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Field Work Plan to Plug and Abandon Test Wells TW-1 and TW-1a

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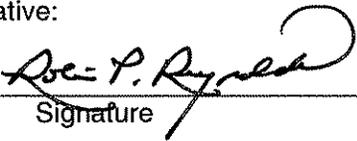
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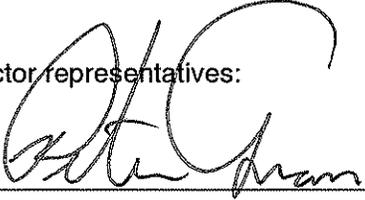
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1.0 INTRODUCTION

This field work plan provides technical guidance for field activities associated with the plugging and abandonment (P&A) of Test Well 1 (TW-1) and TW-1a located in Pueblo Canyon, Los Alamos, New Mexico as shown in Figures 1.0-1 and 1.0-2. Well abandonment of these wells will be consistent with the requirements and guidelines of Sections IV.B.1.b.v and X.D (Well Abandonment) of the Compliance Order on Consent (the Consent Order).

Specific details including pre-abandonment activities and well construction and abandonment details of the three wells are presented below.

2.0 PRE-ABANDONMENT ACTIVITIES

The following activities will be conducted prior to mobilizing well abandonment crews and equipment onsite.

2.1 Removal of Appurtenances

All aboveground and belowground appurtenances were previously removed, including pumps, transducers, data loggers, control panels, concrete pad, etc from TW-1 and TW-1a.

2.2 Inspection and Geophysical Data Collection

The wells will be inspected with a downhole video camera and a natural gamma log will be collected to document the existing conditions. Final water-level measurements will also be collected.

3.0 WELL CONSTRUCTION AND ABANDONMENT

This section describes the construction of TW-1 and TW-1a and the methods that will be employed to plug and abandon the each well.

3.1 Well Construction

Groundwater monitoring well TW-1 was installed in 1950 to monitor the water in the main aquifer in Pueblo Canyon downgradient from the waste treatment plant at TA-45. Construction details are as follows:

- 0-52 ft: 16-in. inside diameter (I.D.) steel casing
- 0-241 ft: 12-in. I.D. steel casing
- 0-627 ft: 8-in. I.D. steel casing
- 622-632 ft: 6-in. I.D. steel casing swaged into bottom of 8-in. casing
- 632-642 ft: 6-in. diameter screen swaged into the bottom of the 6-in. casing

Groundwater monitoring well TW-1A was installed in 1950 to monitor the perched water in the main aquifer in Pueblo Canyon downgradient from the waste treatment plant at TA-45. Construction details are as follows:

- 0-39 ft: 16-in. inside diameter (I.D.) steel casing

- 0-100 ft: 12-in. I.D. steel casing
- 0-215 ft: 6-in. I.D. steel casing
- 215-225 ft: 6-in. diameter screen swaged into the bottom of the 6-in. casing

3.2 Plugging and Abandonment

The two wells will be plugged and abandoned per the direction of the New Mexico Environment Department (NMED). The TW-1 group of wells may be plugged and abandoned in any order that LANL deems appropriate. The well abandonments are listed in alphanumeric order in this field plan.

Older well completions like TW-1 and TW-1a represent some challenges in determining a specific abandonment approach because of incomplete and sometimes discrepant completion records, multiple casing strings, and old casing. Plugging and abandonment at these wells will generally take the approach of removing as much/many of the internal casing strings as possible in order to gain access to outer casing strings for the purpose of perforating and sealing via grouting. Attempts will be made at each well to remove all casing strings from the boreholes. This approach represents some risks of separating (parting) the casing strings. A conservative approach of pulling the casing strings at 125% of the string weight will be employed. The field crew will evaluate the reported length of each casing string while pulling and use readings from the hydraulic gauges on the drill rig to establish approximate pull back forces. Attachment A details general pipe weights and dimensions. Work will take place within the well from inside to outside, working on the smallest diameter casing first. Casing cutters and perforators will be pneumatic tools run in the hole on drill rods. Perforation intervals will be oriented with four (vertical) rows of perforations spaced at 90 degrees. This approach will require the use of a rotary drilling rig.

