Central Files 200-BP-5
File Name:
Cross References:

Nez Perce
ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT
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January 7, 2019

Mr. Ray J. Corey
Assistant Manager for the River and Plateau
Richland Operations Office
US Department of Energy
PO Box 550, MSIN: A5-11
Richland, WA 99352

Re: *Remedial Investigation Report for the 200-BP-5 Groundwater Operable Unit*, DOE/RL-2009-127, Revision 0

Dear Mr. Corey:

The Nez Perce Tribe's Environmental Restoration and Waste Management Program (ERWM) appreciates the opportunity to collaborate with the US Department of Energy (DOE) on Hanford groundwater and vadose zone issues. We are responsible for the management of natural resources based on rights reserved through treaties with the United States government. Protecting and perpetuating these natural resources is at the heart of the ERWM's responsibility to the long-term survival of Nez Perce people. Contaminated natural resources prevents the connection to the land and water by tribal and non-tribal people alike.

ERWM staff are concerned DOE and its contractors are underestimating the risks to human health and the environment due to past releases in the B, BX, and BY tank farms (200-BP-5 Groundwater Operable Unit) as detailed in the *Remedial Investigation Report for the 200-BP-5 Groundwater Operable Unit*, Revision 0. We believe the leaking tanks in 241-BY tank farm are major contributors to ongoing groundwater contamination in the B-BX-BY area instead of the 216-BY cribs. The volumes and

contents of the releases from the single shell tanks farms located in the 200 East Area are underestimated. The Attachment to this letter details our concerns.

I am requesting your staff examine this information and possible impacts to your remediation efforts. If you have any techncial questions please contact Stan Sobczyk at (208) 621-3751, or by email at stans@nezperce.org. I can be reached at (208) 621-4710 or jackb@nezperce.org. We look forward to hearing from your offices to improve and expedite the work needed to remediate Hanford's groundwater with the goal of protecting the Nez Perce Tribe's retained treaty rights and the Columbia River.

Sincerely,

Jack H. Bell
ERWM Director

cc: Laurene Contreras, YN
Mathew Johnson, CTUIR
Dave Einan, EPA
Ken Niles, ODOE
Karen Lutz, DOE/RL
Alex Smith, Ecology

Attachment

Nez Perce Tribe
Environmental Restoration and Waste Management Program
December 28, 2019
Comments On:

Remedial Investigation Report for the 200-BP-5 Groundwater Operable Unit, DOE/RL-2009-127, Revision 0

Environmental Restoration and Waste Management Program (ERWM) has reviewed the *Remedial Investigation Report for the 200-BP-5 Groundwater Operable Unit*, DOE/RL-2009-127, Revision 0, and we recommend the document be revised in the following two areas:

1. It should be acknowledged that leaking tanks in 241-BY tank farm are major contributors to ongoing groundwater contamination in the B-BX-BY area instead of the 216-BY Cribs.
2. The volume and contents of the releases in 200 East single shell tank farms are underestimated in RPP-26744, 2005, *Hanford Soil Inventory Model, Rev. 1*, CH2M HILL Hanford Group, Inc., Richland, Washington.; and thus, the risk assessment underestimates the risk. The releases in the tank farms are the major contributors to ongoing groundwater contamination within the 200-BP-5 Groundwater Operable Unit.

Making the revisions will better estimate groundwater fate and transport and show the past releases in the tank farms are the ongoing vadose zone sources of groundwater contamination.

General Comments

B-BX-BY Area

The current location of the high groundwater concentrations for ^{99}Tc, nitrate, and cyanide is located to the east of the 241-BY tank farm (Figure 1). Waste disposal at the BY Cribs ceased when ^{60}Co and ^{137}Cs contamination breakthrough to groundwater occurred at the 299-E33-3 well on January 9, 1956 (Thomas et al. 1956). The travel time for waste from the crib to reach groundwater was estimated at between 10 days and two months (Clukey 1955). The 216-B-50 Crib received condensate from the BY Tank Farm ITS unit located in the BY Tank Farm eight to nine years after the closure of the other cribs. Since the closure of the cribs a half century ago, the mass flux of contamination draining from the vadose zone underneath the BY Cribs into the groundwater should be decreasing with time (Figure 2). Plots of groundwater sampling results (Figures 3, 4, 5 and 6) show declining amounts of contamination until the mid-1990s followed by increasing amounts of groundwater contamination. The increase in these contaminants since the mid-1990s must be attributed to a source other than the BY Cribs.

