

Meeting Notes: C-111 Heel Retrieval Workshop

Meeting Date: October 24, 2012, 12:00 noon

Location: 2440 Stevens Center, room 2200

Purpose: Using C-111 as a representative tank, explore options for completing heel retrieval to consent decree target.

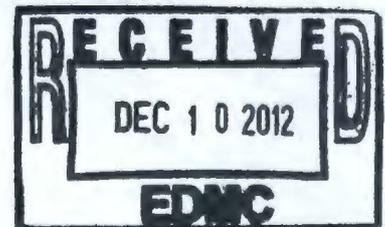
Attendees: Nancy Uziemblo, Ecology, Mike Barnes, Ecology, Joni Grindstaff, ORP, Chris Kemp, ORP, Jeff Rambo, ORP, Kathy Higgins, ORP, Kent Smith, WRPS, Jeff Luke, WRPS, Peggy Hamilton, WRPS, Vikki Wagner, WRPS, Blaine Barton, WRPS, Leela Sasaki, WRPS, Dan Herting, WRPS, Robb Burk, WRPS, Alan Olander, WRPS, Susan Eberlein, WRPS

Background:

Modified sluicing in Tank C-111 was not as effective as anticipated due to a surface layer of extremely hard material. Tank C-112 had similar hard material on the surface, but use of the extended reach sluicing system (ERSS) provided more retrieval success than modified sluicing alone. The baseline plan for the second retrieval technology for C-111 is an ERSS supplemented with high pressure water. The purpose of this workshop was to evaluate available options for retrieval of the remaining waste in C-111 to determine if there was a more promising technology or combination of technologies. Ideas discussed in this workshop may also be applicable to C-112.

Topics discussed:

- Kent Smith summarized the objectives of the meeting, to:
 - Listen to the concerns that everyone has regarding retrieval of C-111
 - Summarize what is known and what is not known about the waste
 - Develop a basis to make the best decisions about how to retrieve the waste
- It was noted that most of the technical discussion should also apply to C-112
- The constraints on retrieval of C-111 and C-112 were discussed:
 - It was agreed that, for purposes of this discussion, the potential impacts of tank AY-102 would not be considered
 - Completion of retrieval is required by September 30, 2014, to meet the Consent Decree. This time constraint limits the types of new technologies that can be applied to C farm retrieval.
 - Double Shell Tank (DST) space limits affect the amount of water, caustic, and other liquids that can be used for retrieval.
 - There are common transfer routes and common receiver tanks that affect the timing of retrievals, the use of retrieval equipment and the number of people needed to keep retrieval operating. C-111 and C-112 are among 4 tanks to be retrieved on the AN-101 route by September 2014. There are only 1 or 2 control rooms for each transfer route, also limiting the number of simultaneous retrievals.
 - The AN-101 receiver tank will become caustic deficient in FY13, and will require caustic addition.
- There was a discussion of water use for retrieval, and a request for more information on water allowances and usage status (see Action Items).



- Ecology indicated that they recognized the constraints and understood the need to pick the best retrieval approach within the constraints.
- Leela Sasaki presented a summary of the modified sluicing of C-111, including video (see Attachment 1).
 - C-111 and C-112 have similar waste, but the ERSS in C-112 managed to break up some of the hard surface, allowing retrieval of the underlying sludge.
 - It's hard to predict the thickness of the C-111 surface layer – some C-112 chunks were 4-6 inches thick. C-112 showed some undermining of the hard surface.
 - There was discussion of the historic waste temperatures in C-111, C-112 and C-109. Historically, C-111 may have been slightly higher. No conclusion was drawn on the effect of temperature on waste drying and hardening.
- Dan Herting presented lab data from previous sampling of C-111 and the Best Basis Inventory (BBI) estimate of the tank contents (see Attachment 2).
 - It was noted that the estimated total volume of waste in C-111 at the end of interim stabilization was greater than following modified sluicing. However, that change was due primarily to a change in volume estimation method and measurements, not to any change to the waste itself.
 - Although C-111 had historically been considered a possible leaking tank, the leak loss reassessment process concluded that historic losses were due to evaporation, rather than a tank leak.
 - Raman spectrometer analysis of C-111 waste surface detected mostly cancrinite in the local area under the riser. It is not clear how that area relates to the rest of the waste surface. The Raman spectrometer still needs more development before it can be deployed effectively in the field.
 - Some historic samples of small chunks and powder from C-111 are available and were analyzed. Most of the C-111 samples from the 1990's characterization campaign had poor recoveries. Major constituents are gibbsite and cancrinite.
- Blaine Barton presented information on the current thinking regarding how the waste heels originate, and why they are hard to retrieve (see Attachment 3).
 - Most post-retrieval waste heel samples are very high in aluminum.
 - Aluminum compounds are more soluble at pH 12 than iron, calcium or nickel, leading to crystal growth over longer time frames for aluminum compounds.
 - Nancy Uziemblo noted that more information about the waste composition may be needed to make informed decisions about the best retrieval method.
 - Joni Grindstaff suggested that mechanical size reduction should be considered because it is not dependent on chemistry.
- Blaine Barton led a discussion of the available retrieval tools and methods, including a summary of the advantages and disadvantages associated with each one (see Table 1).
 - Nancy Uziemblo asked why the ERSS and high pressure water were selected as the baseline retrieval approach. It was noted that those methods were considered the best options when the FY13-14 baseline was developed. At that time, the caustic cleaning process had not been demonstrated. Current information suggests that chemical (caustic or water) soaking may be beneficial.

