TRI-PARTY AGREEMENT

Change Notice Number TPA-CN- 0794	TPA CHANGE NOTICE FORM	Date: September 12, 2017
Document Number, Title, and Revision: DOE/RL-2010-72 Sampling and Analysis Plan for Remediation Wells in the 200-ZP-1 Operable Unit, Revision 2		Date Document Last Issued: June 2014
Approved Change Notices Against this Document: TPA-CN-641, TPA-CN-0758		
Originator Mark E. Byrnes		Phone: 509 373-3996

Description of Change:
Changes are required to the ZP-1 SAP to incorporate two new injection wells and one monitoring well.

M.W. Cline (**DOE**) and E. Laija (**Lead Regulatory Agency**) agree that the proposed change modifies an approved workplan/document and will be processed in accordance with the Tri-Party Agreement Action Plan, Section 9.0, *Documentation and Records,* and not Chapter 12.0, *Changes to the Agreement.*

Figures 1-1, 1-2, and 1-3 need to be revised to include new wells. Revised figures in Chapter 1 to include two new injection wells and one monitoring well.

Additionally, Tables 1-1, 1-2 and 3-1 need to be revised to add new wells and to reflect sampling requirements in the new wells.

Sampling requirements for YJ-33 (C9878/699-47-78), YJ-34 (C9880/699-47-78C), and MW-6 (C9936/699-46-61) will be implemented during drilling of new wells.

Deleted text is denoted by ~~strikeout~~ and new text is denoted by <u>double underline</u>.

Note: Include affected page number(s): 1-3, 1-4, 1-5, 1-6, 1-7, and 3-2

Justification and Impacts of Change:
New injection wells are needed to increase 200 West P&T injection capacity. Sampling and analyses are needed during drilling below the water table to collect baseline data to support ongoing assessment of injection well performance. Water sample intervals target more permeable (and more representative) formation zones versus sampling every 20 feet below the water table.

New monitoring well is needed in an area lacking monitoring wells to fill data gap for characterization and tracking carbon tetrachloride migration.

Approvals:

DOE Project Manager	9/18/2017 Date	[X] Approved [ ] Disapproved
EPA Project Manager L. Below for E. Laija	9/20/2017 Date	[X] Approved [ ] Disapproved
N/A Ecology Project Manager	Date	[ ] Approved [ ] Disapproved

