

Appendix 2A

**Summaries of the Significant Events Leading to
Long-Term Contamination of the YNPS Site
(Presented in LTP Table 2-3)**

AOR 61-15: Radioactive Spill – 9/20/61

A half-liter container of reactor coolant water was dropped on the asphalt in the Potentially Contaminated Area between the Primary Auxiliary Building and the Waste Disposal Building. The sample contained approximately 35 μCi (specific radionuclide data not available). The spill was absorbed using absorbent paper and the area decontaminated by mopping. The fixed contamination remaining was approximately 0.05 mr/hr at 1 inch from the pavement.

Impacted Areas NOL-02/ NOL-05

AOR 63-12: Shield Tank Cavity Fill Water Spill – 9/18/63

A one-half inch sampling valve located over the IX Pit was inadvertently left open while filling the shield tank cavity. This resulted in a spill of approximately 10 gallons of water from the Safety Injection Tank. A portion of the spill ran off the deck of the pit and onto a section of the blacktop surface to the west of the pit. The radiation level in the immediate area was 70-100 mr/hr measured at one inch. Contamination levels were 10^6 to 10^7 dpm (specific radionuclide data not available) over areas of several square inches. Run off water resulted in contamination levels of 20-60,000 dpm/ft² (Sic).

Impacted Areas NOL-01/NOL-02

Impacted Structures NSY-02

AOR 63-17: De-watering Pump Packing Leakage – 10/8/63

A water leak from the fuel chute de-watering pump was routed, via a small utility hose, to a 30 gallon collection drum placed in a storm drain catch basin (ECB-005) located between the railroad tracks and the NE corner of the spent fuel pit. It was determined that the bottom rim of the barrel was corroded, and water was leaking from the bottom of the barrel. At the time the leak was identified, six to eight inches of water had accumulated in the barrel with activity of 6×10^{-5} $\mu\text{Ci/ml}$ (specific radionuclide data not available). It was believed only a small amount of water was leaked to the storm system.

Impacted Areas OOL-05/OOL-06/NOL-01

Impacted Sub-surface Areas/Structures - East Storm Drain System

AOR 64-08: Seal Water Tank Spill – 9/3/64

Shutdown cooling pump seals leaked reactor coolant water and back-flowed into the seal water tank. This caused the tank to overflow through the vent connection, into the common relief valve discharge line and onto the Primary Auxiliary Building roof. An estimated 35 gallons of water containing a total activity of 270 μCi (specific radionuclide data not available) was released. The Roof Drain System drained into the Storm Drain System via a sub-surface piping connection. A sample of the storm drain (WCB-009) was determined to contain 1×10^{-6} $\mu\text{Ci/ml}$. The predominant isotopes were Co-58, Co-60 and Mn-54 (distribution of the radionuclides in the sample not available). Service Water was diverted to the storm drain to flush the system.

Impacted Areas - AUX-02 Roof and Roof Drain System

Impacted Sub-surface Areas/Structures - West Storm Drain System

AOR 64-13: Leakage from Ion Exchange Pit - 10/3/64

After filling the Ion Exchange Pit to its normal operating level, the operator failed to close the fill valve. Water continued to flow into the pit from the Primary Water Storage Tank by gravity feed. Later, the operator noticed water seeping through the blacktop on the west side of the pit,

diagnosed the cause and closed the valve. The water on the blacktop was sampled and was found to contain radioactivity. The radionuclides and concentrations identified were: Ag-110m at 5×10^{-7} $\mu\text{Ci/ml}$ and Co-60 at 1×10^{-6} $\mu\text{Ci/ml}$. The blacktop was rinsed down with Service Water to the storm drain (ECB-005).