The *Phase I Remedial Investigation Report for 200-BP-1 Operable Unit (*DOE/RL-92-70) reported for the BY Cribs that: "It is probably more likely that maximum groundwater concentrations were reached shortly after cessation of disposal, and that the decline in groundwater concentrations with time was and will be more rapid. This is evidenced by the

maximum Tc-99 groundwater concentrations being an order-of-magnitude greater downgradient (15,000 pCi/L) than beneath the 200-BP-1 operable unit (400-700 pCi/L)." The report recommended the following for the Feasibility Study, "Source control measures do not appear warranted for Tc-99, nitrate, and Co-60 since their current impacts from the operable unit are declining with time and are below MCL standards."

In 200 East, ^{99}Tc activity in groundwater in 1992 (Figure 7) is vastly less contaminated than in 2017 (Figure1). In the past when the high groundwater concentrations for ^{99}Tc, nitrate, and cyanide were located beneath the BY Cribs, the source of these contaminants was attributed to the BY Cribs (PNNL-19277, p. vi). "Prior to the 2011 groundwater flow reversal (Figure 8), ^{99}Tc activity beneath the BY Cribs exceeded 30,000 pCi/L in all three wells located beneath the BY Cribs footprint" (DOE/RL-2015-07, p 9-31). This groundwater flow reversal has made it

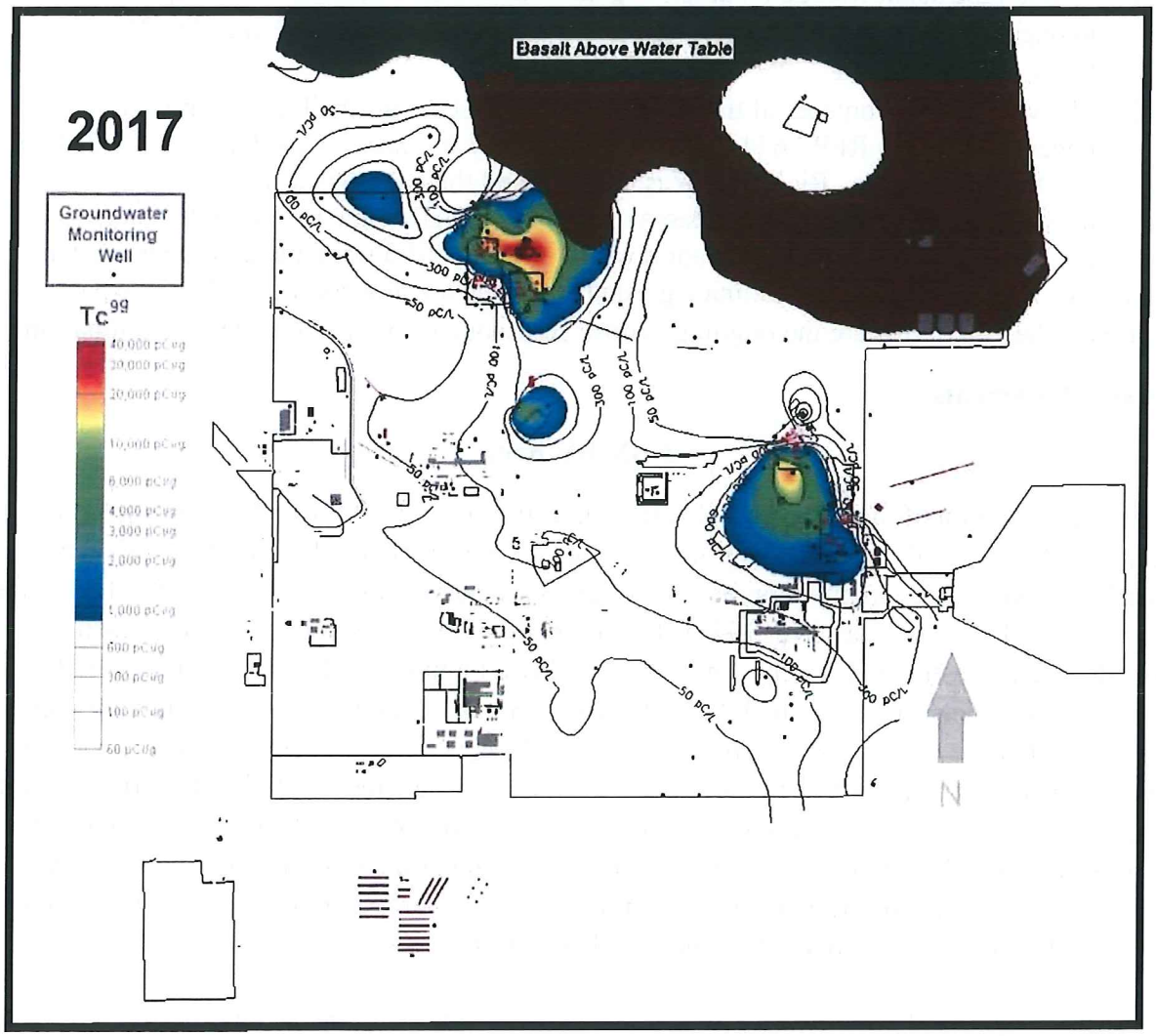

Figure 1. 200 East Area ^{99}Tc groundwater plume in 2017.