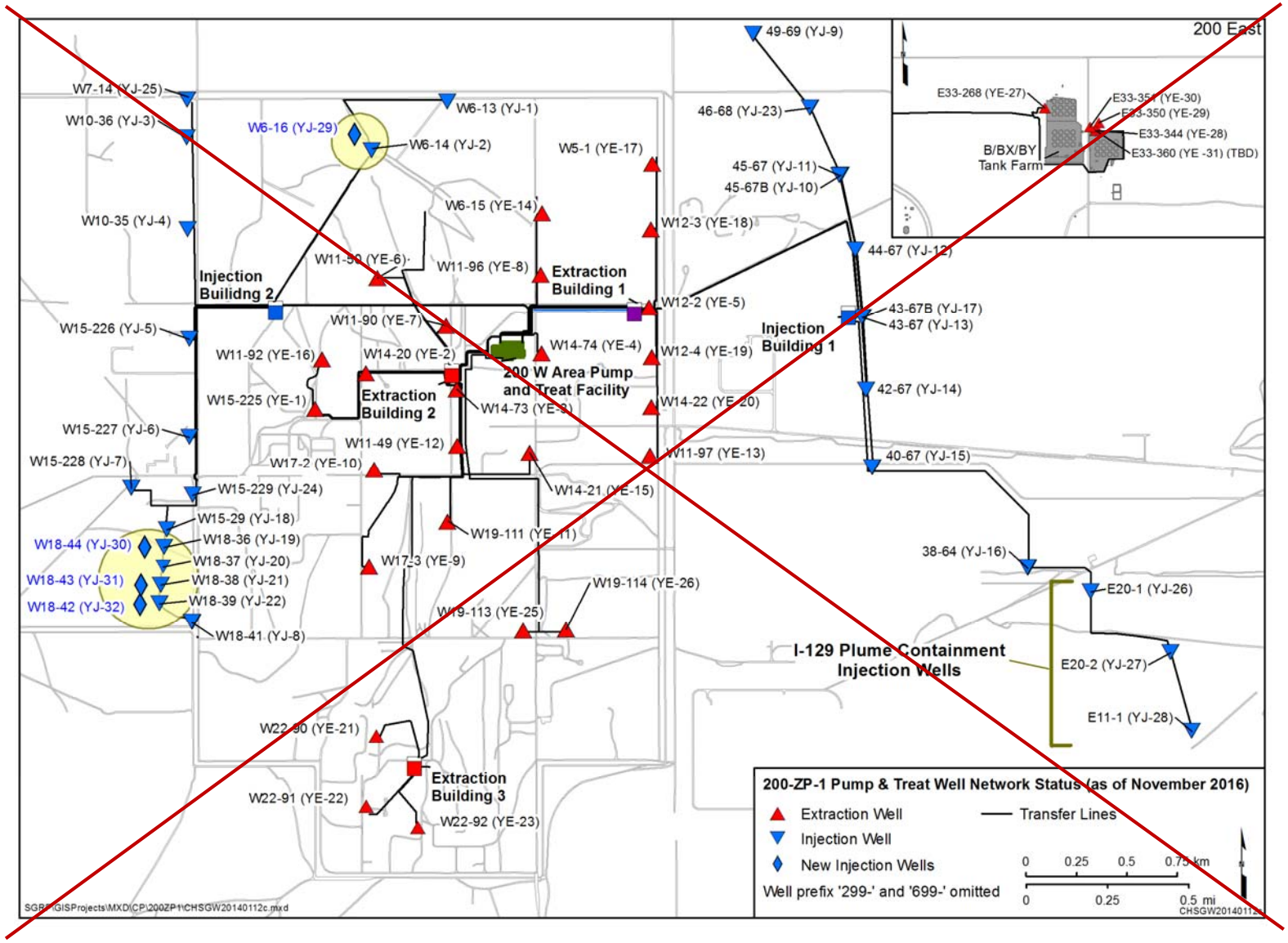

Figure 1-1. Approximate Location of Proposed New Injection Wells (Circled) with Existing Extraction and Injection Wells by Drilling Sequence

