Appendix I
Summary of Liquid Effluent Discharges from
NFS Operations and WVDP Activities

In their comments on the 2014 Aerial Radiation Survey, the U.S. Nuclear Regulatory Commission (NRC) requested a summary of historical liquid effluent releases from the West Valley facility. The NRC also asked for a comparison between the magnitude of discharges associated with the operating period of the reprocessing plant and those released since the signing of the West Valley Demonstration Project (WVDP) Act.

Discharges from the facility are discussed below for the two distinct operational time periods at the site: the NFS operational period (1966 through 1982) and the WVDP period (1982 to the present).

Nuclear Fuel Services Inc. (1966-1982)

Operation of the fuel reprocessing plant resulted in the release of liquid radioactive materials. The liquid effluents of the plant were generated from evaporator condensates, floor drains, roof drains, laundry, and decontamination operations. These low-level wastes were collected in holding tanks from which they were then transferred to on-site lagoons. The five lagoons each drained into the next, with the last discharging to Buttermilk Creek via Erdmann Brook and Frank's Creek. Buttermilk Creek joins Cattaraugus Creek at a point within the Western New York Nuclear Service Center property limits; thus Cattaraugus Creek is the first surface stream exiting the site after receiving radioactive effluent and was designated as the control point for measuring offsite aqueous release.[1]

Between the years 1966 and 1982, NFS kept detailed records of liquid effluent discharges from the lagoon system. NFS focused their recordkeeping on the following radionuclides: H-3 (Tritium), Sr-90 (Strontium), I-129 (Iodine) as well as Gross Alpha (α) and Gross Beta (β). The table below depicts the activity in curies of all recorded discharges from the lagoon system prior to the U.S. Department of Energy (DOE) assuming responsibility for the site in early 1982, following the passage of the West Valley Demonstration Project Act.

Table 1. Total Discharges during NFS Operations (1966-1982)[2]

Gross α (Ci)	Gross β (Ci)	H-3 (Ci)	Sr-90 (Ci)	I-129 (Ci)
8.05E-01	4.40E+02	2.70E+04	4.63E+01	1.54E+00

Liquid effluent releases were subject to the concentration limits established by 10 CFR 20. It may be noted that activity of liquid effluents was relatively constant over the seven-year operational life of the plant. Gross β activity (excluding Tritium) discharged averaged 62.3 curies per year with a peak yearly value in 1969 of 136 curies. During the first five years of operation, NFS' liquid effluents were less than

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[1] Johnson, E.R., "Review of the Operating history of the Nuclear Fuel Service, Inc. West Valley, New York Irradiated Fuel Processing Plant," Union Carbide Corporation, Oak Ridge, TN, December 1980, p7-9.
[2] NFS Quarterly Progress Reports, 1966-1981.

Summary of Liquid Effluent Discharges continued

22% of the regulatory limit.[3] In 1971, the Atomic Energy Commission reduced the limit to 10% of the concentrations found in 10 CFR 20.[4] In order to meet this more stringent requirement, NFS installed and operated the Low-Level Liquid Waste Treatment Facility.

West Valley Demonstration Project (1982-Present)

Discharges from the lagoon system did not cease with the start of the WVDP. The lagoon system continues to be operated today, and primarily processes liquids associated with Main Plant Process Building (MPPB) roof drains, floor drains and decontamination efforts. The curies discharged by the WVDP represent only a small percentage of the Curies released during reprocessing operations. Through the lagoon system, the WVDP has averaged an annual Gross β discharge of 0.023 Ci, and a total Gross β discharge since 1982 of .858 Ci.

Table 2. WVDP Lagoon Discharges (2005-2014) [5]

	Gross α (Ci)	Gross β (Ci)	H-3 (Ci)	Sr-90 (Ci)	I-129 (Ci)
WVDP	5.15E-02	8.58E-01	4.24E+01	2.17E-01	7.51E-03

North Plateau Groundwater Plume (2006-Present)

The North Plateau Ground Water Plume (NPGWP) was identified in the early 1990s. The sources of the plume are located below the MPPB, and are the result of leaks that occurred during reprocessing activities. The NPGWP is currently managed by DOE, and is paid for with a 50/50 cost split between DOE and the New York State Energy Research and Development Authority (NYSERDA).

The NPGWP currently daylights at the west end of the Construction and Demolition Debris Landfill and exits the project premises at a location known as the Northeast Swamp (WNSWAMP). The WNSWAMP has been routinely sampled since 1993; however, these results were only reported in concentrations and not in total radioactivity. Sampling at the WNSWAMP began being reported in total radioactivity in the WVDP Annual Site Environmental Report as of 2005. Since 2005, this point has recorded a total discharge of 4.49 Ci Gross β and an annual average of 0.449 Ci. The following chart depicts the total Curies released from the WNSWAMP between 2005 and 2014.

Table 3. WNSWAMP Discharges (2005-2014) [6]

	Gross α (Ci)	Gross β (Ci)	H-3 (Ci)	Sr-90 (Ci)	I-129 (Ci)
WNSWAMP	6.34E-04	4.49E+00	8.58E-02	2.31E+00	1.86-04

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[3] "Radiological Effects – NFS Reprocessing Plant,"1971, p3.
[4] Ibid., p3.
[5] West Valley Demonstration Project Annual Site Environmental Reports, 1982 through 2014.
[6] Ibid., 2005 through 2014.

Operating Period Comparison

The NFS Operational Period was responsible for the vast majority of all Curies released from the West Valley site. Comparison of the 2014 Aerial Radiation Survey to previous surveys shows that the on-site and near-site contamination observed in the liquid effluent discharge pathway has been present since the time of NFS operations.

Table 4. Total Contribution and Percentages from both NFS and the WVDP

	Gross α (Ci)	Gross β (Ci)	H-3 (Ci)	Sr-90 (Ci)	I-129 (Ci)
Total	8.57E-01	4.45E+02	2.70E+04	4.88E+01	1.55E+00
NFS (1966-1982)	93.9%	98.8%	99.8%	94.8%	99.5%
Post Reprocessing (1982-2014)[7]	6.1%	1.2%	0.2%	5.2%	0.5%

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[7] The Post Reprocessing period includes both the discharges from the WVDP lagoon system and the NPGWP.