3.2.1 TW-1 Abandonment

The primary purpose for the plugging and abandonment of TW-1 is to prevent migration of overlying water into the regional aquifer. From other nearby wells (TW-1A, R-3i, POI-4), perched water is known to occur within the basalts. Therefore the focus of the P&A effort will be on sealing across the lowest basalt (410-510 ft below ground surface) and the bottom of next highest (176-255 ft bgs). Based on the available well-completion notes, TW-1 does not have an annular seal or a filter pack around the screen. Unlike other Test Wells, completion notes do indicate that TW-1 has an annular cement seal around the 12-in. casing from ground surface to 241 ft below ground surface (bgs). The actual conditions at the well will be determined by the video camera survey and other examinations at the start of field activities. Figure 3.1-1 details the construction specifics, casing schedule, and lithologic intervals at TW-1.

Initially, an attempt will be made to pull the 8-in. casing with the 6-in. swaged screen section. If the casing comes out, hydrated bentonite chips will be placed from the borehole's TD at 642 ft bgs to 290 ft bgs. Neat cement will be installed from 290 to 190 ft bgs. Bentonite chips will be installed in the 12-in. casing from 190 to 50 ft bgs. Finally, neat cement grout will be installed to ground surface. If the 8-in. casing does not come out, the casing will be perforated from 500 to 580 ft bgs, cut off at 340 ft bgs and removed from the hole. Neat cement will be installed from TD to 400 ft bgs followed by the installation of bentonite chips to 290 ft bgs. The remaining backfill will be the same as described above. If the 8-in. casing does not pull free at 340 ft bgs, the interval from 190 to 290 ft bgs will be perforated. An additional attempt to cut and pull the 8-in. casing will be made at 300 ft bgs. Whether or not the casing comes out, the backfilling will be the same as described above.

3.2.2 TW-1a Abandonment

The primary purpose for the plugging and abandonment of well TW-1A is to prevent comingling of alluvial or surface water with the perched aquifer. Based on the available well-completion notes, TW-1A does not have an annular seal or a filter pack around the screen. The actual conditions at the well will be determined by the video camera survey and other examinations at the start of field activities. Figure 3.1-2 details the construction specifics, casing schedule, and lithologic intervals at TW-1a.

Initially, an attempt will be made to pull the 6-in. casing with the swaged screen section. If the casing comes out, bentonite chips will be installed from the borehole's TD at 225 ft bgs to 120 ft bgs. The 12-in. casing will be perforated from 40 to 70 ft bgs (across the alluvial base) and neat cement will be installed to ground surface. If the 6-in. casing does not come out, bentonite chips will be placed from TD to 120 ft bgs. The 6-in. casing will then be cut off at 105 ft bgs and removed from the hole. The remaining backfill will be the same as described above.

4.0 SURFACE COMPLETION

The holes will be cement-grouted to within 2.0 ft of ground surface. A 2-ft X 2-ft X 2-ft concrete surface pad will be installed at ground surface with a brass survey marker and will be surveyed in accordance with the Section IX.B.2.f of the Consent Order, which states that pertinent structures may be horizontally located with a global-positioning system to within 0.5 ft.

5.0 WASTE

No sampling will take place during plugging and abandonment of this well. The intent is to reuse and recycle all materials. If some materials cannot be recycled, they will be disposed of in accordance with the waste characterization strategy form that applies to this activity.

6.0 HEALTH AND SAFETY

Tailgate safety meetings will be conducted and daily site, drill rig, and heavy equipment inspection forms will be filled out prior to starting work. An IWD briefing will be conducted if the work scope changes or new hazards are introduced.

Copies of the emergency contact list and route to the hospital maps will be kept onsite.

7.0 REPORTING

A brief report will be prepared detailing the methods used, presenting borehole logs (video and natural gamma), quantities of materials used, and providing the final abandonment details. Figures depicting the location of the abandoned well and backfill completion will also be included in the report.