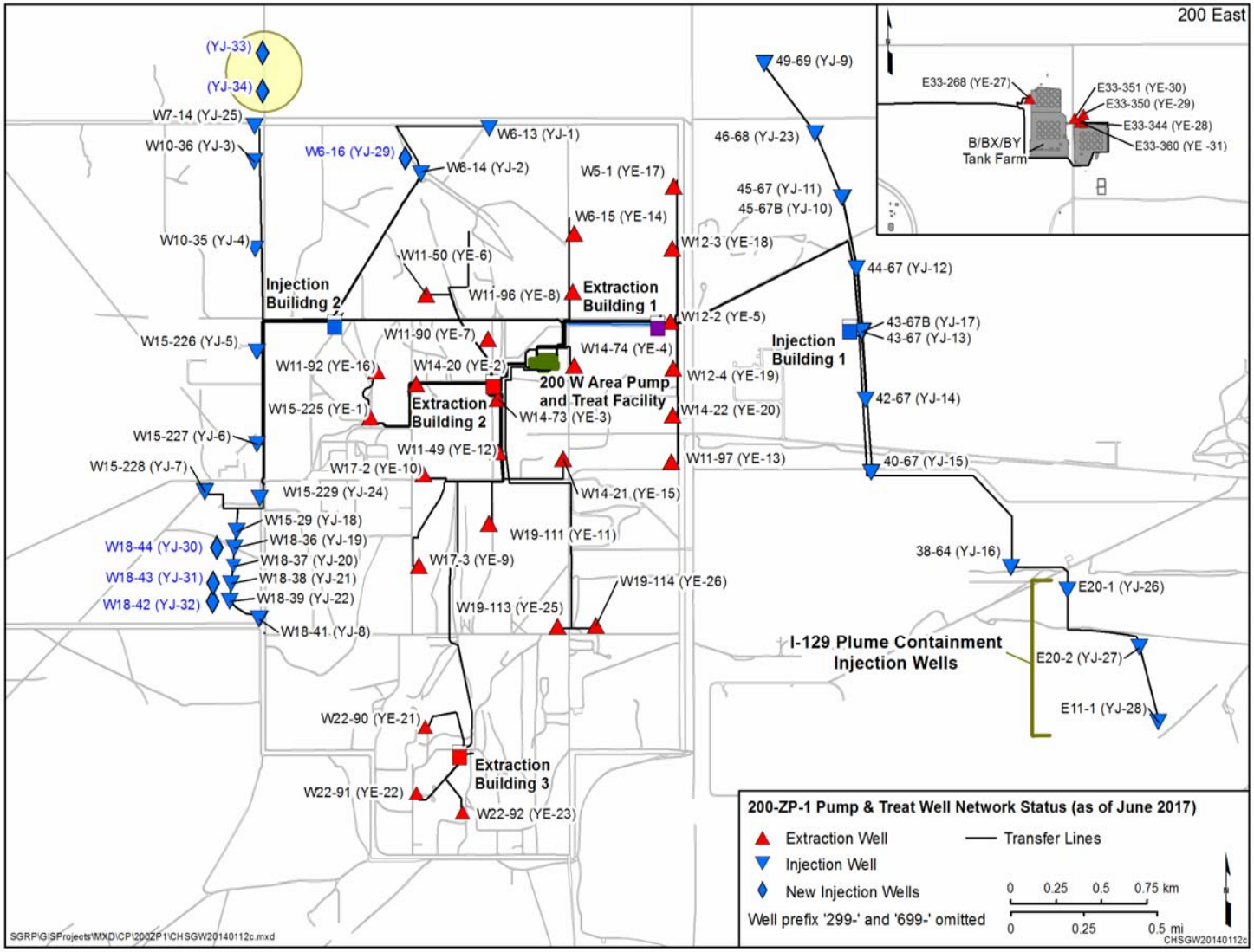

Figure 2-1. Approximate Location of Proposed New Injection Wells (Circled) with Existing Extraction and Injection Wells

