Tank Waste Release in the Tank Farm Waste Management Areas: RCRA Groundwater Monitoring and Assessment

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November 28, 2000

Hanford Groundwater Monitoring Project

(www.hanford.pnl.gov/groundwater/)

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Tank Farm Waste Management Areas

- WMAs include tanks, ancillary equipment, and waste systems (e.g., transfer lines, diversion boxes, and salt well pipeline networks)

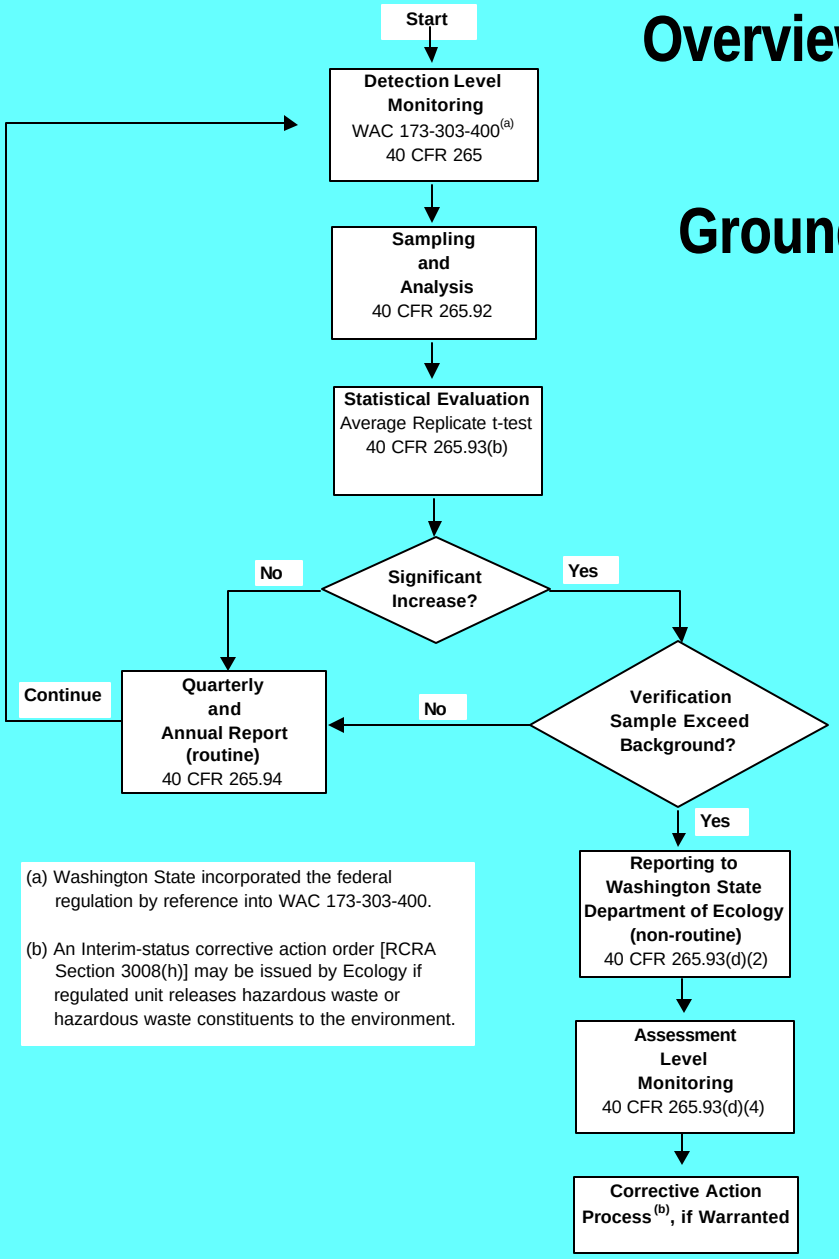
- 12 tank farms grouped into 7 Waste Management Areas (WMA): T, TX-TY, U, S-SX, B-BX-BY, C, and A-AX

Status

- All are monitored under interim-status regulations
- Five of the 7 WMAs are in groundwater quality assessment, two are in detection monitoring status
- Four WMAs (T, TX-TY, S-SX, and B-BX-BY) are in RFI/CMS phase