apparent that the BY cribs are not the current major source of ^{99}Tc, nitrate, and cyanide concentrations in groundwater in the B-BX-BY area. The lower levels of these contaminants underneath the BY Cribs indicates that the majority of the contamination originates from a different vadose zone source (Figure 1).

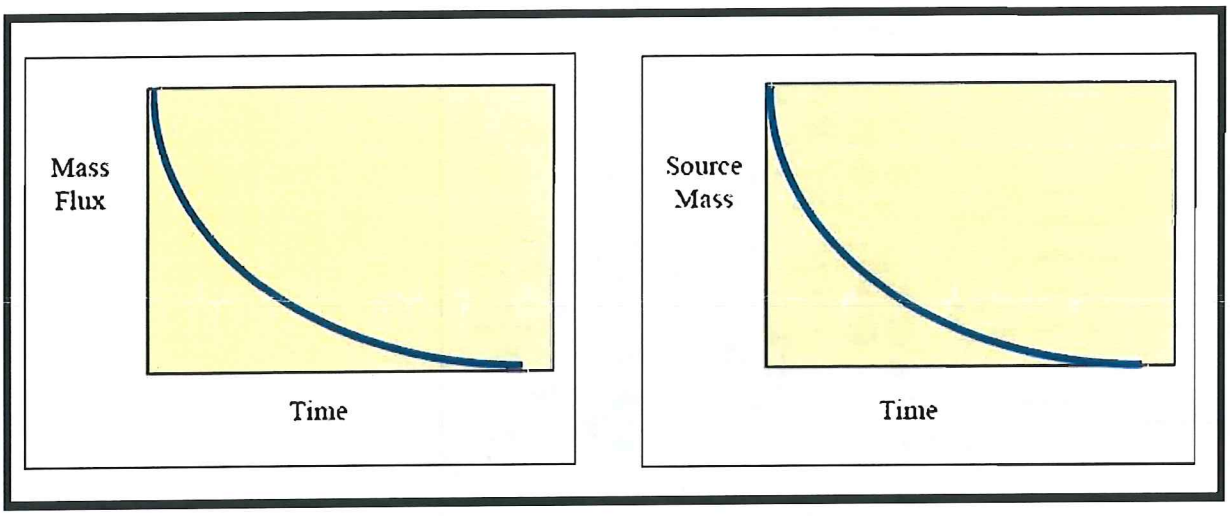

Figure 2. Conceptual model of contaminant mass flux from a waste site to groundwater and depletion of contaminant source mass in the vadose zone (Groundwater Services, Inc. 2006).

The releases in the 241-BY tank farm, which is located up stratigraphic dip from the current high groundwater concentrations for ^{99}Tc, nitrate, and cyanide, are shown in Figure 5. Cyanide, ^{99}Tc, and nitrate together define the signature of scavenged waste, which was cascaded from the BY tank farm to the BY cribs. The scavenged waste releases from the leaking tanks in the 241-BY tank farm are the current dominate vadose zone sources of the groundwater contamination with the scavenged waste characteristics.