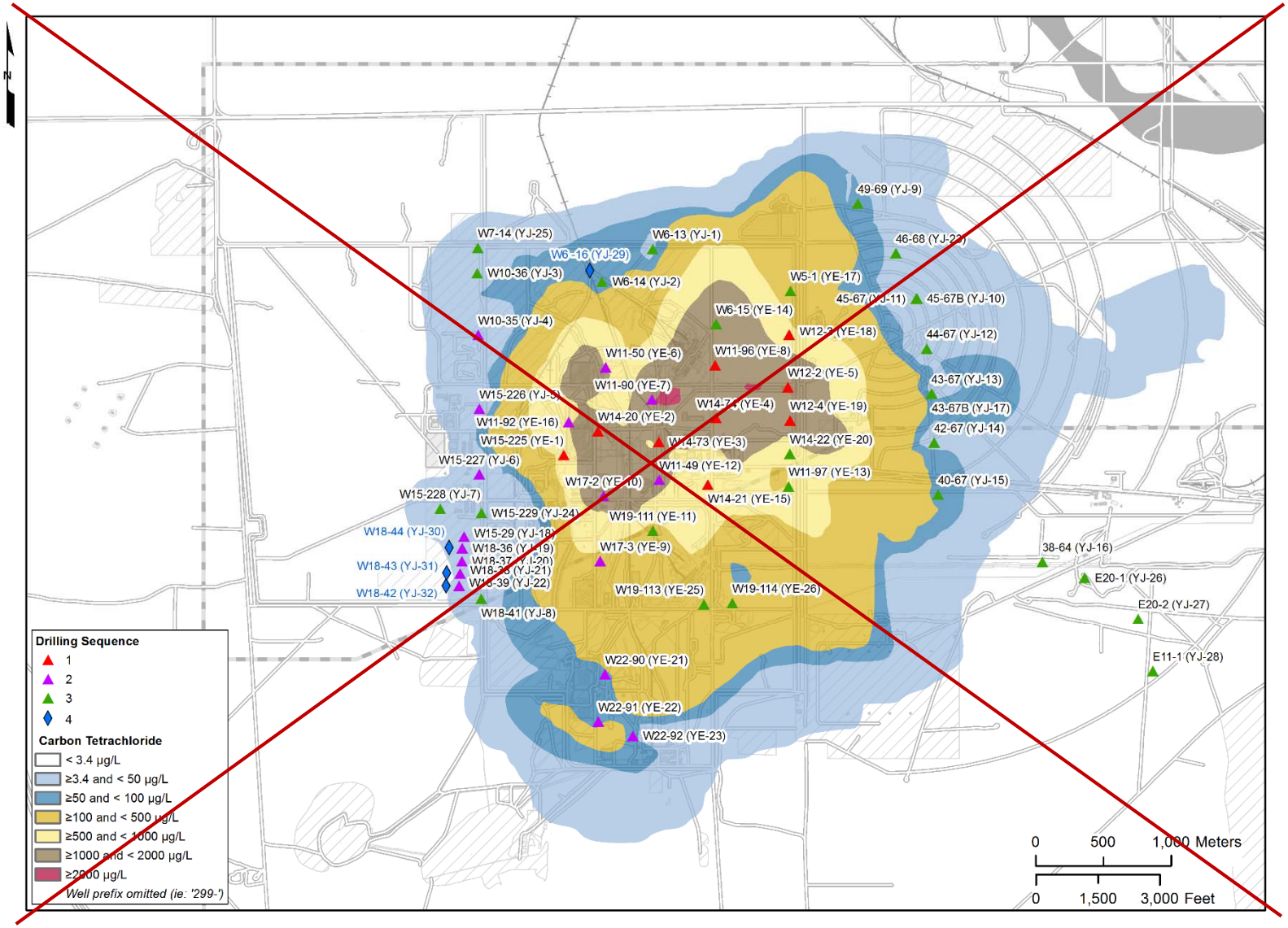

Figure 1-2. 200 West Well Network with Carbon Tetrachloride Plume Extent

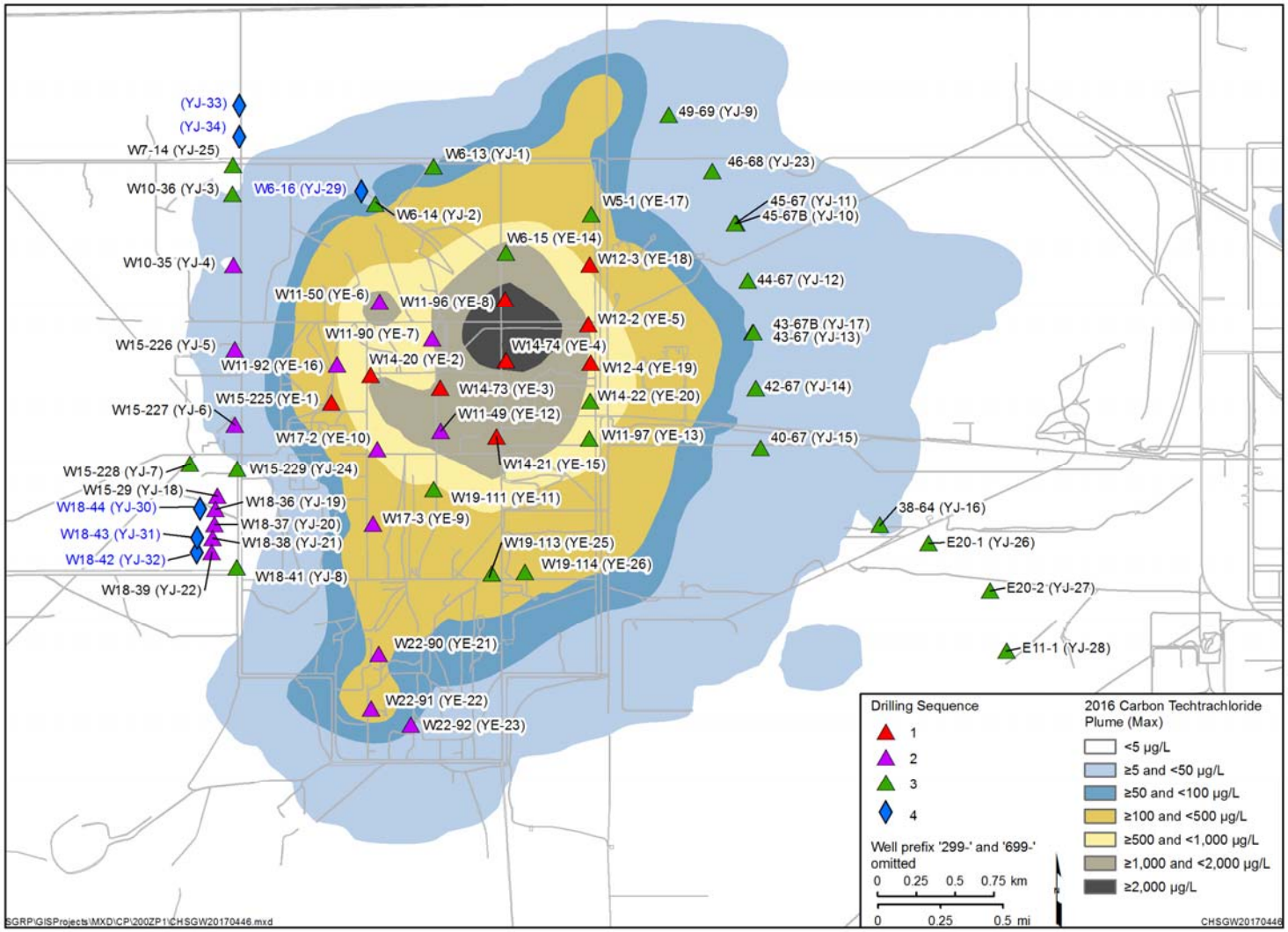

Figure 1-2. 