Overview of RCRA Interim-Status

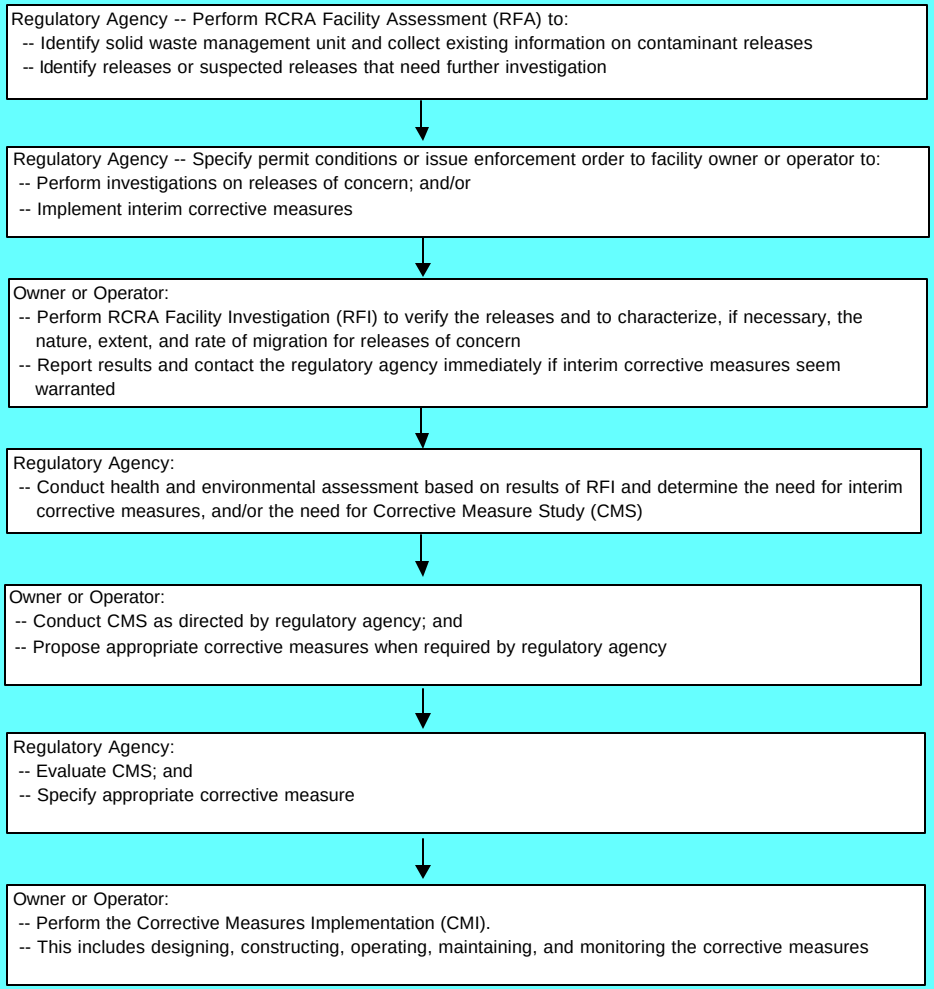
Groundwater Monitoring Program



(a) Washington State incorporated the federal regulation by reference into WAC 173-303-400.

(b) An Interim-status corrective action order [RCRA Section 3008(h)] may be issued by Ecology if regulated unit releases hazardous waste or hazardous waste constituents to the environment.

Overview of RCRA RFI/CMS Process



Groundwater Quality Assessment Objectives

- As required by 40 CFR 265.93(d)(7), the objectives are to determine:

  (i) the rate and extent of migration of the hazardous waste or hazardous waste constituents in the groundwater

  (ii) the concentration of hazardous waste or hazardous waste constituents in the groundwater

Groundwater Quality Assessment Activities

- New well installations to determine areal and vertical extent of contamination
- Hydraulic testing to determine aquifer properties
- Tracer tests to determine flow direction and velocity
- Some special analysis

Current Findings

- Five WMAs contribute to groundwater contamination
- Major contaminants are technetium-99, nitrate, nitrite, tritium, chromium, and uranium
- Some contaminants were found at depth at TX-TY
- Cesium, strontium, plutonium, americium isotopes are not detected in RCRA network wells

Waste Constituents Reaching Groundwater and Approximate Transport Rates (200 East)