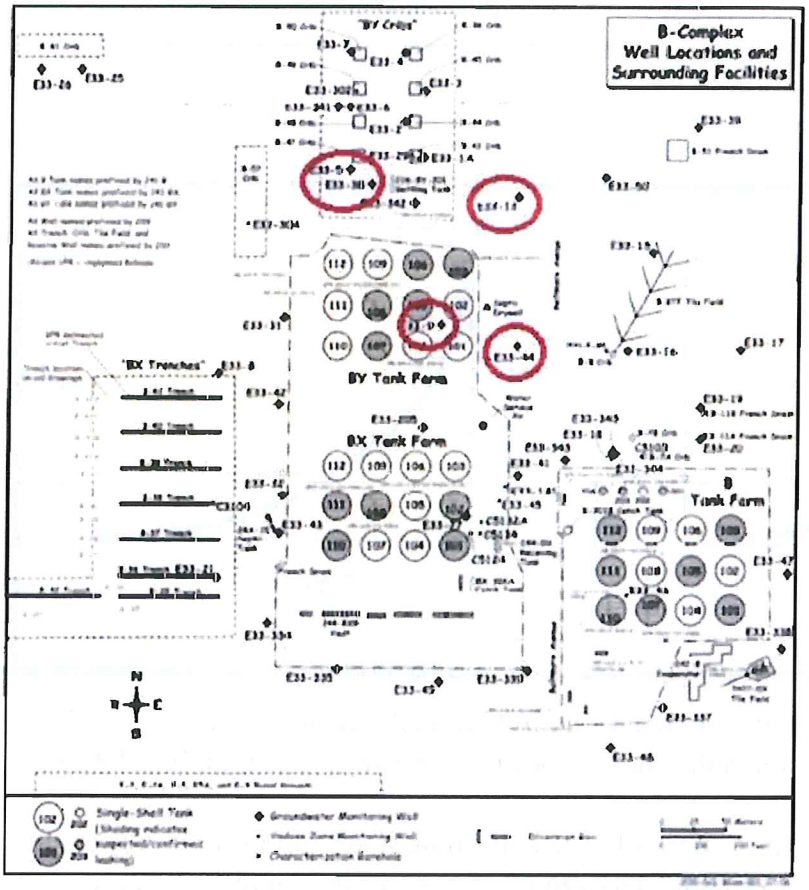

Figure 16. B-Complex Well Locations and Surrounding Facilities

Figure 3. Index map that shows the well locations (circled in red) for the plots of groundwater sampling results shown on Figures 4, 5 and 6 (modified from ECF-Hanford-13-0037).

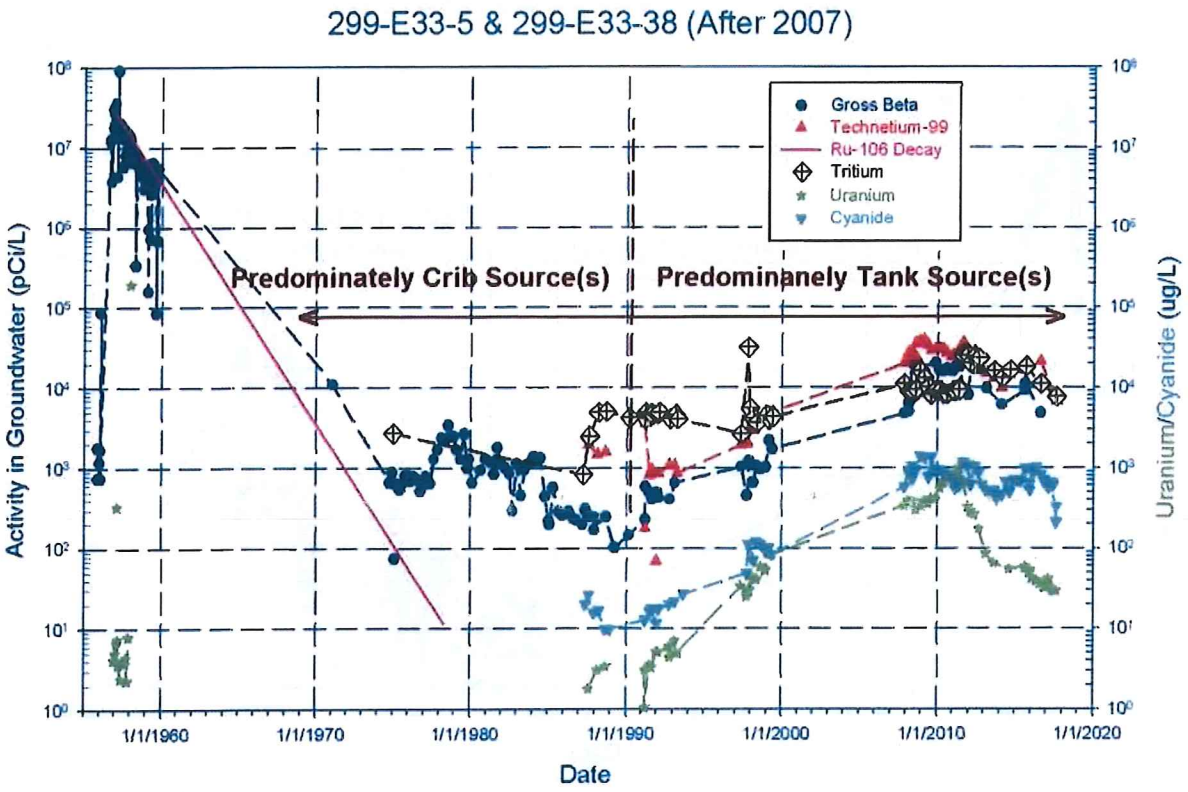

Figure 4: Since the closure of the BY Cribs more than 50 years ago, the drainage from the vadose zone beneath cribs has been decreasing, which results in lower levels of groundwater contamination.