200 West Well Network with Carbon Tetrachloride Plume Extent

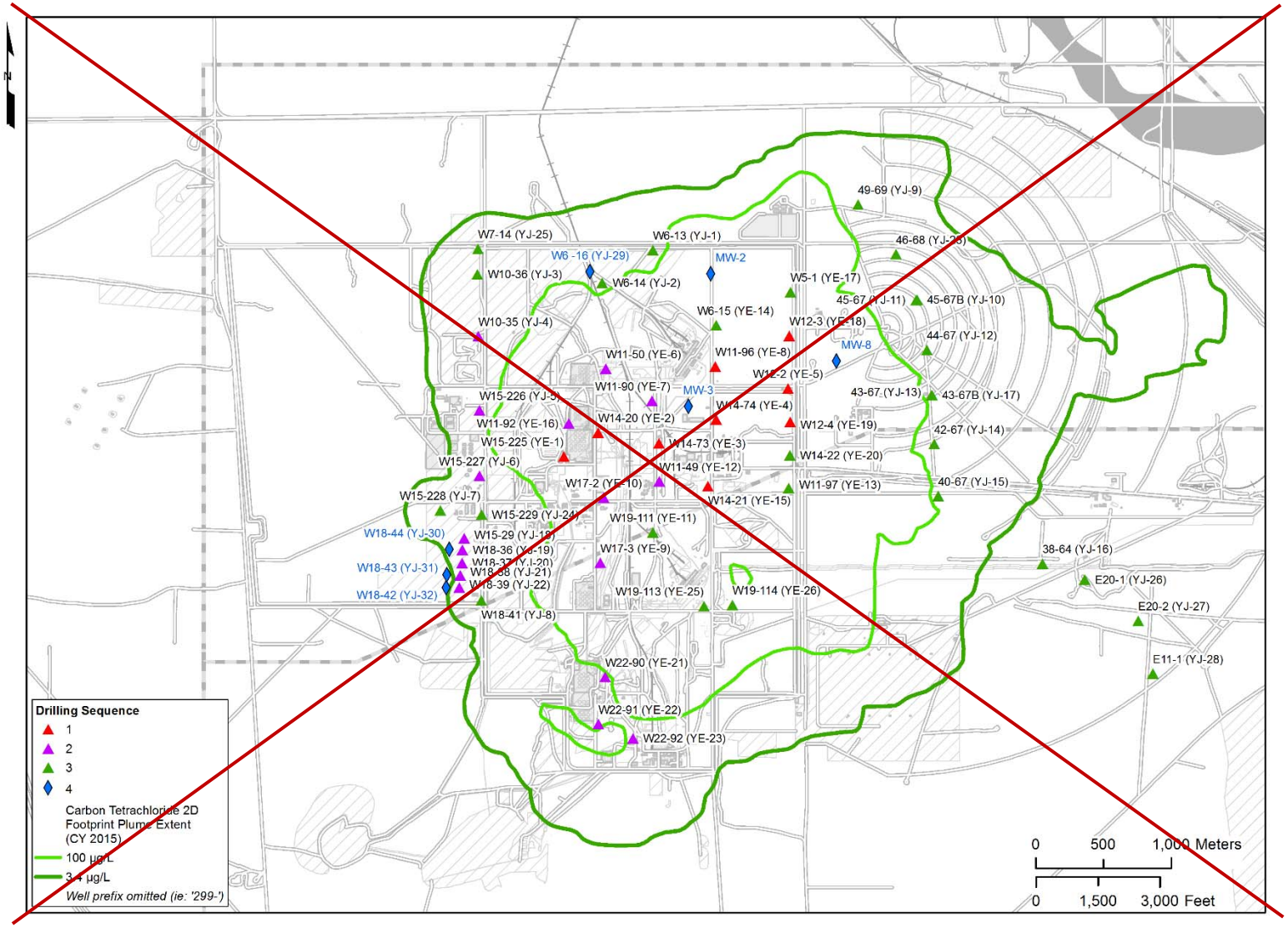

Figure 1-3. Drilling Sequence and Outline of Carbon Tetrachloride Plume at the Cleanup Level (3.4 µg/L)