8.0 REFERENCES

Los Alamos Technical Associates, February 9, 1998. "Engineering, Geology, and Construction Data of Twenty-five Test Holes and Test Wells on and Adjacent to the Pajarito Plateau," report prepared for Los Alamos National Laboratory, (LA-UR-05-2230)

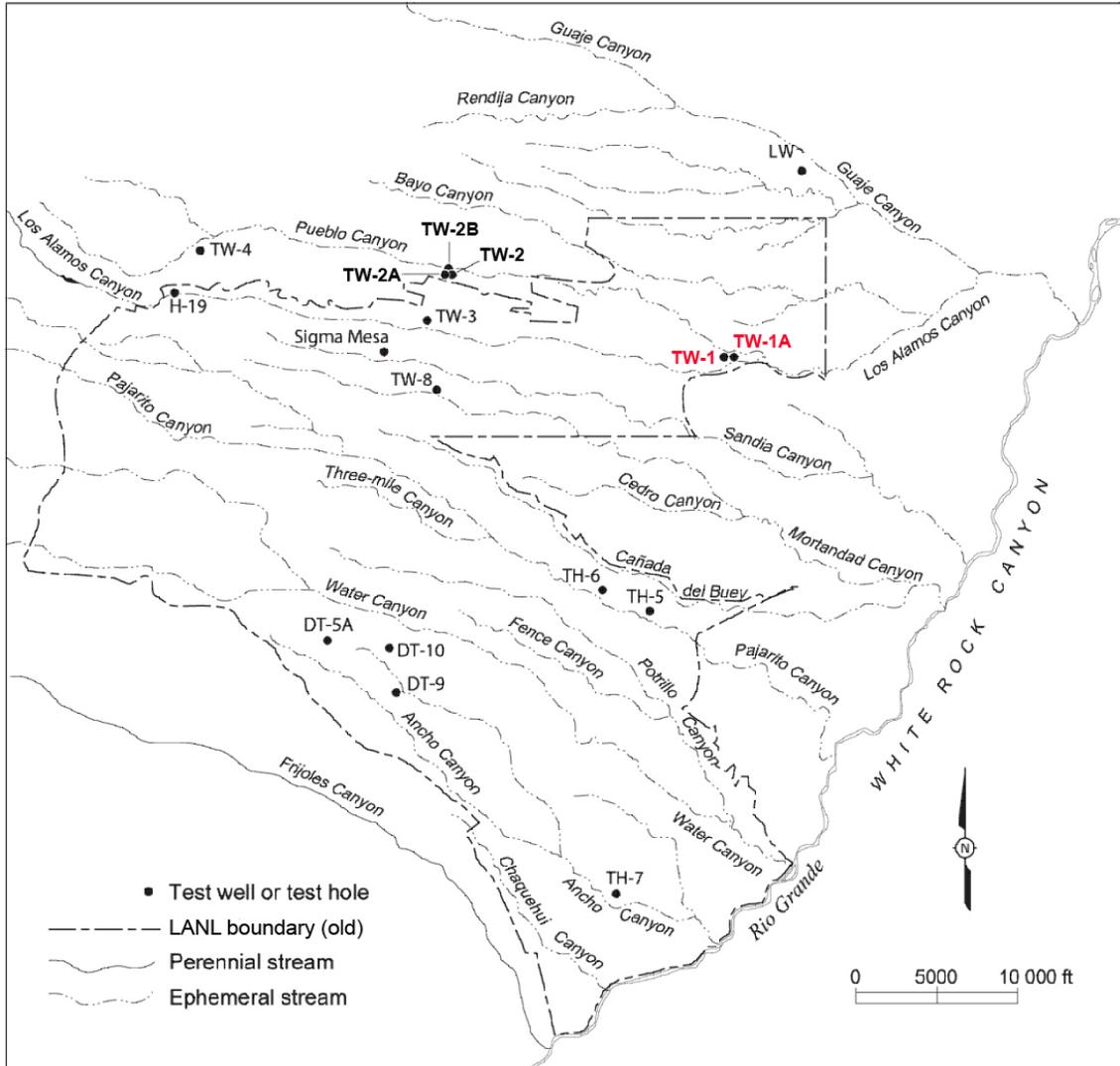


Figure 1.0-1 General location of wells TW-1 and -1A

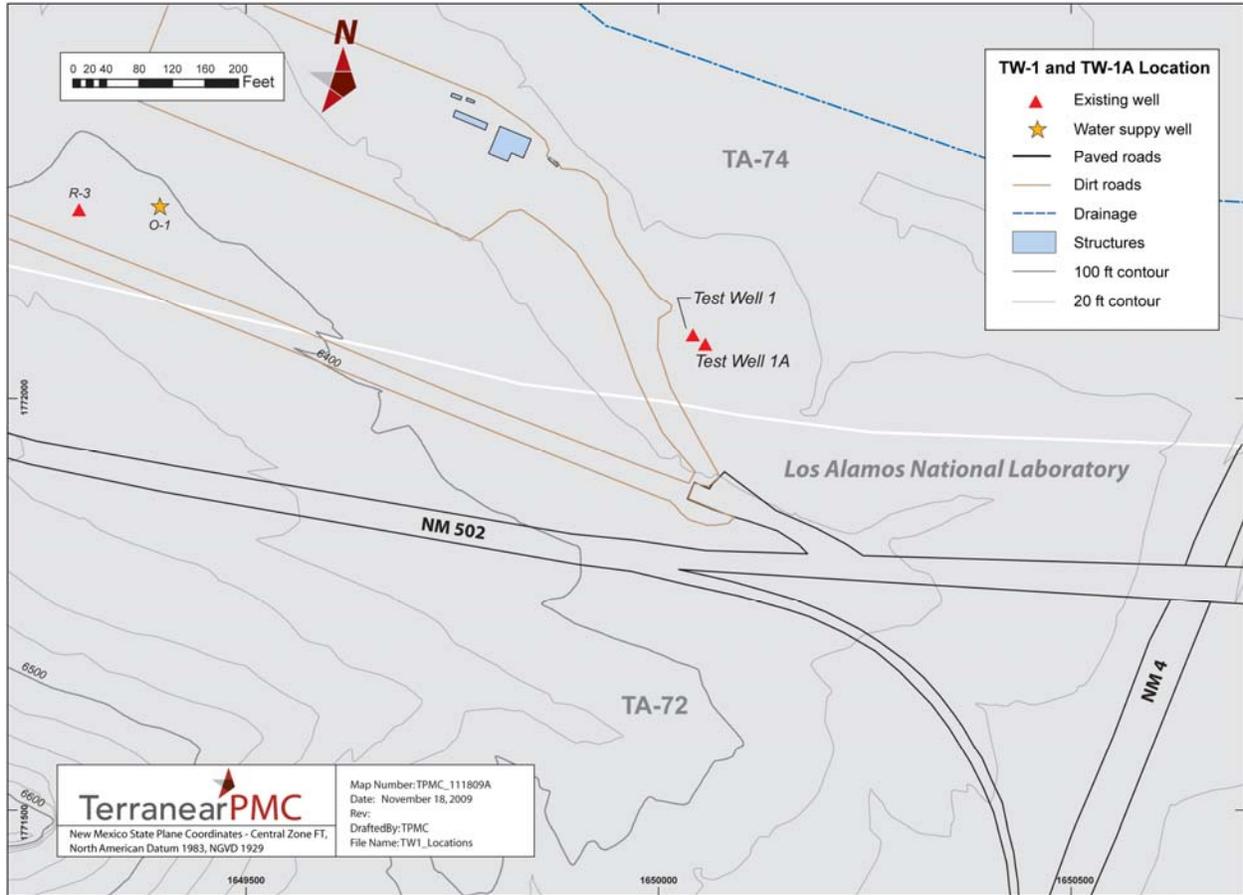


Figure 1.0-2 Detailed location of wells TW-1 and -1A

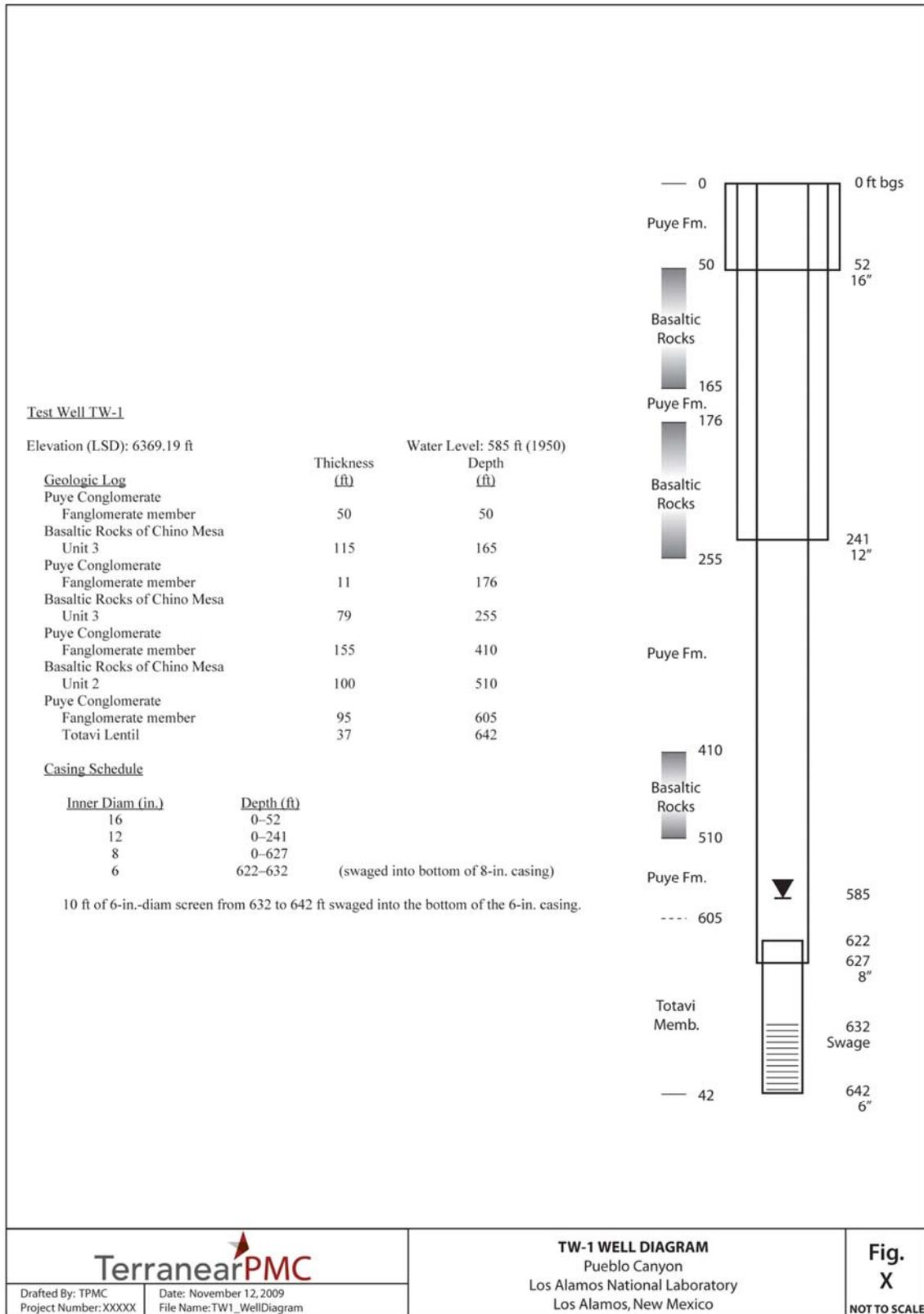


Figure 3.1-1 Monitoring well TW-1 as-built well construction diagram

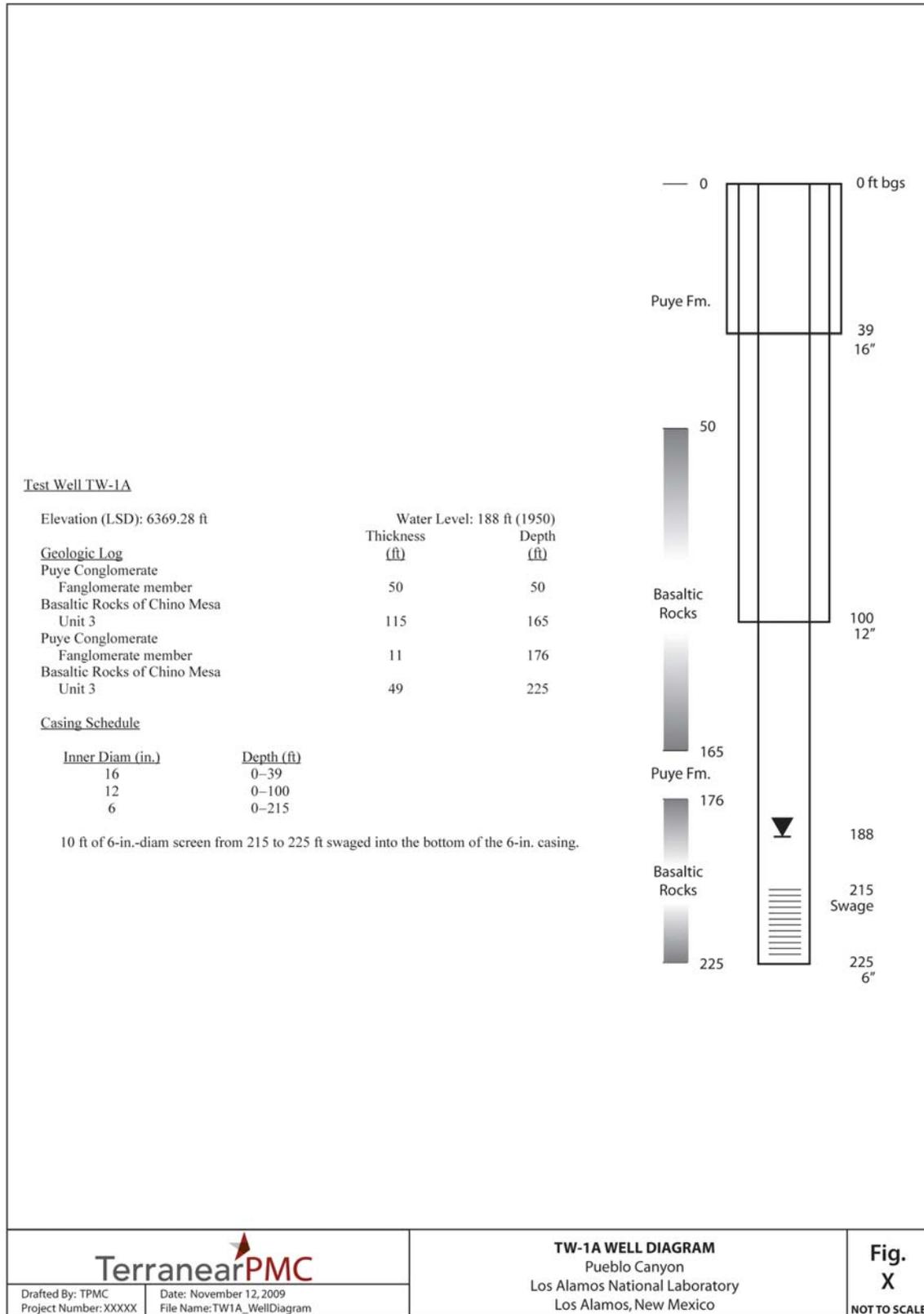


Figure 3.1-2 Monitoring well TW-1A as-built well construction diagram

UPPER FIGURES = WALL THICKNESS IN INCHES LOWER FIGURES = WEIGHT PER FOOT IN POUNDS

Pipe Size	O.D. in Inch	Dimensions and Weights of Seamless and Welded Pipe														DBLE. E.H.
		5s	5	10s	10	20	30	40s & Std.	40	60	80s & E.H.	80	100	120	140	
