INL/EXT-15-34759

2014 Idaho National Laboratory Water Use Report and Comprehensive Well Inventory (Revision 23)

Mike Lewis

June 2015

The INL is a U.S. Department of Energy National Laboratory
operated by Battelle Energy Alliance

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Idaho National Laboratory

Idaho Falls, Idaho 83415

http://www.inl.gov

Prepared for the
U.S. Department of Energy
Office of Nuclear Energy
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ABSTRACT

This *2014 Idaho National Laboratory Water Use Report and Comprehensive Well Inventory (Revision 23)* provides water use information for production and potable water wells at the Idaho National Laboratory for Calendar Year 2014. It also provides detailed information for new, modified, and decommissioned wells and holes. One new well was drilled and completed in Calendar Year 2014. No modifications were performed on any wells. No wells were decommissioned in Calendar Year 2014. Detailed construction information and a location map for the new well is provided.

This report is being submitted in accordance with the Water Rights Agreement between the State of Idaho and the United States, for the United States Department of Energy (dated 1990), the subsequent Partial Decree for Water Right 34-10901 issued June 20, 2003, and the Final Unified Decree issued August 26, 2014.

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ACRONYMS

ATR Complex	Advanced Test Reactor Complex
bls	below land surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CITRC	Critical Infrastructure Test Range Complex
CWI	Comprehensive Well Inventory
CY	calendar year
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
MFC	Materials and Fuels Complex
NRF	Naval Reactors Facility
RWMC	Radioactive Waste Management Complex
TAN	Test Area North
USGS	United States Geological Survey

2014 Idaho National Laboratory Water Use Report and Comprehensive Well Inventory (Revision 23)

1. INTRODUCTION

This *2014 Idaho National Laboratory Water Use Report and Comprehensive Well Inventory, (Revision 23)* is being submitted in accordance with the *Water Rights Agreement between the State of Idaho and the United States, for the United States Department of Energy* (Department of Justice 1990), the subsequent Partial Decree for Water Right 34-10901 (District Court 2003) issued June 20, 2003, and the Final Unified Decree (District Court 2014) issued August 26, 2014. As previously agreed (Street 2001), the annual Water Use Report and Comprehensive Well Inventory (CWI) are being combined and submitted as one report.

The Idaho National Laboratory (INL) Site water use reported is for Calendar Year (CY) 2014. Section 2 provides the annual volume of water diverted, maximum and average diversion rates, and "available" pumping levels (water depth) as required by Section 6.2.3 of the Water Rights Agreement for production and potable water wells at the INL Site. Section 2.1 provides total monthly volume, average monthly volume, total annual volume diverted, and water depths (as available) for each production or potable water well. Section 2.2 provides the total monthly volume of water diverted for each facility and the total annual volume for all INL Site production or potable water wells. Section 2.3 provides a summary of the annual water usage, including the total volume of water diverted, maximum diversion rate, and average monthly volume of water diverted for all production and potable wells.

Section 3 is the CWI for the INL Site as required by Section 6.2.2 of the Water Rights Agreement. Section 3.1 provides information for new and modified wells, and Section 3.2 provides information for decommissioned wells and boreholes. One new well was drilled and completed in CY 2014. No modifications were performed and no wells were decommissioned in CY 2014.

Appendix A provides a location map and diagrams containing detailed construction information for the newly constructed well.

2. 2014 WATER USE INFORMATION FOR IDAHO NATIONAL LABORATORY

2.1 Water Volume for Individual Idaho National Laboratory Production or Potable Water Wells

Eight major facilities are located at the INL Site:

- Advanced Test Reactor Complex (ATR Complex)
- Central Facilities Area (CFA)
- Critical Infrastructure Test Range Complex (CITRC)
- Idaho Nuclear Technology and Engineering Center (INTEC)
- Materials and Fuels Complex (MFC)
- Naval Reactors Facility (NRF)
- Radioactive Waste Management Complex (RWMC)
- Test Area North (TAN).

Each major facility is serviced by one or more production and/or potable water wells. Tables 1 through 8 show the water information for production or potable wells at these facilities.