WMA	COC*	Transport Rate	
		Vadose	Groundwater
B-BX-BY	^{99}Tc, NO_3^-, U, CN^-	months	~ 1 m/d

* **COC = Constituent of concern**

Waste Constituents Reaching Groundwater and Approximate Transport Rates (200 West)

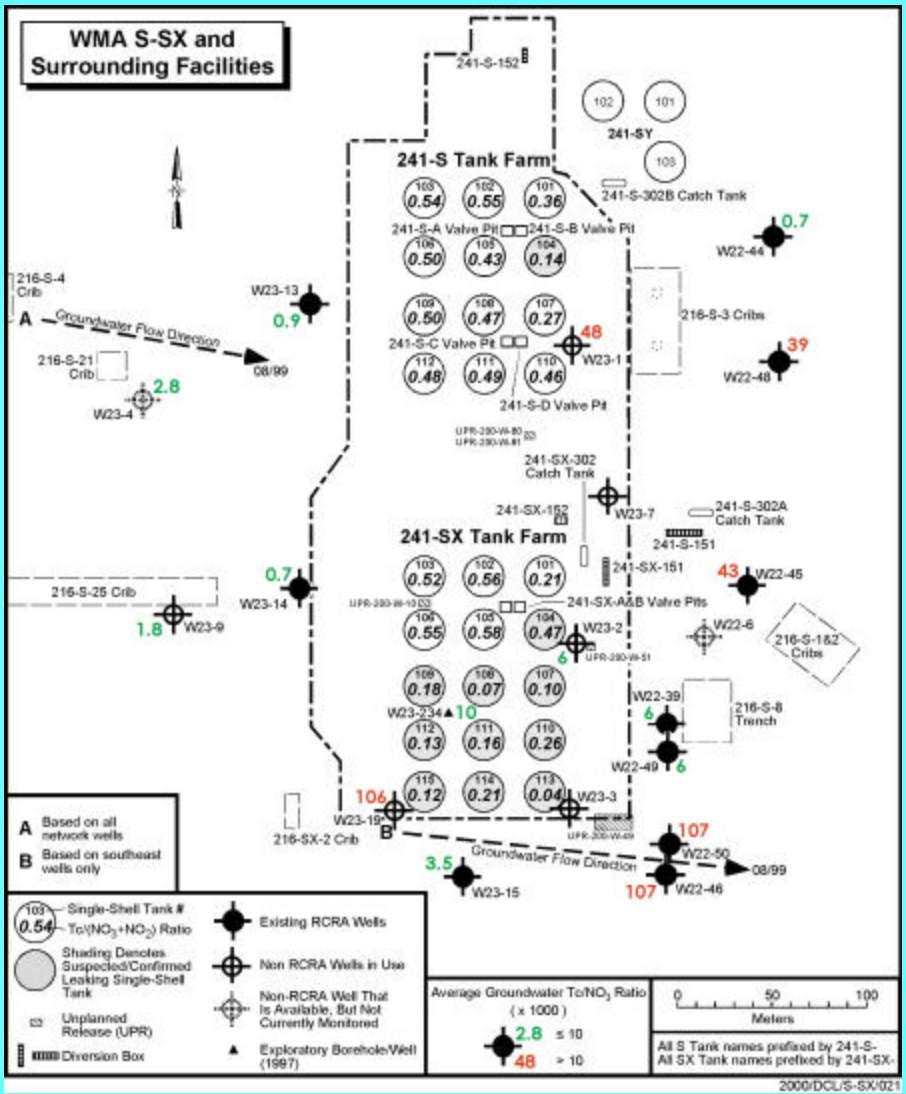
WMA	COC	Transport Rate: Vadose	Transport Rate: Groundwater
T	NO_3^-, NO_2^-, ^{99}Tc, ^{3}H, ^{129}I, Cr^{6+}, F^-	years	<0.1 m/d
TX-TY	^{3}H, ^{129}I, NO_3^-, ^{99}Tc, Cr^{6+}	years	<0.1 m/d
S-SX	^{99}Tc, ^{3}H, NO_3^-, Cr^{6+}	years	<0.1 m/d