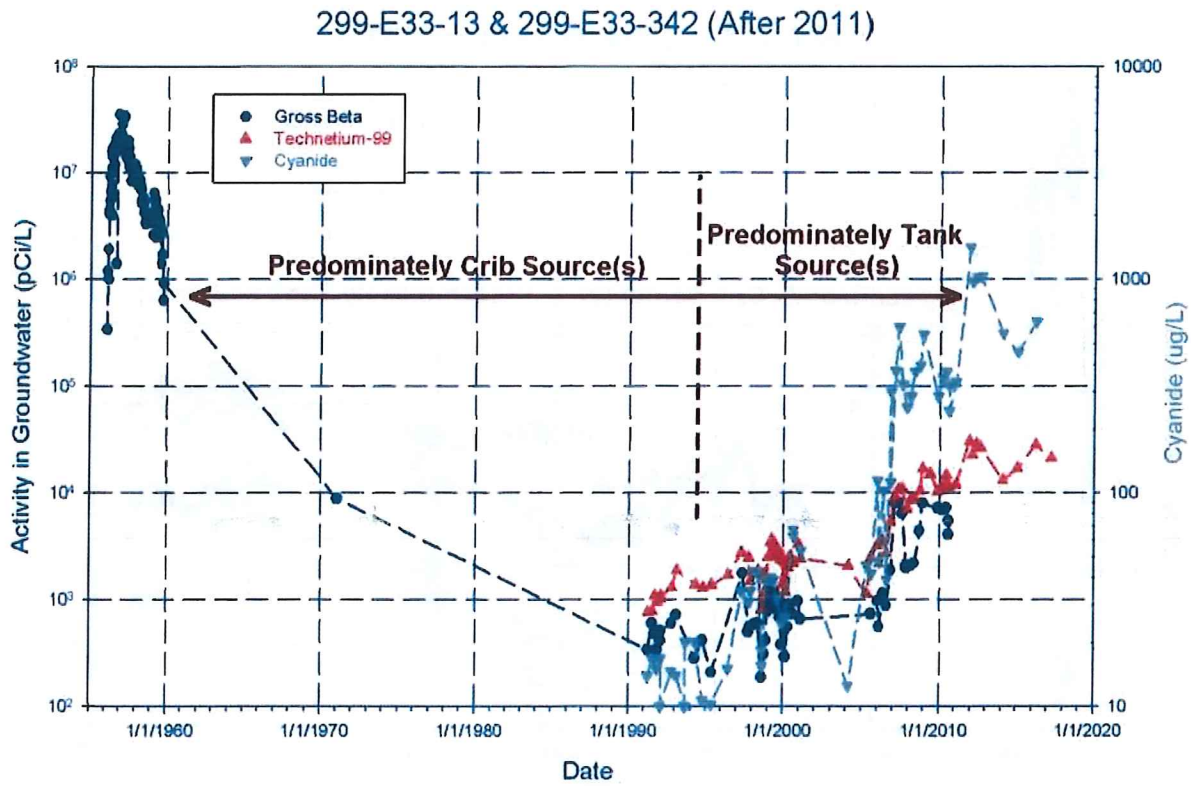

Figure 5. Since the 1990's, the increases in gross beta, nitrate, cyanide and ^{99}Tc in groundwater that have developed in the B-BX-BY area can not be attributed to continued flux from the BY Cribs.

