2.4 Environmental Occurrences

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Onsite and offsite environmental releases of radioactive and regulated materials are reported to DOE and other federal and state agencies as required by law. The specific agencies notified depend on the type, amount, and location of the individual occurrences. In some cases, an occurrence may be under continuing observation and evaluation. All emergency, unusual, and off-normal occurrences at the Hanford Site are reported to the Hanford Site Occurrence Notification Center. This center is responsible for maintaining both a computer database and a hard-copy file of event descriptions and corrective actions. Copies of occurrence reports are made available for public review in the DOE's Hanford Reading Room located in the Consolidated Information Center on the campus of Washington State University at Tri-Cities, Richland, Washington.

As defined in DOE Order 232.1, emergency occurrences "are the most serious occurrences and require an increased alert status for onsite personnel and, in specified cases, for offsite authorities." There was one emergency occurrence report filed in 1998.

An unusual occurrence is defined in the DOE Order as "a nonemergency occurrence that exceeds the Off-Normal Occurrence threshold criteria, is related to safety, environment, health, security, or operations, and requires immediate notification to DOE." There was one environmentally significant unusual occurrence report filed during 1998.

Off-normal environmental occurrences are classified in the DOE Order as "abnormal or unplanned events or conditions that adversely affect, potentially affect, or are indicative of degradation in the safety, safeguards and security, environmental or health protection, performance or operation of a facility." Several of these occurrences are discussed in Section 2.2.5.4, "RCRA Inspections;" Section 2.2.6.1, "Clean Air Act Enforcement Inspections;" and Section 2.2.7, "Clean Water Act." The following summarizes some of the emergency and off-normal environmental occurrences not previously discussed or that were not discussed in detail. For each occurrence summarized below, the title and report number from the Hanford Site Occurrence Notification Center is given in the heading.

2.4.1 Emergency Occurrences

- Small Bottle of Suspect Material Discovered – Alert-Level Emergency Declared
  (RL-PHMC-327FAC-1998-0002)

On January 28, 1998, a small bottle, labeled "picric acid," and containing an unknown dry solid was discovered in a crawlspace off the basement of the 327 Building in the 300 Area. Building personnel had entered the crawlspace to perform an inspection for future steam line work. The bottle was found in a plastic pail next to the crawlspace wall. Because of the location of the bottle and because the dry solid form of picric acid could potentially explode if exposed to flame or friction, an alert-level emergency (defined as the potential degradation of the level of safety of the facility) was declared. The facility was evacuated, appropriate notifications were made, an incident command post was established, and protective actions were initiated. An entry plan was developed and, following approval, an entry was made into the crawlspace to videotape the bucket, container, and surrounding area. The alert-level emergency was terminated on January 28, 1998 on discovery that the quantity of picric acid involved (approximately 35 to 50 g [0.077 to 0.11 lb]) could

not result in a large-enough explosion to compromise the facility. The bottle and its contents were stabilized and removed from the facility on January 30, 1998. Subsequent analysis confirmed that the material was picric acid. No personal injury, personal contamination, or environmental releases occurred as a result of this event.

2.4.2 Unusual Occurrences

- Contamination Control Issue at the 200-East Area, Hanford Site and Associated Contamination Detection at Offsite Locations
  (RL-PHMC-FSS-1998-0021)

On September 28, 1998, Radiation Control Technicians were conducting radioactivity surveys at Mobile Office MO-967 in the 200-East Area and detected contamination in some unusual locations. Because this general area has a long history of contaminated biota (e.g., tumbleweeds, ants, beetles, mice), known pathways for these vectors were investigated. Searches into locations where biological vectors would be expected to have spread contamination yielded negative results, as did collections of animals known to be vectors from these areas.

Expanded surveys detected contamination on refuse in a dumpster located outside of MO-967. The dumpster was isolated so that contamination would not be transported off the site. On September 30, 1998, a Radiation Control Technician was monitoring radioactivity on a pipe in MO-967 and observed the contamination to "fly away." The technician and her partner then repeated the exercise with the same results. Closer inspection revealed the contamination to be located on very small flying insects, later identified as fruit or vinegar flies (*Drosophila* spp.).