Contaminant Concentrations in Well 2-W23-19

Constituent[a]	Temporary Screen (1.5m)		Permanent Screen (9.1m)	
	Kabis (6 cm) (October 1999)	Pumped (1 m) (October 1999)	Pumped (2 m) (March 2000)	Pumped (2 m) (June 2000)
^{99}Tc (pCi/L)	48,050	39,000	52,300	63,700
Cr (ug/L)	84	63	90	87
NO_3^- (mg/L)	560	434	491	562
^{3}H (pCi/L)	92,000	91,000	95,800	92,000
Ca^{++} (mg/L)	118	96	127	120
Na^{+} (mg/L)	34	34	42	43

(a) ^{90}Sr, ^{129}I, ^{137}Cs, ^{237}Np, ^{238}Pu, ^{239}Pu, ^{241}Am are all non-detects.

Technetium-99/Nitrate Ratio for WMA S-SX Network Wells



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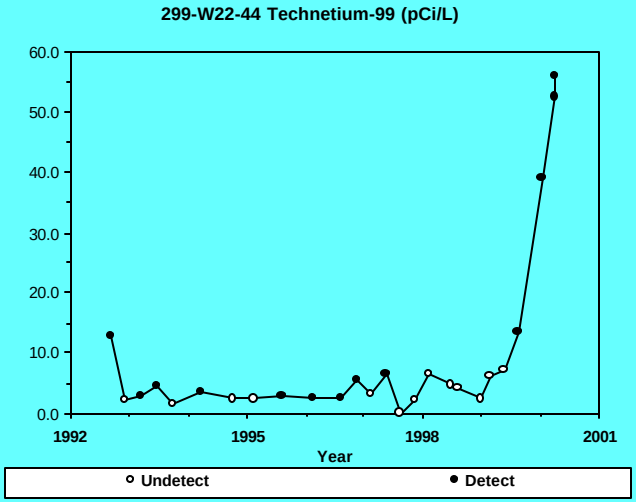
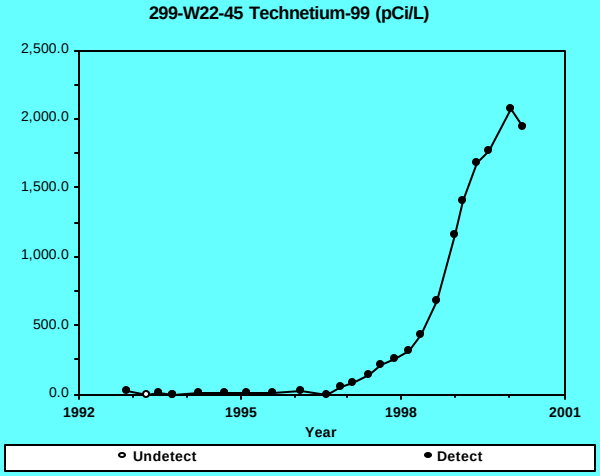
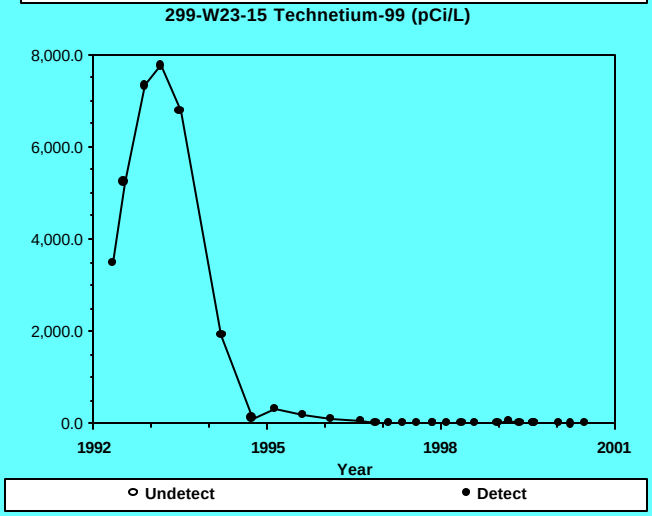
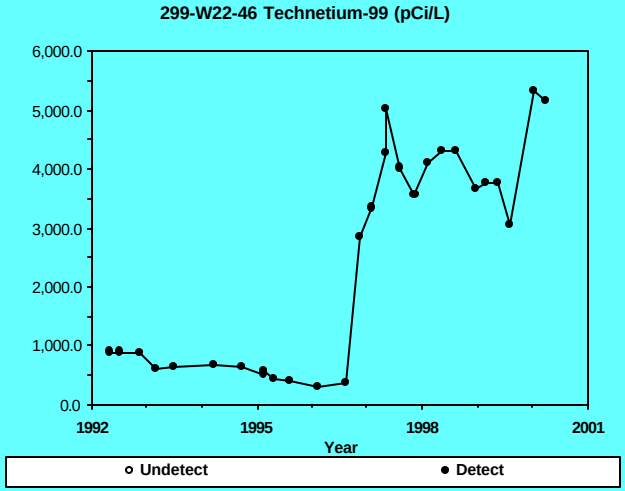
Concentration vs Time Plots in Selected WMA S-SX Monitoring Wells









