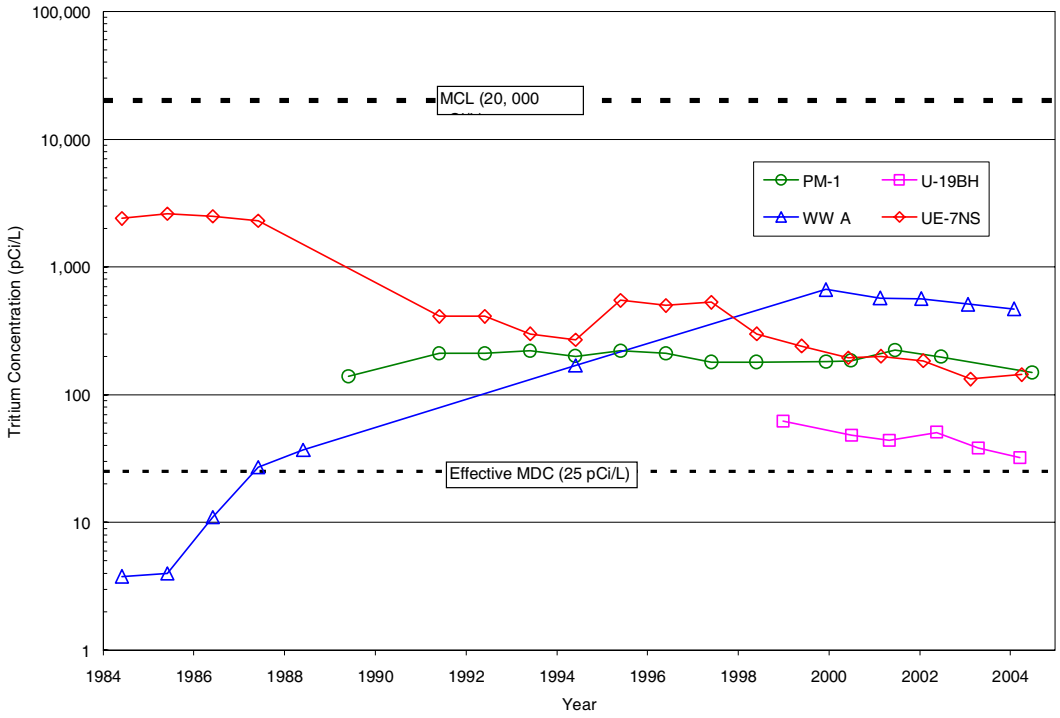

Figure 4-10. Concentrations of tritium in wells with a history of detectable levels

4.1.8 *Results from NTS E Tunnel Ponds*

Five primary basins were constructed to collect and hold water discharged from the E Tunnels in Area 12 where nuclear testing was conducted in the past (see Figure 4-3 and Figure 7-2). The water is perched groundwater that has percolated through fractures in the tunnel system. The Defense Threat Reduction Agency (DTRA) conducts monitoring of effluent waters from E Tunnel to determine if radionuclides and non-radiological contaminants exceed the allowable contaminant levels regulated under a state water pollution control permit (NEV 96021), which is issued to DTRA. During October, 2004, a DTRA contract company sampled the tunnel effluent near where water is discharged. During September, 2004, BN personnel sampled water from the pond influent (which at the time was flowing into Pond 5), and from Pond 5 itself. Sediment was also sampled from the basin of Pond 5. Effluent water was analyzed by DTRA for tritium, gross alpha, and gross beta (Table 4-5) and for 16 non-radiological contaminants and water quality parameters (DTRA, 2004). All other samples were analyzed by BN for tritium (water samples only), gamma-emitting radionuclides, uranium, plutonium, ^{90}Sr, and ^{241}Am (Table 4-6).

Table 4-5. Radiological results for E Tunnel Pond effluent pertaining to Water Pollution Control Permit NEV 96021

Parameter	Permissible Limit (pCi/L)	Average Measured Value (pCi/L)
Tritium	1,000,000	710,000
Gross Alpha	35.1	13.4
Gross Beta	101	72

Source: Water Pollution Control Permit NEV 96021 Quarterly Monitoring Report and Annual Summary Report for E Tunnel Waste Water Disposal System (DTRA, 2004)

Table 4-6. Routine radiological water monitoring results for E-Tunnel Ponds in 2004

Sample	^{3}H ± Uncertainty[a] (MDC)	^{90}Sr ± Uncertainty (MDC)	^{137}Cs ± Uncertainty (MDC)	^{238}Pu ± Uncertainty (MDC)	$^{239+240}$Pu ± Uncertainty (MDC)	^{241}Am ± Uncertainty (MDC)
Water - Concentration units are pCi/L						
Influent to Pond 5	738,000 ± 74,300 (1,620)	0.51 ± 0.39 (0.63)	62.70 ± 6.38 (2.84)	0.36 ± 0.09 (0.04)	3.10 ± 0.39 (0.05)	0.26 ± 0.08 (0.06)
Pond 5 Water	721,000 ± 72,600 (1,610)	0.29 ± 0.26 (0.47)	55.30 ± 4.38 (2.95)	0.40 ± 0.09 (0.03)	3.25 ± 0.41 (0.04)	0.18 ± 0.07 (0.06)
Pond 5 Water FD[b]	730,000 ± 73,500 (1,620)	0.59 ± 0.36 (0.58)	49.00 ± 5.75 (3.17)	0.40 ± 0.09 (0.03)	3.60 ± 0.44 (0.01)	0.25 ± 0.07 (0.04)
Sediment - Concentration units are pCi/gram						
Pond 5 Sediment	NA[c]	-0.02 ± 0.21 (0.49)	17.00 ± 0.25 (0.06)	0.05 ± 0.02 (0.02)	0.34 ± 0.08 (0.01)	0.01 ± 0.02 (0.01)
Pond 5 Sediment FD	NA	0.30 ± 0.31 (0.61)	19.70 ± 1.38 (0.06)	0.02 ± 0.02 (0.01)	0.36 ± 0.08 (0.01)	0.01 ± 0.02 (0.02)