On September 30, 1998, it was recognized that a large contamination event was under way. Through continued investigation, it was learned that the dumpster located near MO-967 had been emptied on September 28, 1 d ahead of schedule, and that the contents had been hauled to the Richland City Landfill. The landfill manager was notified, all refuse-hauling trucks were isolated, a Radiation Control Technician was dispatched to the landfill, and flying insect traps were placed in suspect environs. Subsequent radioactivity surveys of the refuse trucks and the landfill confirmed that contamination had gone off the site. Fruit flies appeared to be the primary vector, however, the source of the contamination was still unknown.

Beginning on October 1, 1998, and for several days thereafter, contaminated fruit flies were found in traps near MO-967 and the nearby 241-ER-152 Diversion Pit. Because of its past history of biotic contamination incidents, the diversion pit was investigated as the potential source of the contaminated fruit flies. Initial isotopic analysis of the fruit flies and other refuse contamination indicated nearly pure strontium-90 with some cesium-137. Visual inspections revealed openings into the diversion pit and that fruit flies were present. No other sources were identified that would account for the contaminated fruit flies. Additionally, in 3 mo of trapping, only one contaminated fruit fly was found at any other location. The lone contaminated fruit fly found away from the diversion pit was in a trap near US Ecology on a day following strong northeasterly winds blowing from the direction of the pit.

It was discovered that, prior to a scheduled maintenance campaign to be conducted on September 15, the diversion pit had been sprayed on September 10 with a mono-saccharin-based fixative to prevent aerial dispersion of contamination when the pit was to be opened. The fixative acted as a food source attractant to the fruit flies, which had open access on September 15 to enter and lay eggs in the moist (now contaminated) media. The natural life cycle of the fruit fly (10 to 14 d) provided a population of contaminated flies by September 28, 1998.

Radioisotopic analysis of both the spot contamination and of the contaminated fruit flies identified nearly identical ratios of strontium-90 to cesium-137, the primary contaminants. The maximum contamination in the fruit flies was found on a sample of nine fruit flies that had 260,000 pCi of strontium-90 per sample. Ingestion of all nine fruit flies would result in a 50-yr committed effective-dose equivalent of approximately 34 mrem.

Control measures included trapping, pesticide application (both in and around the diversion pit, to all local dumpsters, to the affected landfill and burial ground, and to refuse hauling trucks), removing the contaminated material from the Richland City Landfill to a Hanford Site low-level burial ground, ceasing transport of Hanford refuse to offsite locations, and establishing a refuse receiving and monitoring transfer station before offsite transfers of Hanford refuse were reinitiated. The diversion pit was resealed and fogged with insecticide prior to a final campaign in the spring of 1999. Monitoring of flying insects has been added to the routine monitoring schedule for near-facility monitoring. A new program, the Integrated Biological Control Program, has been established to identify and correct known and suspected biological intrusion problems on the Hanford Site. This program will coordinate with Near-Facility Monitoring to control the biological spread of radioactive contamination.

2.4.3 Off-Normal Occurrences

- Waste Drums Discovered at 618-4 Burial Ground (RL-BHI-REMACT-1998-0002)

On April 2, 1998, approximately 350 waste drums with unknown contents were discovered at the 618-4 Burial Ground during an ongoing remediation activity in the 300 Area. It was suspected that the drums contained depleted uranium filings and mineral oil. Several of the drums had leaked, and the suspect leakers were placed into overpack drums and additional mineral oil was added to cover the metal filings. Exposed drums were then reburied to isolate them from the atmosphere. Work was suspended at this burial ground until a more-detailed plan could be developed for future excavation, treatment, and disposal of the drums. No additional impact on the environment or human health resulted from this discovery.