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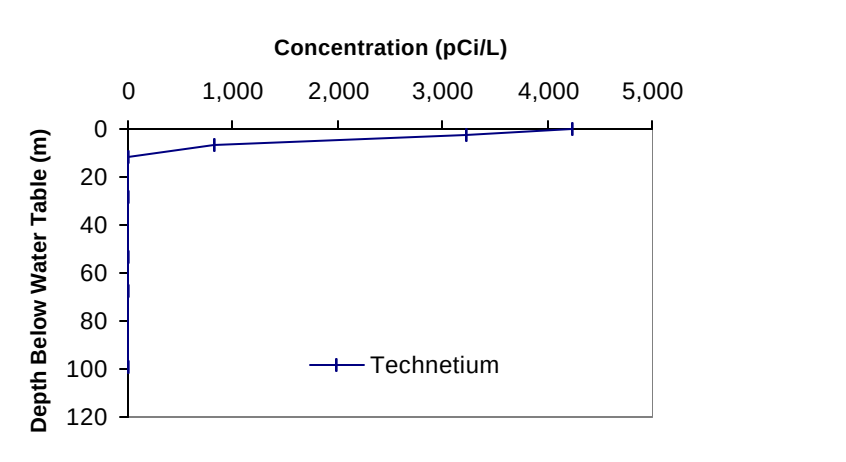
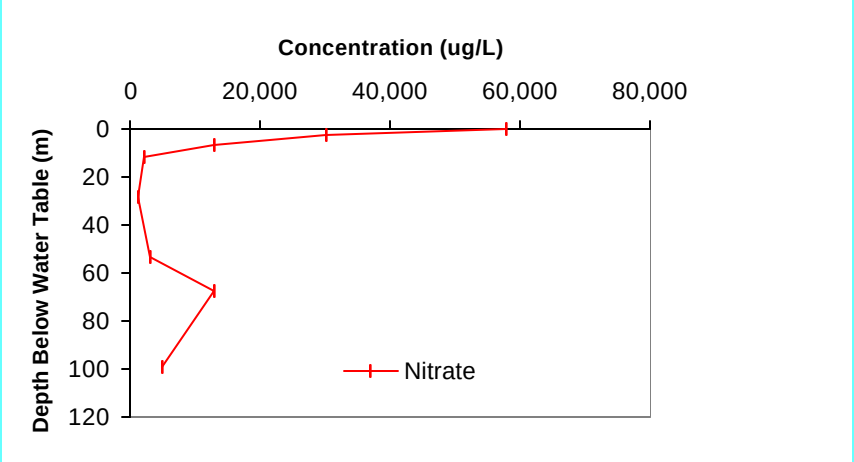
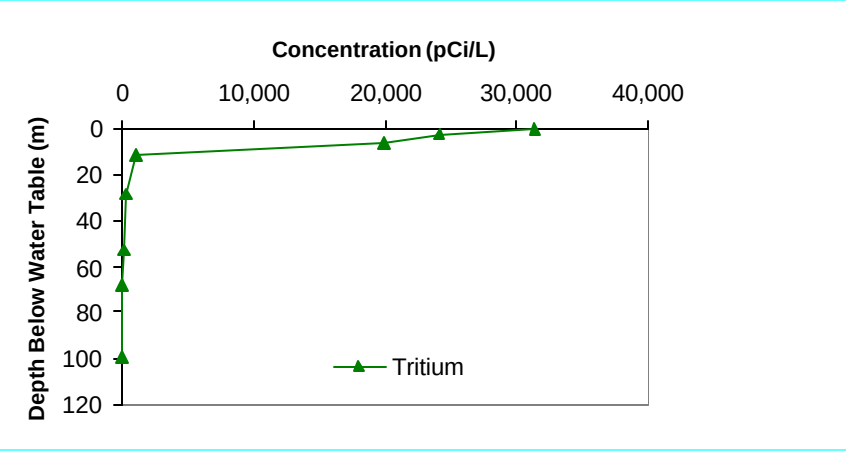
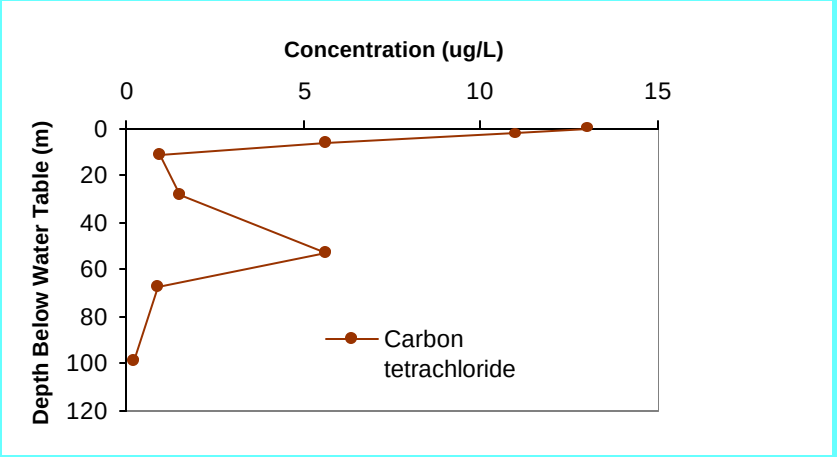
Depth Distribution of Key Contaminants, Well 299-W22-50, WMA S-SX