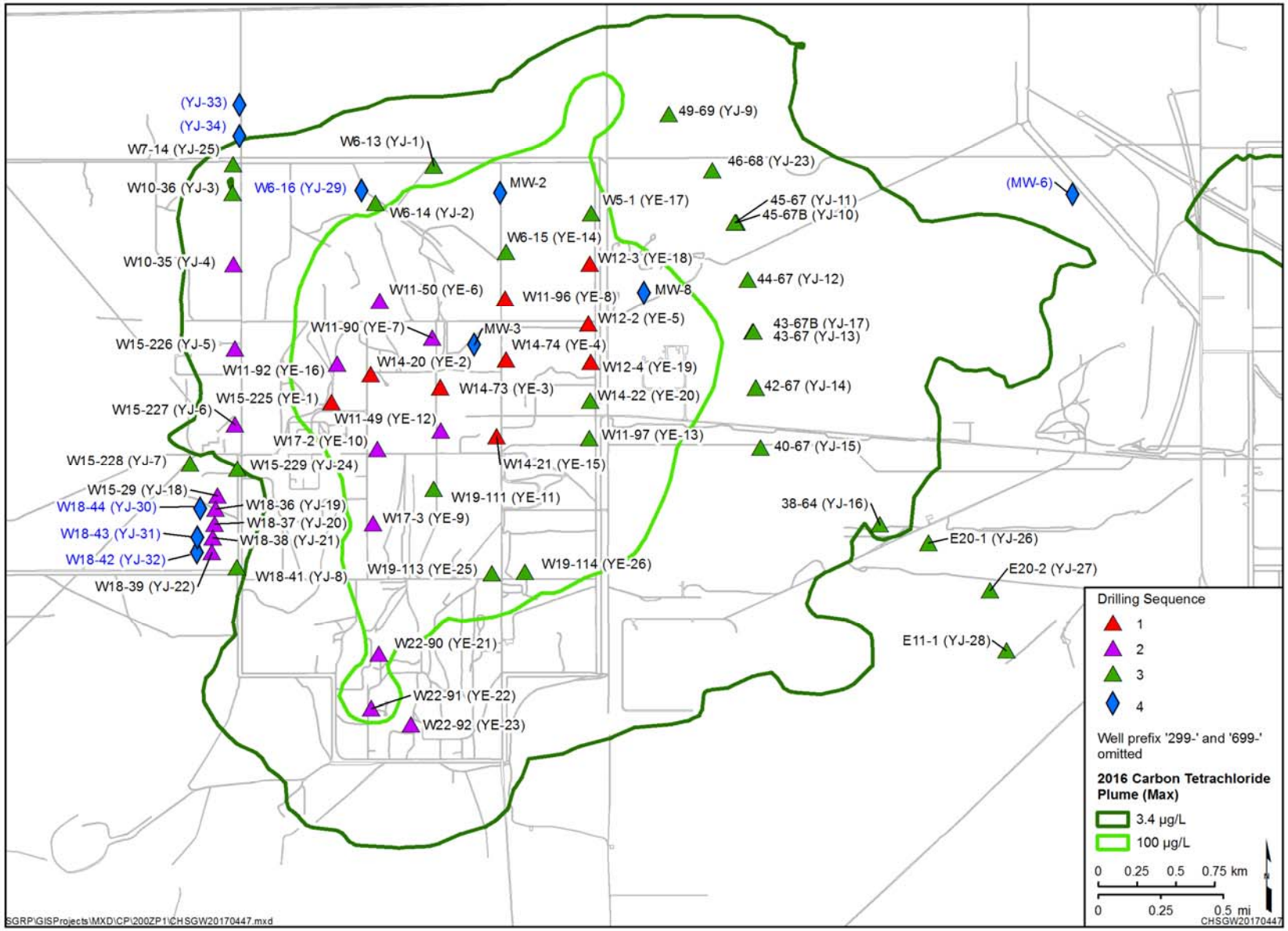

Figure 1-3. Drilling Sequence and Outline of Carbon Tetrachloride Plume at the Cleanup Level (3.4 µg/L)

Table 1-1. Estimated Depth of Each Proposed Extraction, Injection Well, and Monitoring Well

Well Name	Extraction (YE)/ Injection Well(YJ) Monitoring Well (MW)	Estimated Depth to Water (ft bgs)	Estimated Depth to the Cold Creek Unit (ft bgs)	Estimated Depth to Upper Ringold Unit* (ft bgs)	Estimated Depth to Ringold Unit E (ft bgs)	Estimated Depth to Ringold Lower Mud* (ft bgs)	Estimated Depth to Basalt (ft bgs)
299-W6-13	YJ-1	273	56	69	108	NP	450
299-W6-14	YJ-2	256	59	NA	95	NP	465
299-W10-36	YJ-3	246	98	105	131	432	505
299-W15-228	YJ-7	232	160	NA	164	448	561
299-W18-41	YJ-8	219	113	NP	159	443	560
699-49-69	YJ-9	261	100?	NP	173	NP	372
699-45-67B	YJ-10	292	NA	148*	195	314	437
699-44-67	YJ-12	312	105	NP	220	338	472
699-42-67	YJ-14	321	120	270	280	381	535
699-40-67	YJ-15	325	120	270	403	384	530
699-38-64	YJ-16	338	235	NA	286	387	513
699-43-67B	YJ-17	325	118	NP	210	363	495
699-46-68	YJ-23	280	61	NP	193	306	433
299-W15-229	YJ-24	256	158	NA	183	459	564
299-W7-14	YJ-25	252	61	105	134	NP	460
299-W6-16	YJ-29	248	52	NP	76	NP	476
299-W18-44	YJ-30	224	129	NP	154	444	566
299-W18-43	YJ-31	218	123	NP	149	440	570
299-W18-42	YJ-32	212	117	NP	145	434	569
699-47-78	YJ-33	235	45	85	109	405	473
699-47-78C	YJ-34	245	44	86	109	393	469
299-W19-111	YE-11	261	144	138	163	437	545
299-W11-97	YE-13	294	152	NA	117?	426?	535
299-W6-15	YE-14	293	110	NA	157?	NP	475
299-W5-1	YE-17	295	100*	NA	159?	NP	460

