Original Process Waste Lines (OPWLs) IHSS Briefing Summary

Prepared by Rik Getty

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121, Original Process Waste Lines (OPWLs)

Approximate Location
Northing: N/A
Easting: N/A
Location Relationship to other Site areas: The OPWLs existed throughout most of the Industrial Area of the site so there is no general location for them. Many OPWLs located under buildings are addressed in the close-out reports for those particular buildings.

Historical Information
(For a detailed history on IHSS 121 see Reference 1; the following section relies heavily on language used in Reference 1.)

The OPWLs were a network of underground pipelines and 62 tanks in 40 locations constructed to transport and temporarily store liquid chemical and radioactive process wastes from point of origin to on-site treatment and discharge points. The OPWL network was first put into service in 1952 when the site began production operations. The network was expanded over the years as more buildings were constructed which required waste disposal lines. The system handled process wastes from Buildings 122, 123, 441, 444, 559, 707, 776/777, 779, 865, 881, 883, and 889. The wastes were analyzed prior to transfer. Depending on the level of radioactivity and chemical composition, process wastes were routed to Building 774 for treatment, Pond B-2, or the Solar Evaporation Ponds. Process waste held in Pond B-2 was also pumped to Pond A-2 for storage during the mid-1970s.

(At this point, the author of this briefing summary would like to digress from Reference 1 and point out that while wastes were supposed to be analyzed prior to transfer, this was not always the case. As a first-hand observer, I know that this practice was not always followed. Workers disposed of certain materials in process waste lines without prior analysis. In some cases, even if the waste had been analyzed, it would not have been accepted for treatment if the contents were known prior to transfer. In short, process waste drains inside many buildings were used to improperly dispose of certain wastes.)

The OPWL varied in age, usage history and construction. The OPWLs ranged from one to ten inches in diameter and were constructed of a variety of materials including cast iron, stainless steel, vitrified clay, polyvinyl chloride, teflon, and pyrex glass. They were buried in trenches averaging three feet wide and three to eight feet deep, and were bedded in sand and/or native soil

backfill. The OPWL network was approximately 33,000 feet in length, where approximately 13,000 feet were located under buildings. The remaining OPWLs were in various locations including about 13,000 feet in areas highly congested with other active and inactive utility lines.

In addition to the pipelines, there were approximately 62 tanks in the OPWL network. The tanks were used for temporary storage of process waste:

- at the point of origin prior to transfer;
- at the point of destination prior to treatment and/or disposal; and,
- at intermediate points.

Due to improper material selection and design flaws, the OPWL network experienced numerous leaks throughout its years of service (Reference 1 documents over 60 cases of OPWL leaks over the years). Leak repairs were routinely made to the system during its operational history. The OPWL releases occurred primarily as a result of the following:

- leakage of tank and pipeline fittings, including tank/pipeline connections, pipeline joints, elbows, and reducers, junction boxes, and valves;
- pipeline breakage due to construction activities, soil settling, and building foundation settling;
- overflows of tanks and pipeline junction boxes and valve vaults; and,
- tank and pipeline corrosion and deterioration.

Beginning in 1975 the OPWL network was phased out and replaced by a double containment, fully inspectable process waste system. The new system, termed New Process Waste Lines (NPWLs), was completed in 1984. Some of the existing OPWLs were converted to NPWLs as part of this project.

Pre-remediation Characterization Data
(Again portions of this section heavily rely on Reference 1)

Due to the complex nature of the OPWL network a clear understanding of the nature and extent of contamination in soil adjacent to the OPWL network leaks was not known. The OPWL network is known to have transported and stored various aqueous process wastes containing the following:

- low-level radioactive materials;
- nitrates;
- caustics;
- metals;
- VOCs;
- SVOCs such as oils/greases;
- cleaning compounds;
- medical decontamination fluids including some biohazard waste;
- miscellaneous lab wastes;
- laundry effluent; and,
- numerous other liquid wastes.

The composition of individual process waste streams handled by the OPWL varied widely, and some OPWL components were not exposed to all potential process waste compounds.

A 1976 study of the OPWL indicated that the OPWL wastes contained the following primary constituents:

- U-238, U-235
- Pu;
- nitrates;
- acids;
- bases; and,
- hexavalent chromium.

Constituents also mentioned in the 1976 study were:

- chromium (other than hexavalent);
- beryllium;
- iron;
- iodine;
- phosphates; and,
- tritium.

Remedial Actions Taken
(This section relies heavily on information contained in References 2 and 3)

As part of the 2003 modifications to the Rocky Flats Cleanup Agreement (RFCA), the RFCA parties (CDPHE, DOE, and EPA) agreed on a process to remediate the OPWLs. Existing OPWLs less than 3 feet deep were completely removed and disposed as waste. About 17,000 feet of the total 33,000 feet of OPWL were removed. OPWLs between 3 and 6 feet below ground surface were either remediated if they exceeded WRW ALs or grouted in place. Approximately 14,700 feet of OPWL were tapped/drained, grouted, and left in place. Sampling was an important component of the OPWL remediation effort. A total of 655 soil samples were collected from 449 sampling locations (356 characterization locations, 7 in-process remediation locations, and 86 remediation confirmation locations).

All of the manways and 29 valve pits associated with the OPWLS were completely removed as part of the remedial action. All OPWL tanks were removed prior to building demolition, during building demolition, or as part of an environmental restoration action except for two tanks. Tanks 36 and 37 were sump locations in the Building 771 Annex located 3.5 feet below final grade. These tanks were decontaminated, left in place, and backfilled with soil.

Post-remediation Remaining Contamination
The post-remediation remaining contamination which exceed WRW ALs consists of Am-241, Pu-239/240, arsenic, and benzo(a)pyrene (SVOC). However, the remaining contamination is at soil depths that does not require remediation per the 2003 modifications to the RFCA. Since almost 15,000 feet of the OPWL were left in place, there are undoubtedly some remaining contaminants in the OPWLs even though they were tapped and drained before grouting. These contaminants which remain in the buried OPWLs are at depths approved by the regulators. In

addition there are remaining contaminants in soils near OPWL leaks either below WRW ALs or buried deep enough that the contamination does not require remediation as provided in the RFCA.

Based on the remedial actions performed by the site, the OPWL network was approved for a NFAA (No Further Accelerated Action) status by the regulators in October 2005.

Potential Exposure Pathways to Remaining Contamination
The primary exposure pathway to remaining buried OPWL contamination is the mobilization of the contamination into groundwater (not Pu or Am contamination since they are very immobile in groundwater) and subsequently into surface water. Since the OPWL network was spread out over a large portion of the Industrial Area, it is difficult to assign contamination in groundwater to the OPWLs. Rather the remaining OPWL contamination may make contributions to existing contaminated groundwater plumes such as the diffuse source Industrial Area plume, the Solar Evaporation Pond plume, specific plumes associated with buildings, and other groundwater plumes.

Long Term Stewardship (LTS) Controls
The site and regulators believe the post-closure groundwater and surface water monitoring locations will be effective in understanding the movement of contaminants in the site's water. It is important for the site to continue water monitoring to ensure the effectiveness of the site's remediation. LTS controls such as prohibitions against drilling, digging, and other soil disturbance activities must be in place in order to ensure remaining OPWL contamination is not exposed.

Notes
None at this time.

Document references
1. 1992 Historical Release Report (document path, CERCLA AR# SW-A-000378)
2. Close-out Report for Original Process Waste Lines (OPWL) (document path, CERCLA AR# pending)
3. FY2005 Final Historical Release Report, Volume I, October 2005 (document path, CERCLA AR# pending)