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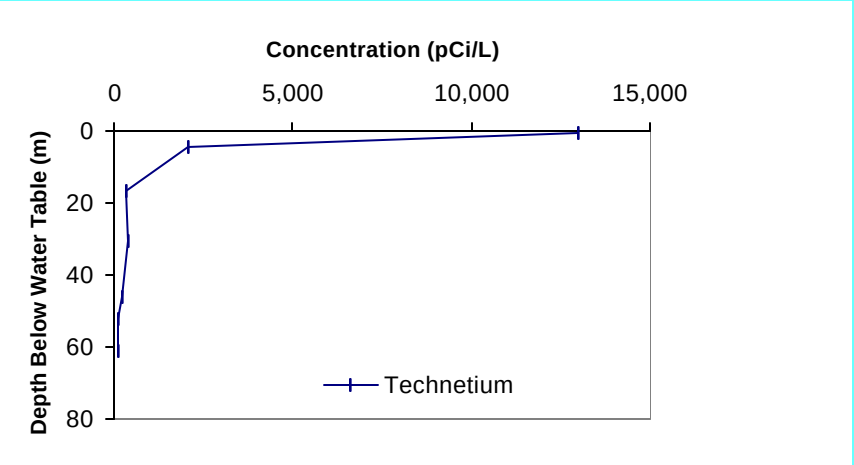
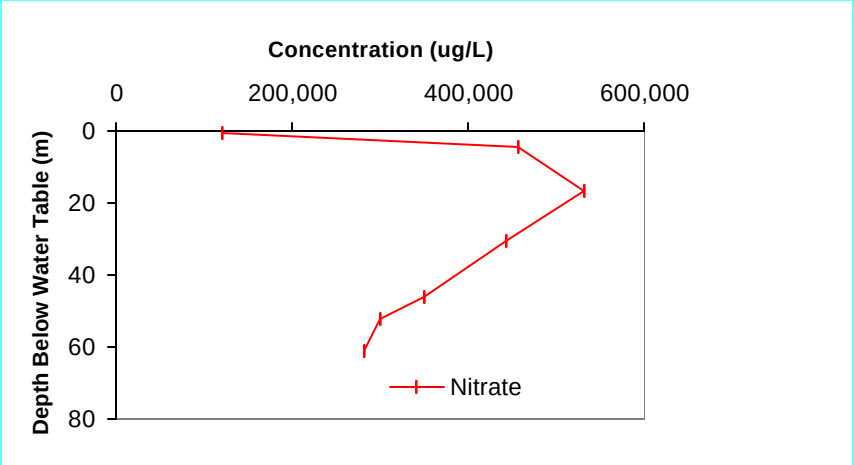
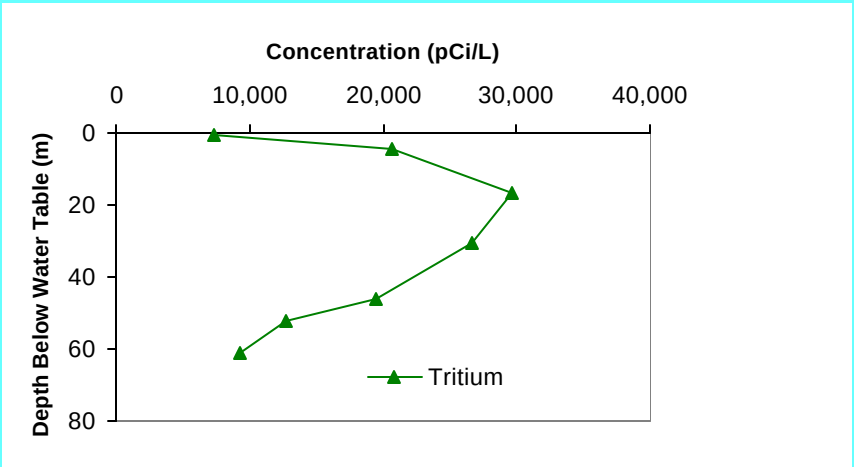
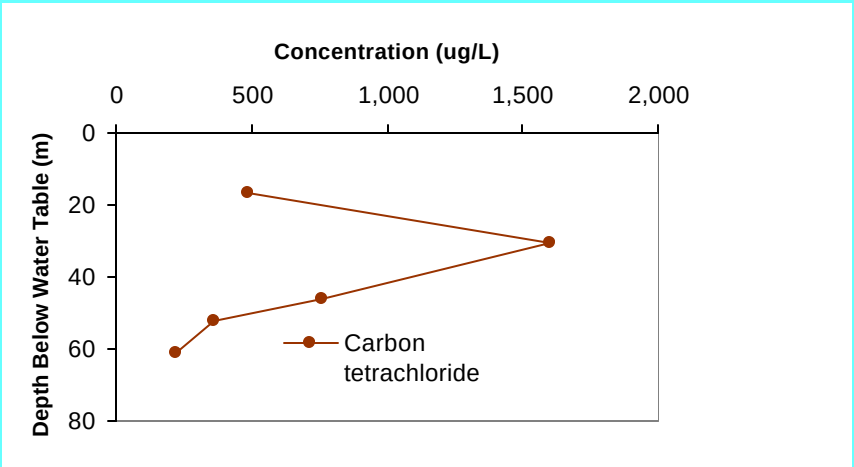
Depth Distribution of Key Contaminants, Well 299-W10-14, WMA T