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299-W14-22	YE-20	303	150	NP	180	NP	515
299-W5-2	MW-1	281	100	NP	179	NP	460
299-W13-2	MW-7	313	152	156	249	411	535
299-W6-17	MW-2	291	75	139	147	NP	478
299-W11-98	MW-3	298	115	149	159	NP	516
699-44-70B	MW-8	317	75	115	184	370	511
699-46-61	MW-6	260	90	121	151	413	493

Sources: PNNL-13858, *Revised Hydrogeology for the Suprabasalt Aquifer System, 200-West Area and Vicinity, Hanford Site, Washington*, was used to estimate Ringold Unit E outside of the 200 West Area (Plate 7), Ringold lower mud (Plate 5), and top of basalt (Plate 2).

Water levels are estimated from Figure 2.8-2 of DOE/RL-2008-66, *Hanford Site Groundwater Monitoring for Fiscal Year 2008*; March 2008 data.

WHC-SD-EN-TI-014, *Hydrogeologic Model of the 200 West Groundwater Aggregate Area*, was used to estimate the top of the caliche (Figure 2-12), top of upper Ringold (Figure 2-10), and Ringold Unit E (Figure 2-8) in the 200 West Area.

* May not be present.

bgs = below ground surface NA = not available NP = not present ? = questionable selection
YE = extraction well YJ = injection well MW = monitoring well

1.1 Contaminants of Concern

The list of the COCs for the 200-ZP-1 OU presented in Table 1-2 was taken from the ROD (EPA et al., 2008) and was derived from review of the documents identified in Table 1-3. The 200-ZP-1 OU FS report (DOE/RL-2007-28) outlines the statistical measures used for determining the COCs. In addition to the COCs presented in the ROD, other parameters or constituents may be analyzed (including chloroform) to support future MNA monitoring. Standardized reporting lists for certain broad-spectrum U.S. Environmental Protection Agency (EPA) methods (SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*; Methods 8260, 200.8, and 300.0) are provided in Appendix A of this SAP. The tables in Appendix A define the standard compound lists for statements of work when developing laboratory contracts for this project using a method-based analysis approach. The results for the analytes listed in these tables will be reported in the Hanford Environmental Information System (HEIS) database in addition to the COCs presented in Table 1-2. If analysis indicates tentatively identified compounds beyond those listed in Table 1-2 or Appendix A, these will also be reported in the HEIS database and will have a “J” (estimated value) qualifier (which identifies it as a tentatively identified compound).