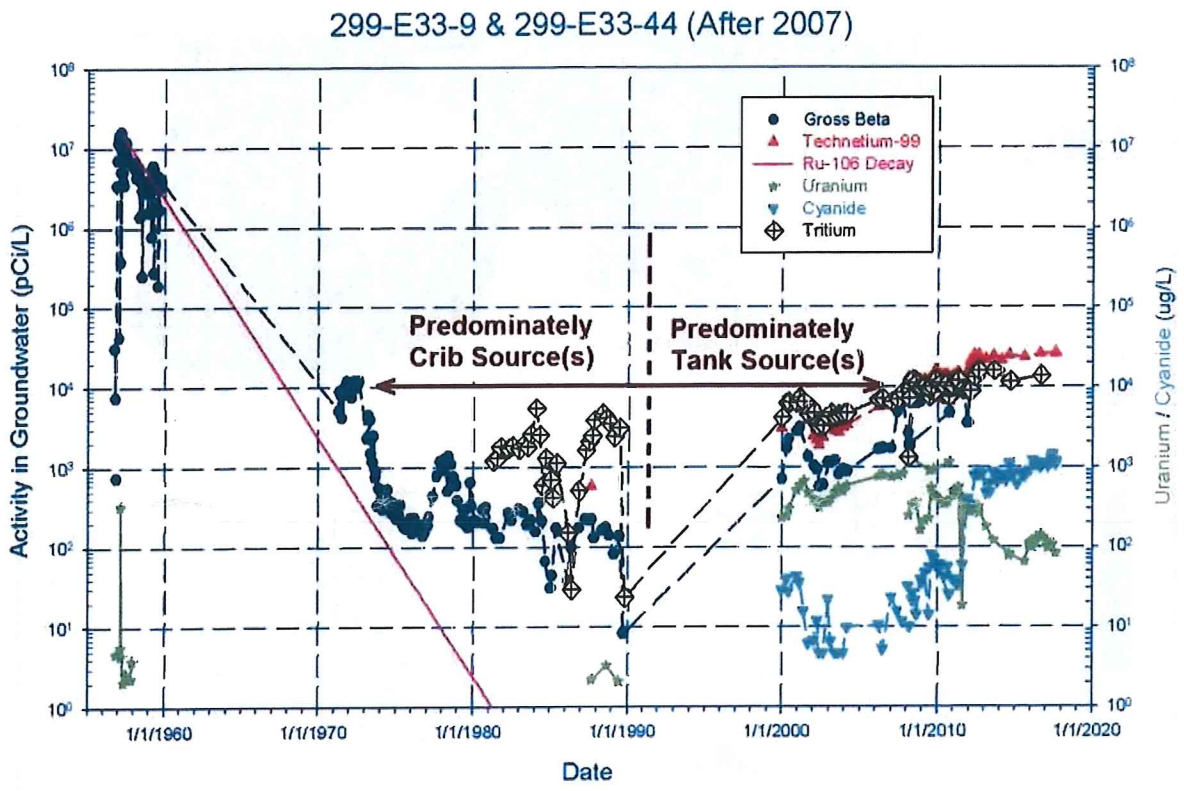

Figure 6. After the 2011 groundwater flow reversal, The highest ^{99}Tc activity and cyanide concentrations in groundwater are located down stratigraphic dip from the BY tank farm.