Green shaded results are considered detected (results greater than the sample-specific MDC)

(a) ± 2 standard deviations

(b) FD = Field duplicate

(c) Not applicable: tritium is not measured in samples which do not contain water

The majority of samples had radionuclide concentrations above their MDC (Table 4-6). While tritium concentrations in tunnel effluent were elevated, they were about 29 percent lower than the limit allowed under permit NEV 96021 for that discharge system (Table 4-5). Tritium was found in all pond inlet and pond water samples at concentrations slightly lower than the previous two years' samples (Figure 4-11). Most pond water samples had tritium concentrations very close to those in tunnel effluent, but there have been measurements of tritium in pond water much lower than the tunnel effluents (Figure 4-11). This is likely due to precipitation events that dilute the original tritium concentrations. Concentrations of ^{90}Sr, ^{137}Cs, plutonium, and ^{241}Am were at levels comparable with the past two years. Uranium was not detected in samples collected during 2004.

Due to the elevated concentrations of radionuclides in the E Tunnel containment ponds, the ponds are fenced and posted with radiological warning signs. Given that the ponds are available to wildlife, animals are also sampled under RREMP monitoring to assess potential radiological doses to wildlife and to humans consuming game animals (see Section 7.0 and Section 8.0).

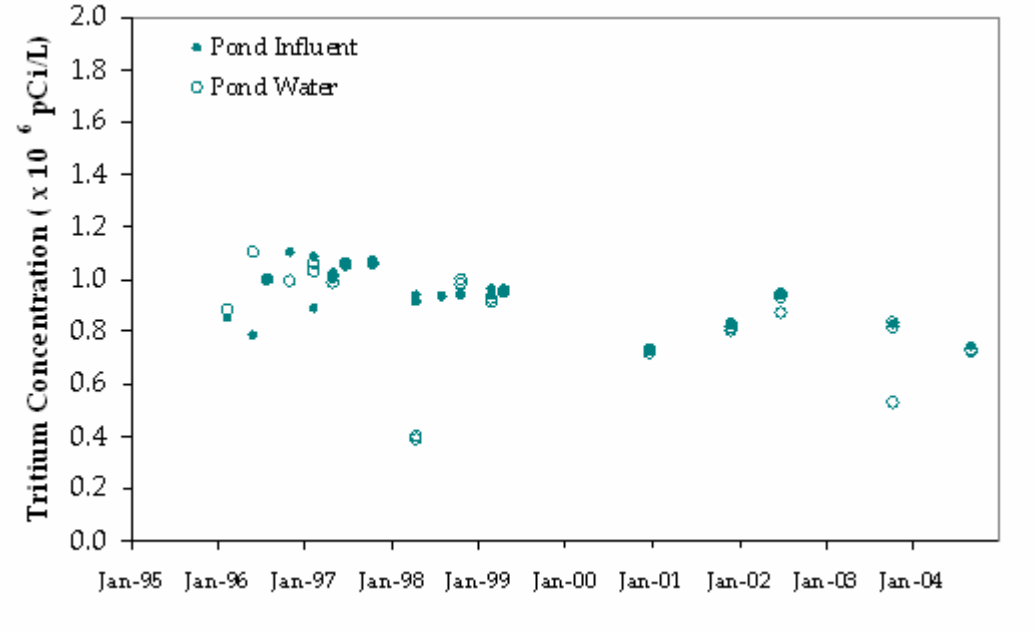

Figure 4-11. Tritium concentration in E Tunnel Ponds from 1995 – 2004

4.1.9 Results from NTS Sewage Lagoons

Each sewage lagoon at the NTS is part of a closed system used for the evaporative treatment of sanitary sewage. Sewage storage and treatment at the NTS has transitioned from lagoons to septic systems at several locations in recent years. Two permitted sewage lagoons remain: Area 6 Yucca and Area 23 Mercury (A23) (see Figure 4-3). The permits for these lagoons do not require that the water or sediments be monitored for radioactivity (see Section 4.2.4). However, to more completely demonstrate the proper management of effluents on the NTS, limited radiological analyses are conducted for these lagoons under the RREMP (DOE, 2003b).

The lagoon water samples were analyzed for tritium using standard (un-enriched) analyses and by gamma spectroscopy for other radionuclides. No tritium was detected at concentrations above MDCs in the lagoon water samples (Table 4-7) and no man-made gamma-emitting radionuclides were detected.