1/8	.405		.035 1383	.049 1863	.049 1863			.068 2447	.068 2447		.095 3145	.095 3145				
1/4	.540		.049 2570	.065 3297	.065 3297			.088 4248	.088 4248		.119 5351	.119 5351				
3/8	.675		.049 3276	.065 4235	.065 4235			.091 5676	.091 5676		.126 7338	.126 7338				
1/2	.840		.065 5383	.083 6710	.083 6710			.109 8510	.109 8510		.147 1088	.147 1088			.187 1304	.294 1714
3/4	1.050		.065 6838	.083 8572	.083 8572			.113 1131	.113 1131		.154 1474	.154 1474			.218 1937	.308 2441
1	1.315		.065 8678	.109 1404	.109 1404			.133 1679	.133 1679		.179 2172	.179 2172			.250 2844	.358 3659
1 1/4	1.660		.065 1107	.109 1806	.109 1806			.140 2273	.140 2273		.191 2997	.191 2997			.250 3765	.382 5214
1 1/2	1.900		.065 1274	.109 2085	.109 2085			.145 2718	.145 2718		.200 3631	.200 3631			.281 4859	.400 6408
2	2.375		.065 1604	.109 2638	.109 2638			.154 3653	.154 3653		.218 5022	.218 5022			.343 7444	.436 9029