Impacted Areas NSY-02/NOL-01/OOL-05/OOL-06

Impacted Sub-surface Areas/Structures - East Storm Drain System internal and external to piping (backfill) / SFP-02 sub-floor / NSY-09 / AUX-01 North external perimeter (backfill) / SFP-01 West external perimeter (backfill) / BRT-01 Eastern external perimeter

AOR 66-7: Spent Fuel Pit Water Spill – 9/27/66

A two-inch priming valve for the Spent Fuel Pit (SFP) cooling and purification pump was left open; however an upstream valve isolating make up water to the Low Pressure Surge Tank (LPST) was correctly closed. The LPST make up pump was started to provide make up water to a hose connection located between the two valves to wash down a shipping cask as it was removed from the pit. Water flowed through the open priming valve to the SFP in sufficient quantity to result in actuation of the high level alarm. The reason for the high level alarm was not immediately determined and by the time the reason was identified water had overflowed from the SFP. Approximately 33 gallons of water flowed down the SFP exterior wall, over a small section of asphalt paving and into an immediately adjacent storm drain, ECB-005. A continuous service water flush of the east side culvert system (ECB-005) was initiated and continued for a 24 hour period. This occurrence resulted in a total release of 4 μCi gross β - γ and 670 μCi of tritium (more specific radionuclide data not available).

Impacted Areas SFP-01 North external wall /NOL-01/OOL-01

Impacted Sub-surface Areas/Structures East Storm Drain System internal and external to piping (backfill between SFP-01 and ECB-005)

AOR 66-8: Abnormal Activity in Storm Drain – 9/27/66

Water from the west storm drain culvert was sampled (the SFP water released discussed above discharged to the east side only). An average of two samples from the west side showed gross activity of 6.7×10^{-7} $\mu\text{Ci/ml}$ (specific radionuclide data not available). Investigation found a relief valve on the safety injection tank heating system to be slowly leaking into a floor drain in the PAB. The floor drains in that section of the building were traced to discharge to a storm drain located on the outside of the building (WCB-009). Further investigation indicated that the relief valve leak could not have existed for more than one day and that the maximum volume did not exceed eight gallons during that period. A sample of culvert water collected 24 hours after the occurrence indicated a gross activity of 1.2×10^{-8} $\mu\text{Ci/ml}$ and tritium activity of 5.1×10^{-5} $\mu\text{Ci/ml}$. This occurrence resulted in a total release of 0.8 μCi gross β - γ and 3.32 mCi tritium.

Impacted Area - OOL-05/OOL-06

Impacted Sub-surface Areas/Structures - West Storm Drain system

AOR 66-9: Hose Failure – 11/1/66

The hose used for a routine draining of the fuel chute pump discharge line burst. Less than 10 gallons of contaminated water flowed into a storm drain served by the east culvert (ECB-005). Approximately 10 gallons of water with an activity of 3.0×10^{-3} $\mu\text{Ci/ml}$ (for a total of 113 μCi) was released. The spill area was flushed with service water. The east culvert was sampled after the spill.

Impacted Areas - NOL-01/OOL-01**Impacted Sub-surface Areas/Structures - East Storm Drain system****AOR 68-1: Waste Holdup Tank Moat Spill – 1/16/68**

The suction line from the waste hold-up tank was found to be frozen. Approximately 200 gallons of water spilled from a valve bonnet failure caused by the freezing of the suction line. A total of 520 μCi β - γ and 698 mCi tritium were spilled into the moat. The spill was contained within the moat structure.

Impacted Structures - NSY-07**PIR 75-7: Yard Area Contamination 7/16/75**

An area of land near the Ion Exchange Pit was identified with a contamination level of approximately 500,000 dpm. Over the next few days, the entire restricted area was surveyed. Fourteen areas, ten of which were in areas previously identified as a “clean area,” were found to be contaminated at levels greater than 1000 dpm/100 cm^2 . Most of the contamination was removed, and the remaining contamination was sealed in place using asphalt sealer and covered with clean soil.

Impacted Areas - NOL-01 through NOL-06 and SVC-03**Impacted Sub-surface Areas/Structures - SVC-03 beneath slab in old RCA access alley****PIR 77-16: Service Building Radioactive Sump Transfer Line Puncture – 12/21/77**

A boring bit inadvertently punctured the 2.5 inch stainless steel line leading from the Service Building Sump Tanks to the PAB while conducting core borings inside the Radiation Control Area. The sump line ran at a depth of 15 feet underground, where the damage occurred, and the boring depth was 61.5 feet. The damage was not detected until the next day when the sump pump started and water issued from the borehole. The sump pump ran through two cycles resulting in 20 gallons of water discharged from the rupture. The water contained the following:

Radionuclide	Total Activity, μCi	Concentration, $\mu\text{Ci/ml}$	Fraction of MPC
I-131	16.50	2.18×10^{-4}	3.63
I-133	2.76	3.65×10^{-5}	0.18
Cs-134	0.34	4.46×10^{-6}	0.01
Cs-137	0.50	6.67×10^{-6}	0.02
Co-60	0.58	7.69×10^{-6}	0.01

No measurable levels of activity were released offsite or to the storm drain. The line was repaired, and a sand and concrete casing was poured around it.