Table 1. Available Retrieval Technologies

Method	Advantages	Disadvantages
Modified Sluicing	Fast and inexpensive to set up (equipment available)	Did not work previously, not expected to work
ERSS with High Pressure Water	<ul style="list-style-type: none"> Provides extended reach, access to waste locations High pressure water may break up hard surface Equipment on order (included in baseline) 	<ul style="list-style-type: none"> ERSS alone will not be enough (based on C-112 experience) ERSS will not reach entire tank bottom High pressure water limited to 5000 psi, cannot reach entire tank surface Requires equipment replacement
Caustic Cleaning	<ul style="list-style-type: none"> Effective in C-108, C-104, C-109 Simple Early availability Excess caustic needed in receiver DST 	<ul style="list-style-type: none"> Effectiveness uncertain without sampling Too much caustic will take up DST space Requires recirculation (sluicing)
Salt Mantis	<ul style="list-style-type: none"> Designed for hard layers Worked in S-112 Wheels can crush rocks 	<ul style="list-style-type: none"> Not yet tried on sludge Does not reduce sand 1 year lead time to obtain Will not be sufficient due to sand
Other		<ul style="list-style-type: none"> Long lead time Success unclear

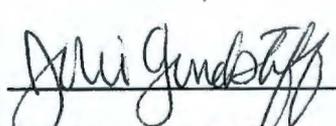
- There was discussion of the potential to obtain more characterization information to make a decision regarding retrieval methods.
 - Sampling was historically difficult. A rotary core system may be able to sample the hard waste, but is not currently available.
 - Only 2 risers are available to take samples to provide analytical data and determine material thickness. Both are near the sides of the tanks where the waste is only 6-8 inches deep. Use of these risers may not even reveal how thick the hard waste layer is.
 - Due to the limited range of retrieval technologies available in the required time frame, it was not clear that additional characterization data would lead to a different decision on retrieval methods.
- Addition of caustic to C-111 as a pre-soak before deploying the ERSS and high pressure water unit was discussed.
 - Caustic addition to the AN-101 receiver DST will be needed intermittently throughout C-101/C-102 retrieval anyway.
 - C-112 could be ready to receive caustic earlier than C-111, and has similar waste. Caustic addition to C-112 could be performed, and results observed to determine if the approach could be effective for C-111.
 - Recirculation of the caustic in C-111 and C-112 is necessary, since there would not be enough caustic to submerge all waste.
 - Sampling during recirculation should be performed. Sample analysis will clarify if aluminum compounds are present.

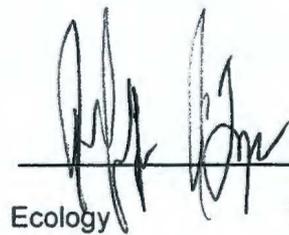
- Additional brainstorming on retrieval methods:
 - The group discussed other chemical cleaning possibilities. Oxalic acid has been used in the past. Due to changes in safety basis requirements, the path to using oxalic acid again would be difficult. Waste Treatment Plant impacts and potential criticality concerns were also discussed.
 - The use of a backstop for the slurry pump would be helpful to suspend larger particles. Installation of a backstop (similar to that used on MARS) would require a much larger tank opening than is available without cutting the tank dome. A second sluicer might be used as a "virtual" backstop.
 - Two ERSS units will offer advantages over one ERSS and one standard sluicer. There are technical issues with deployment of 2 ERSS units in one tank, which will need to be addressed.
 - A sand mantis and a FoldTrack with high pressure water should continue to be pursued as developmental technologies
- The group concluded that a pre-soak with caustic prior to use of the ERSS and high pressure (HP) water could be useful, and should not do any harm.
- The group discussed the plan to use a final chemical cleaning step (caustic dissolution) following the ERSS/HP step, if the ERSS/HP step did not achieve the retrieval goal.
- The group acknowledged that there was uncertainty associated with the retrieval approach, but that it was the best that could be done with the existing knowledge.
- The group clarified that the technical discussion held today did not represent any discussion of the number of retrieval technologies to be deployed (as discussed in the Consent Decree).
- Mike Barnes noted that he thought sampling of the C-111 waste prior to deployment of the next retrieval technology was not appropriate due to the length of time involved in obtaining sample results.
- The group acknowledged that a modified Tank Waste Retrieval Work Plan (TWRWP) would be the mechanism to formally describe the recommended plan for continued retrieval of C-111, and that Ecology's approval of the TWRWP was required to complete retrieval.

Actions:

- Add Mike Barnes to the distribution list for daily reporting (Barton/Sasaki)
- Add a chart to the weekly retrieval reporting to include water allowance/usage/planning (Olander)

Concurrence:


 Jeri Grindstaff, ORP _____
 Date 12/3/12


 Ecology _____
 Date 12-10-12