- Notice of Violation for Operation of 324 Building Plasma Arc Furnace (RL-PHMC-324FAC-1998-0003)

On May 13, 1998, the Washington State Department of Health issued a Notice of Violation for operation of the plasma arc furnace from April 13 to 17, 1998 at the 324 Building in the 300 Area during a classified technology demonstration project, involving the treatment and destruction of dismantled weapons components. Tritium was released to the environment during this test; however, the tritium monitoring system was not operated during this demonstration because it was determined that sampling results would be classified and it was believed that this action was allowable under the notice of construction permit for the plasma arc furnace. A notice of construction permit is issued by the Washington State Department of Health for activities that involve the potential release of radionuclides. The notice of construction permit had been modified and approved by the Washington State Department of Health in August 1997 to allow for the release of 20 Ci of tritium during this demonstration. The notice of construction permit did not require air sampling. Alleged violations include failure to provide tritium sampling in accordance with regulatory requirements and failure (prior to the event) to disclose the nature and general description of the material processed. After the event, classified tritium source term information was presented to the Washington State Department of Health to verify that the facility had not exceeded the tritium release limits approved in

the notice of construction. Although review of the applicable regulatory and notice of construction requirements supported the position that tritium sampling was not required, consultation with the Washington State Department of Health would have clarified the matter and prevented the notice of violation.

- Tritium Released Through the Stack from High-Level Radiochemistry Hot Cell
  (RL-PNNL-PNNLNUCL-1998-0008)

On August 26, 1998, a continuous air monitor that measures stack emissions from the radiochemical-processing laboratory in the 325 Building in the 300 Area alarmed because of elevated tritium activities. The source of tritium was determined to be a hot cell, where a cold vapor trap was being purged with helium as part of a sample collection process (the liquid nitrogen coolant had been removed from the trap as part of the collection procedure). Once the source was identified, the helium purge gas was turned off, the cold vapor trap was isolated, and the tritium activities in the stack quickly decreased. Effluent monitoring data indicated that 118 Ci of tritium were released. No release levels or exposure limits were exceeded during this event. The potential dose to hypothetical onsite and offsite personnel was estimated to be a maximum of 0.4 mrem on the site and 0.05 mrem off the site. Hot cell procedures were reviewed and modified to prevent this type of release in the future.

- Halon® Based Fire Suppression System Activated and Released Halon® into a Room During Preventive Maintenance
  (RL-PHMC-PFP-1998-0040)

On September 11, 1998, the Halon® fire suppression system in building 2701-Za in the 200-West Area inadvertently discharged during a preventive maintenance activity. Approximately 145 kg (319 lb) of Halon® were discharged during this event. Halon® is a fairly nontoxic chemical but is hazardous in high concentrations because it displaces oxygen. In addition, Halon® is an ozone-depleting compound, and accidental releases should be minimized. All personnel immediately evacuated the building, and the Hanford Fire Department responded by exhausting the Halon® from the building. Five personnel in the room during the discharge were evaluated by fire department personnel and were determined to have no adverse health effects. One individual, who was near a discharge nozzle, was sent to a local hospital for further evaluation and was released. Procedures were reviewed and will be modified, as needed, to prevent such accidental releases in the future.

- Unplanned Tritium Emission from the 325 Radiochemical Processing Laboratory
  (RL-PNNL-PNNLNUCL-1998-0011)

On December 8, 1998, a continuous air monitor on the exhaust stack of the 325 Building in the 300 Area activated an alarm (12-min duration). The release was caused by an operator error that resulted in an incorrect opening of a fume hood valve. Effluent monitoring staff calculated that the alarm resulted from the release of 68 Ci of tritium, with estimated potential doses to the offsite public of 0.003 mrem at the closest accessible point and 0.0004 mrem to the nearest residential area. On December 10, 1998, the Washington State Department of Health issued an order temporarily suspending tritium operations associated with the air permit for the Tritium Target Qualification Project in the 325 Building, pending corrective actions.