Impacted Areas - NOL-02**Impacted Sub-surface Areas/Structures - Soils surrounding perforation and transfer line backfill/Soils to a depth of 61.5 feet and below along the bore hole.****PIR 80-9: Resin Spill - 8/6/80**

A hose developed a pinhole leak, while pumping resin to a cask. The failure of the hose allowed the release of several gallons of water and one quart of resin. A 15 foot by 20 foot area of the RCA yard was contaminated. Radiation readings on contact with the resin were 1 mrad/hr and the spilled liquid reading were up to several hundred thousand dpm/100 cm^2 (sic) (specific

radionuclide data not available). Decontamination included removal and disposal of some of the blacktop.

Impacted Areas - NOL-02/NSY-02

Impacted Sub-surface Areas/Structures - South and East exterior walls of NSY-02. The sub-slab area of NSY-02 (IX-pit) was also impacted due to transfer of contamination by surface water (i.e., water used in decontamination and rainwater) into cracks between asphalt and IX Pit walls.

PIR 81-9: Contamination of Yard Area During Reactor Head Removal – 5/15/81

While positioning the reactor vessel head over the equipment hatch in preparation to lower the head through the equipment hatch, the reactor head made contact with the shield wall. This resulted in the spread of removable radioactivity outside of the Vapor Container (VC).

Removable radioactivity immediately below the equipment hatch was 200 mrad/hr beta. The total activity released to the ground was approximately 250 μCi , with approximately 10 μCi (specific radionuclide data not available) discharged to Sherman Pond. The area was cleaned, but due to rainfall trace radioactive material levels were detected in the east storm drains.

Impacted Areas - NOL-01/NOL-06/OOL-12/OOL-13

Impacted Sub-surface Areas/Structures - BRT-01/in cracks and crevices under VC Equipment Hatch and along rails/ties in OOL-12 and OOL-13 and the East Storm Drain System due to surface water run-off.

PIR 84-16: Drain Pipe Failure – 9/10/84

An excavated drainpipe from the Potentially Contaminated Area (PCA) storage building to the Waste Disposal building was found to be leaking. Soil samples from around the pipe identified the presence of Co-60 and Cs-137 and the excavation of the pipe continued. The area of maximum contamination was measured at 25-35 mR/hr (specific radionuclide data not available), with a hot spot of 29,300 pCi/gm Co-60 in this same area. The pipe from the edge of the old PCA (Potentially Contaminated Area) building to the edge of the waste disposal building and approximately 420 ft³ of dirt and rock were removed as radioactive waste. The soil remaining at the bottom of the excavation contained Co-60 at an average concentration of 30 pCi/gm.

Impacted Areas – WST-01/WST-02/WST-03

Impacted Sub-surface Areas/Structures – WST-02 at a depth in excess of 9 feet below grade, activity remains potentially in excess of the soil DCGL. WST-03 at ash dewatering sump in drumming pit. Decommissioning standards had not yet been developed at the time this partial remediation was performed. Radiological decay since 1984 may have reduced the radionuclide concentration below the soil DCGL. Further scoping data will be collected below the 9 foot clean backfill to confirm this evaluated condition.

PIR 94-03 & 94-09.

Leakage from Frozen Fuel Chute Dewatering Line and NST Tell-tales

On February 17 and 18, 1994, a fuel chute dewatering line and a neutron shield tank telltale drain line ruptured due to freezing. A 3.5 liter sample from the fuel chute line indicated 1000 net cpm, and a sample from the NST telltale line indicated the presence of Co-60 and Cs-137. The ground below the rupture, as well as the area adjacent to the railroad tracks and pumpback house, showed no contamination. However, the snow pile along the south side of the rails by the new

fuel vault indicated the presence of Co-60, Cs-137 and Mn-54. All snow piles with positive radiation measurements were sent to the rad drains and the areas de-posted.

Impacted Area – NOL-01