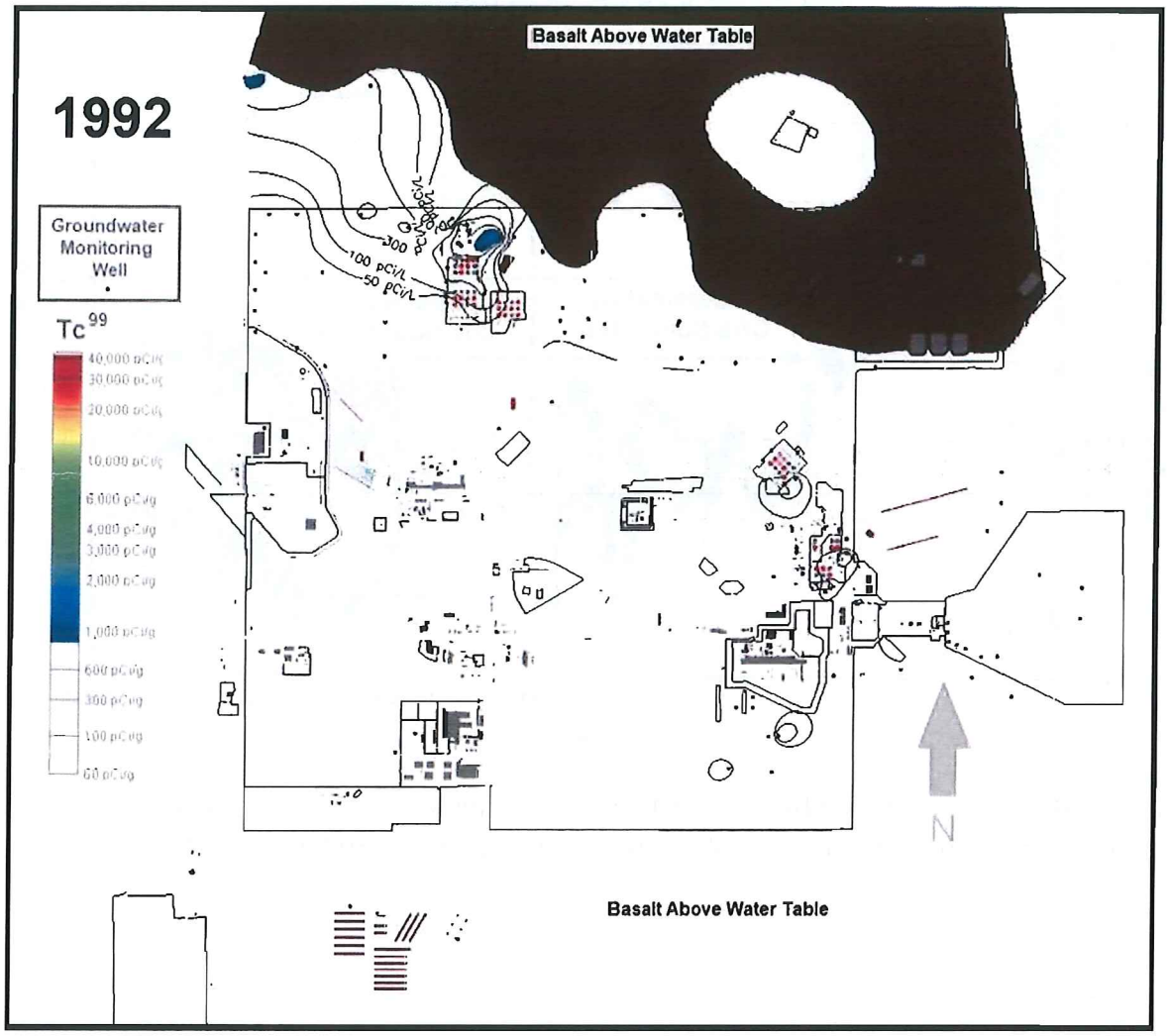

Figure 7. 200 East Area ^{99}Tc groundwater plume in 1992, demonstrates that the diminished impact of releases to BY Cribs on groundwater.