Table 3-1. Well Sample/Measurement Locations and Depth

Sampling Location	Vadose Zone Sampling Depth, Frequency, and Analysis (ft bgs)	Aquifer Sampling Depth, Frequency, and Analysis (ft bgs)	
		Water Samples	Soil Samples (Sediment) Below Water Table[a]
YE-11, YE-13, YE-14, YE-17, YE-20, YJ-1, YJ-2, YJ-3, YJ-7, YJ-8, YJ-9, YJ-10, YJ-12, YJ-14, YJ-15, YJ-16, YJ-17, YJ-23, MW-1, MW-7, MW-2, MW-3, MW-8, and MW-6	**Ground surface to water table at each of the new wells:** During drilling, archive grab samples for geological purposes will be collected every 5 ft and where lithology changes occur in one-pint jar and a chip tray from the drill cuttings.	**During drilling, water samples to be collected (in accordance with Section 3.5.6) as follows:** at 20 ft intervals throughout aquifer, unless visual observation in aquifer material change by the field geologist calls for 10 ft intervals for further clarification: • Carbon tetrachloride for quick-turnaround samples[b] • Table 1-2 constituents at standard turnaround time • Field screening parameters (temperature, pH, dissolved oxygen, specific conductance, and NTU)	**During drilling, soil samples to be collected:** • Every 5 ft, grab archive samples will be collected and where lithology changes occur in one-pint jar and a chip tray from the drill cuttings • Every 20 ft, in correlation with aquifer water samples, grab two composite soil samples in pint jars from drill cuttings over the 20 ft interval for field screening grain-size (sieve) analysis
YJ-24 and YJ-25	**Ground surface to water table at each of the new wells:** During drilling, archive grab samples for geological purposes will be collected every 5 ft and where lithology changes occur in one-pint jar and a chip tray from the drill cuttings.	**During drilling, water samples to be collected (in accordance with Section 3.5.6) as follows:** one sample just below the water table, one sample at about the middle of the aquifer (~390 ft bgs), and one sample just above the Ringold lower mud unit. Each sample will be analyzed for volatile organic compounds only.	**During drilling, soil samples to be collected:** • Every 5 ft, grab archive samples will be collected and where lithology changes occur in one-pint jar and a chip tray from the drill cuttings • Every 20 ft, in correlation with aquifer water samples, grab two composite soil samples in pint jars from drill cuttings over the 20 ft interval for field screening grain-size (sieve) analysis
YJ-29, YJ-30~~, and~~ YJ-32, YJ-33, and YJ-34	**Ground surface to water table at each of the new wells during drilling:** • Split-spoon samples for analytical purposes will be collected at about 80 ft bgs, 140 ft bgs, and 200 ft bgs. Samples to be analyzed for Table 1-2 biofouling constituents at quick turnaround times[c].	**During drilling, water samples to be collected (in accordance with Section 3.5.6) as follows:** five samples at 240 ft bgs, 260 ft bgs, 290 ft bgs, 340 ft bgs and 410 ft bgs and one sample collected 10 ft below the Ringold lower mud unit (if present), unless visual observation in aquifer material change by the field	**During drilling, soil samples to be collected:** • Split-spoon samples for analytical purposes will be collected at about 240 ft bgs, 340 ft bgs, and 410 ft bgs. Samples to be analyzed for Table 1-2 biofouling constituents at quick turnaround times[c]. • Every 5 ft, grab archive samples will be collected and where lithology changes occur in one-pint jar and a chip tray from the drill cuttings.

Table 3-1. Well Sample/Measurement Locations and Depth

Sampling Location	Vadose Zone Sampling Depth, Frequency, and Analysis (ft bgs)	Aquifer Sampling Depth, Frequency, and Analysis (ft bgs)	
		Water Samples	Soil Samples (Sediment) Below Water Table[a]
	• Archive grab samples for geological purposes will be collected every 5 ft and where lithology changes occur in one-pint jar and a chip tray from the drill cuttings.	geologist calls for additional sampling for further clarification: • Carbon tetrachloride for quick-turnaround samples[b] • Table 1-2 constituents at standard turnaround time • Field screening parameters (temperature, pH, dissolved oxygen, specific conductance, and NTU) Following construction and development of each well, one water sample will be collected and analyzed for Table 1-2 post development constituents at standard turnaround times to provide baseline concentrations for each constituent.	• Every 20 ft, in correlation with aquifer water samples, grab two composite soil samples in pint jars from drill cuttings over the 20 ft interval for field screening grain-size (sieve) analysis.
YJ-31			**During drilling, soil samples to be collected:** • Every 5 ft, grab archive samples will be collected and where lithology changes occur in one-pint jar and a chip tray from the drill cuttings. • Every 20 ft, in correlation with aquifer water samples, grab two composite soil samples in pint jars from drill cuttings over the 20 ft interval for field screening grain-size (sieve) analysis.

Table 3-1. Well Sample/Measurement Locations and Depth

Sampling Location	Vadose Zone Sampling Depth, Frequency, and Analysis (ft bgs)	Aquifer Sampling Depth, Frequency, and Analysis (ft bgs)	
		Water Samples	Soil Samples (Sediment) Below Water Table[a]

a. If field screening instruments indicate radiological contamination above background at a given interval, grab two additional pint jar samples. Send one pint jar for 24-hour turnaround gamma-energy analysis and one additional jar for testing based on the gamma-energy analysis results (as determined by the groundwater remediation manager).

b. If samples have elevated organic concentrations, an "E" flag may be applied to the data due to a lack of time for dilutions and re-runs on a quick-turnaround time. The standard turnaround time sample will account for dilutions and re-runs, as applicable.

c. Samples not used will be archived until a decision about needs for any additional sampling associated with injection well performance are determined then disposed in accordance with Section 3.6.

bgs = below ground surface

YE = extraction wells

YJ = injection wells

NTU = nephelometric turbidity unit