initial waste retrieval technology (or technologies) will be selected based on the principle criteria of maximizing the retrieval of mobile, long-lived radioisotopes and non-radiological hazardous constituents. The parties recognize and agree that this action is for initial waste retrieval purposes. Completion of this initial retrieval shall be by approval of DOE and Ecology.</p> <p>Goals of this initial waste retrieval project shall include the retrieval to safe storage of approximately 490 curies of mobile, long-lived radioisotopes and meet the retrieval criteria set by Milestone M-45-00 (per DOE Best-Basis Inventory data, 8/01/2000).</p> <p>Completion of S-102 initial waste retrieval is subject to safe storage space availability consistent with M-45-00B.</p> | <p>03/31/2005 06/30/2005</p> |
| <p>M-045-13</p> | <p>Interim completion of Tank S-112 SST waste retrieval and closure demonstration project.</p> <p>The S-112 SST waste retrieval and closure demonstration project will be considered interim complete when the following criteria have been met:</p> <ol style="list-style-type: none"> 1. Full scale waste retrieval has been completed in accordance with applicable regulatory requirements including Washington's Hazardous Waste Management Act, requirements set by this agreement, and the approved S-112 saltcake waste retrieval technology functions and requirements document (DOE will document project data and results in a waste retrieval and closure | <p>12/31/2005 03/31/2006</p> |

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| | <p>demonstration project report).</p> <ol style="list-style-type: none"> 2. Remaining wastes have been adequately characterized, and a risk assessment, approved by Ecology, has been completed for residuals that remain in the tank. 3. The S-112 waste retrieval and closure demonstration plan has been submitted by DOE and approved by Ecology, i.e. incorporated into the site-wide permit. 4. If appropriate, DOE has requested, and Ecology has approved an exception to waste retrieval criteria pursuant to agreement Appendix H. | |
| M-45-15 | <p>Interim completion of Tank S-102 SST waste retrieval and closure demonstration project.</p> <p>The S-102 SST waste retrieval and closure demonstration project will be considered interim complete when the following criteria have been met:</p> <ol style="list-style-type: none"> 1. Full scale waste retrieval has been completed in accordance with applicable regulatory requirements including Washington's hazardous waste management act, requirements set by this agreement, and the approved S-102 initial waste retrieval functions and requirements document (DOE will document project data and results in a waste retrieval and closure demonstration project report). 2. Remaining wastes have been adequately characterized, and a risk assessment, approved by Ecology, has been completed for residuals that remain in the tank. 3. The S-102 waste retrieval and closure demonstration plan has been submitted by DOE and approved by Ecology, i.e. incorporated into the site-wide permit. 4. If appropriate, DOE has requested, and Ecology has approved an exception to waste retrieval criteria pursuant to agreement Appendix H. | <p>12/31/2005 03/31/2006</p> |
| M-45-13-T01 | <p>Final completion of Tank S-112 SST retrieval and closure demonstration project.</p> <p>Completion of the Tank S-112 retrieval and closure demonstration project is defined as the completion of necessary field project actions required by the approved S-112 waste retrieval and closure demonstration plan.</p> | <p>12/30/2006 03/31/2007</p> |
| M-45-15-T01 | <p>Final completion of Tank S-102 SST retrieval and closure demonstration project.</p> <p>Completion of the Tank S-102 retrieval and closure demonstration project is defined as the completion of necessary field project actions required by the approved S-102 waste retrieval and closure demonstration plan.</p> | <p>12/31/2006 03/31/2007</p> |