2 1/2	2.875		.083 2475	.120 3531	.120 3531			.203 5793	.203 5793		.276 7661	.276 7661			.375 1001	.552 1370
3	3.500		.083 3029	.120 4332	.120 4332			.216 7576	.216 7576		.300 1025	.300 1025			.437 1432	.600 1858
3 1/2	4.000		.083 3472	.120 4973	.120 4973			.226 9109	.226 9109		.318 1251	.318 1251			.437 1901	.636 2285
4	4.500		.083 3915	.120 5613	.120 5613			.237 1079	.237 1079	.281 1266	.337 1498	.337 1498		.437 1901	.531 2251	.674 2754
4 1/2	5.000							.247 1253			.355 1761					.710 3253
5	5.563		.109 6349	.134 7770	.134 7770			.258 1462	.258 1462		.375 2078	.375 2078		.500 2704	.625 3296	.750 3855
6	6.625		.109 7585	.134 9290	.134 9290			.280 1897	.280 1897		.432 2857	.432 2857		.562 3639	.718 4530	.864 5316
7	7.625							.301 2357			.500 3805					.875 6308
8	8.625		.109 9914	.148 1340	.148 1340	.250 2236	.277 2470	.322 2855	.322 2855	.406 3564	.500 4339	.500 4339	.593 5087	.718 6093	.812 6776	.906 7469