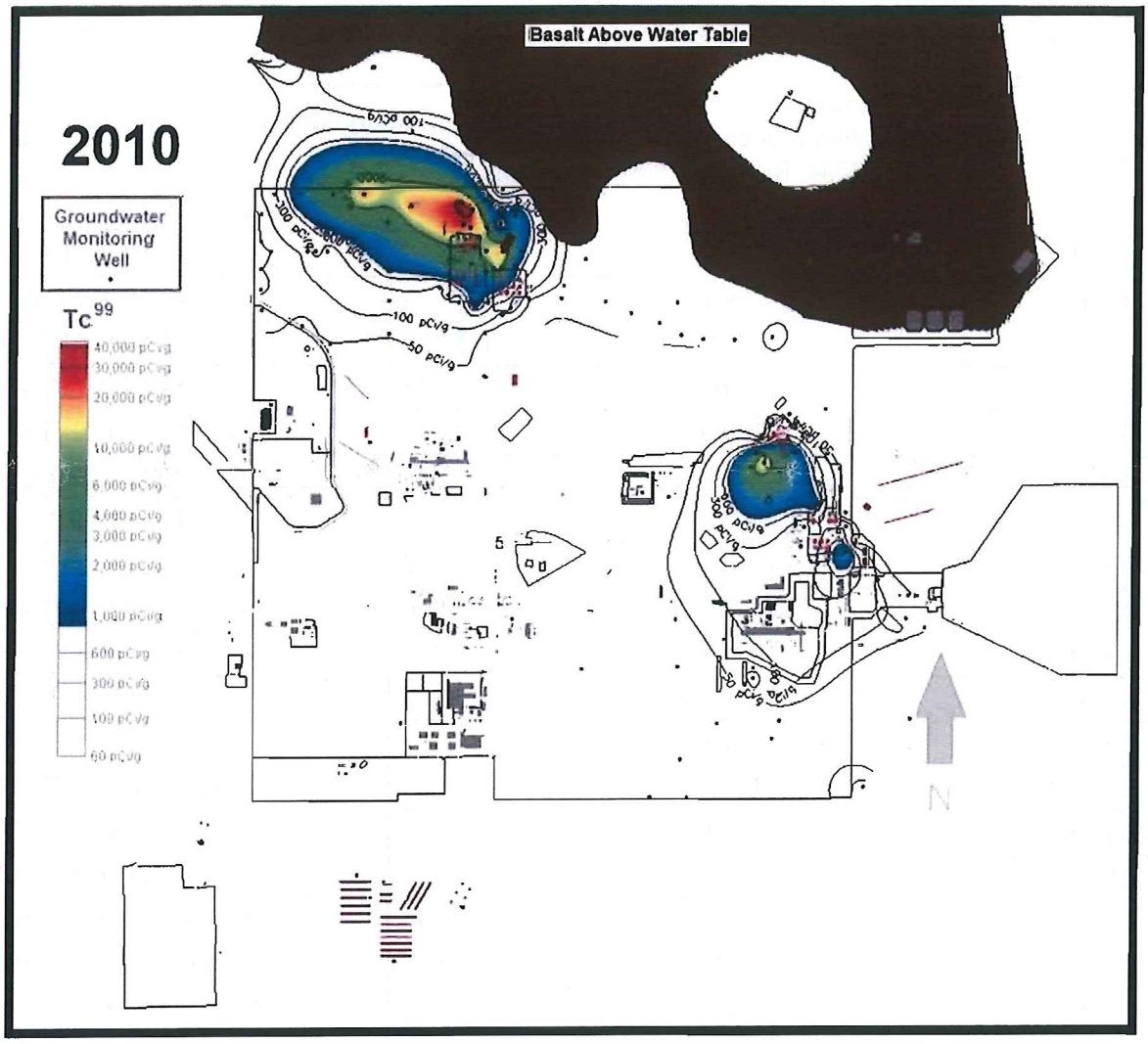

Figure 8. 200 East Area ^{99}Tc groundwater plume in 2010 prior to the groundwater flow reversal.

Hanford Soil Inventory Model (RPP-26744, Rev. 1)

The Hanford Soil Inventory Model (RPP-26744, Rev. 1) underestimates the amount of liquid and contaminant mass releases in the tank farm by a factor of three when compared to more current Hanford references (Table1).

Table 1. Comparison of the Tank Farm Releases in the Hanford Soil Inventory Model (RPP-26744, Rev. 1) with more up-to-date Hanford references.

Tank Farm Release	Hanford Soil Inventory Model (RPP-26744, Rev. 1)	Non-Hanford Soil Inventory Model (SIM) Estimate		Reference
	Liters	Liters	Gallons	
241-B-101	NA	7,570	2,000	RPP-RPT-49089, Rev. 0
241-B-103	NA	--	--	HNF-EP-0182, Rev. 369
241-B-105	NA	416,350	110,000	RPP-RPT-49089, Rev. 0
241-B-107	53,000	52,990	14,000	RPP-RPT-49089, Rev. 0
241-B-110	37,900	49,205	13,000	RPP-RPT-49089, Rev. 0
241-B-111	NA	--	--	HNF-EP-0182, Rev. 369
241-B-112	7,570	7,570	2,000	HNF-EP-0182, Rev. 369
241-BX-101	15,100	3,407	900	RPP-RPT-47562, Rev. 0
241-BX-102	347,000	529,900	140,000	RPP-RPT-47562, Rev. 0
241-BX-108	9,460	9,460	2,500	RPP-RPT-47562, Rev. 0
241-BX-110	NA	--	--	HNF-EP-0182, Rev. 369
241-BX-111	NA	--	--	HNF-EP-0182, Rev. 369
241-BY-103	1,510	<18,925	<5,000	RPP-RPT-43704, Rev 0A
241-BY-105	NA	--	--	HNF-EP-0182, Rev. 369
241-BY-106	NA	--	--	HNF-EP-0182, Rev. 369
241-BY-107	4,540	57,154	15,100	HNF-EP-0182, Rev. 369
241-BY-108	1,510	18,925	5,000	HNF-EP-0182, Rev. 369
241-C-101	3,790	<143,452	<37,900	RPP-ENV-33418, Rev. 4
241-C-104	0	105,980	28,000	RPP-ENV-33418, Rev. 4
241-C-105	3,790	7,570 to 77,593	2,000 to 20,500	RPP-ENV-33418, Rev. 4
241-C-108	0	68,130	18,000	RPP-ENV-33418, Rev. 4
241-C-110	7,570	7,570	2,000	RPP-ENV-33418, Rev. 4
241-C-111	20,800	20,800	5,500	RPP-ENV-33418, Rev. 4
241-C-112	0	26,495	7,000	RPP-ENV-33418, Rev. 4
Total	513,540	1,551,453 to 1,621,476		

216-B-57 Crib

The contention that 216-B-57 Crib is an ongoing major vadose zone source for tritium activity in groundwater does not seem plausible. A prototype Hanford barrier was deployed over the 216-B-57 Crib at the Hanford Site in 1994 to prevent percolation through the underlying waste and to minimize spreading of buried contaminants (PNNL-17176). From 1994 to 2013, the barrier

limited drainage to well below the 0.5 mm/yr design criterion. During this time period, the barrier experienced three years of enhanced precipitation, three 1000-year return, 24-hour simulated rainstorms (DOE/RL-2016-37). After the weather year 2018, there was no indication of drainage from the ETC barrier (PNNL-28039). Since the closure of the 216-B-57-Crib a half century ago, the mass flux of contamination draining from the vadose zone underneath the Crib into the groundwater should be decreasing with time (Figure 2).

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