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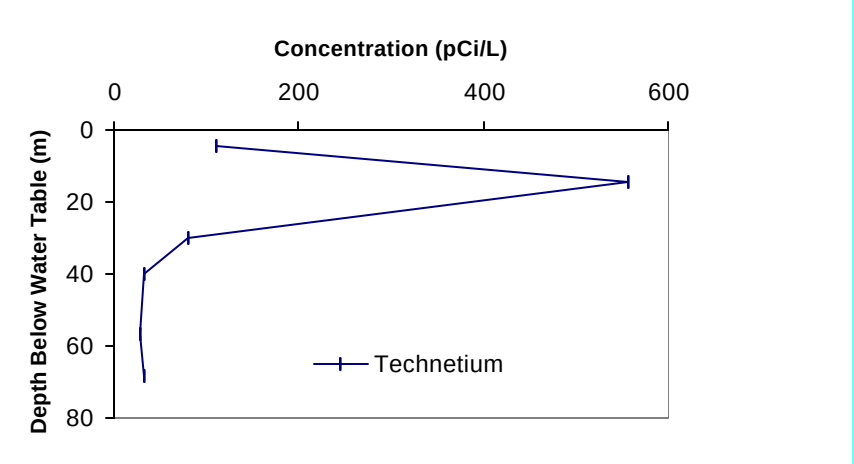
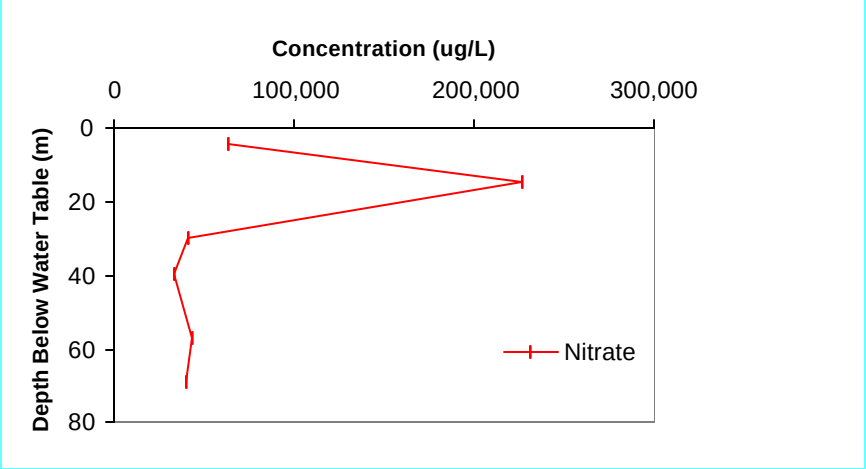
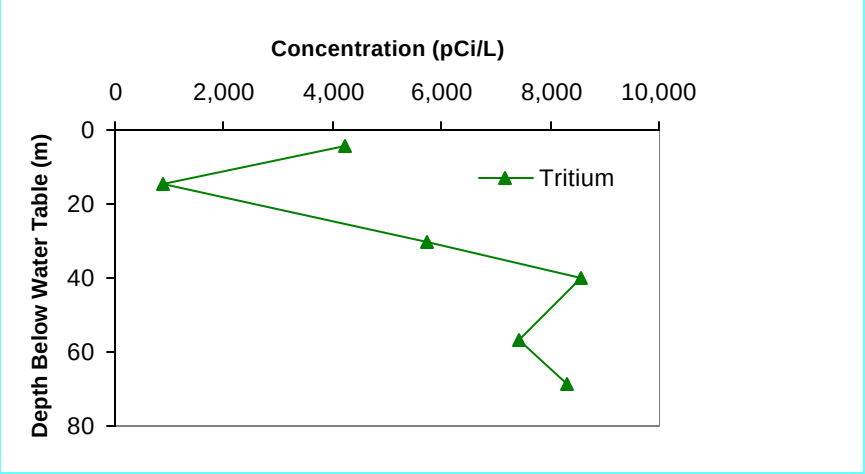