9	9.625							.342 3390			.500 4872					
10	10.750		.134 1519	.165 1865	.165 1870	.250 2804	.307 3424	.365 4048	.365 4048	.500 5474	.500 5474	.593 6433	.718 7693	.843 8920	1.000 1041	1.125 1157
11	11.750							.375 4555			.500 6007					
12	12.750		.156 2107	.180 2416	.180 2420	.250 3338	.330 4377	.375 4956	.406 5353	.562 7316	.500 6542	.687 8851	.843 1072	1.000 1255	1.125 1397	1.312 1603
14	14.000		.156 2307	.188 2773	.250 3671	.312 4568	.375 5457	.375 5457	.437 6337	.593 8491	.500 7209	.750 1061	.937 1307	1.093 1507	1.250 1702	1.406 1891
16	16.000		.165 2790	.188 3175	.250 4205	.312 5236	.375 6258	.375 6258	.500 8277	.656 1075	.500 8277	.843 1365	1.031 1648	1.218 1923	1.437 2235	1.593 2451
18	18.000		.165 3143	.188 3576	.250 4739	.312 5903	.375 8206	.375 8206	.562 7059	.750 1048	.500 1382	.937 9345	1.156 1708	1.375 2080	1.562 2441	1.781 3085
20	20.000		.188 3978	.218 4605	.250 5273	.375 7860	.500 1041	.375 7860	.593 1229	.812 1664	.500 1041	1.031 2089	1.280 2561	1.500 2964	1.750 3411	1.968 3790
22	22.000		.188 438	.218 5071	.250 5807	.375 8661	.500 11481	.375 8661	.593 11481	.812 19741	.500 11481	1.031 25081	1.280 30288	1.500 35361	1.750 4030	1.968 45106
24	24.000		.218 5537	.250 6341	.250 6341	.375 9462	.562 1408	.375 9462	.687 1712	.968 2381	.500 1255	1.218 2964	1.531 3674	1.812 4294	2.062 4831	2.344 54213
26	26.000				.312 8560	.500 13617		.375 10263			.500 13617					
28	28.000				.312 9226	.500 14685	.625 18273	.375 11064								
30	30.000		.250 7943	.312 9893	.312 9893	.500 15753	.625 19608	.375 11865			.500 15753					
32	32.000				.312 10559	.500 16821	.625 20943	.375 12666	.688 23008		.500 16821					
34	34.000				.312 11225	.500 17889	.625 22278	.375 13467	.688 24477							
36	36.000				.312 11892	.500 23613	.625 23613	.375 28235	.750 28235		.500 18957					

Attachment A Pipe Dimensions and Weights