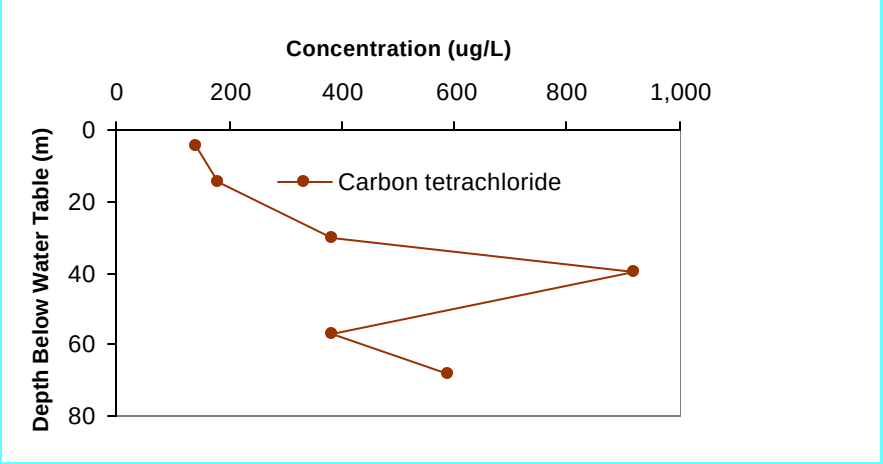
Depth Distribution of Key Contaminants, Well 299-W14-14, WMA TX-TY









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