Seven wells are grouped under the CFA facility. Wells CFA-1 and CFA-2 serve the actual CFA facility. The other five wells (Badging Facility Well, EBR-1, Fire Station Well, Rifle Range Well, and Site-04 [Dairy Farm]) serve smaller facilities or processes. The Fire Station Well has occasionally been used for filling water trucks for construction purposes. However, for 2014, the Fire Station Well was not used because the pump remains inoperable. The Dairy Farm Well is used for irrigating various research projects. The wells identified at other INL Site facilities provide water primarily for that specific facility.

Total monthly volumes are recorded as close to the last day of the month as is reasonably possibly. Each table provides the total monthly volume, average monthly volume, and total annual volume of water diverted from each production or potable well during CY 2014. The tables provide water depth as available. Many of the wells were not designed with an access line to measure the water depth. Each well is identified by its official well name, the most common alias name, and the well identification number. Footnotes are provided where applicable.

Section 5.3 of the Water Rights Agreement states: “The use of water for fire suppression benefits the public. Water diverted for fire suppression may be taken randomly, without a definition of the specific elements of a recordable water right, and if so diverted for fire suppression, existing water rights shall not be diminished.” The volumes in the tables may include water used for fire suppression activities. However, there is no way to distinguish water used for fire suppression and water used for other activities.

Table 1. Advanced Test Reactor Complex water volume for 2014.

Volume in Gallons																
Well	Alias	INL Well ID	January	February	March	April	May	June	July	August	September	October	November	December	Total Annual Volume	Average Monthly Volume
TRA-01	NO. 1 DEEP WELL	356	7,986,000	31,073,000	2,140,000	18,464,000	660,000	41,872,000	32,764,000	3,339,000	28,067,000	10,433,000	23,573,000	20,227,000	220,598,000	18,383,167
TRA-03	NO. 3 DEEP WELL	358	385,000	77,000	13,000	849,000	618,000	2,228,000	24,000	21,000	466,000	279,000	167,000	145,000	5,272,000	439,333
TRA-04	NO. 4 DEEP WELL	359	30,212,000	1,920,000	39,179,000	18,378,000	46,400,000	1,788,000	241,000	42,513,000	0	25,490,000	355,000	6,075,000	212,551,000	17,712,583
TRA-1863[a]		1863	0	0	0	0	0	0	214,000	3,760,000	3,519,000	3,403,000	3,311,000	3,197,000	17,404,000	1,450,333
Monthly total			38,583,000	33,070,000	41,332,000	37,691,000	47,678,000	45,888,000	33,243,000	49,633,000	32,052,000	39,605,000	27,406,000	29,644,000		
Total annual volume for ATR Complex**: 455,825,000**																
a. Well TRA-1863 was removed from service on August 25, 2013 due to damage from a lightning strike. The well was placed back into service on July 24, 2014.																
Depth to water, static water level: Date — TRA-1863 September 10, 2014 — 472.05 ft below the brass cap																

Table 2. Central Facilities Area water volume for 2014.

Volume in Gallons																
Well	Alias	INL Well ID	January	February	March	April	May	June	July	August	September	October	November	December	Total Annual Volume	Average Monthly Volume
CFA-1	CFA-651	93	0	0	2,900	25,600	0	0	1,500	0	5,986,600	1,950,700	942,200	1,197,600	10,107,100	842,258
CFA-2	CFA-642	94	1,672,800	1,122,500	1,115,200	1,296,100	3,903,300	12,063,500	11,909,200	9,273,200	0	65,200	0	0	42,421,000	3,535,083
Badging Facility Well	B27-605 Main Gate	88	1,870	1,800	2,230	2,940	3,180	5,830	4,410	5,260	10,550	8,640	2,660	1,930	51,300	4,275
EBR-1		149	314	555	1,703	1,091	5,054	13,787	13,311	18,813	1,019	485	223	372	56,727	4,727
Rifle Range Well	B21-607 Gun Range	267	1,130	1,150	1,640	4,170	2,760	2,600	3,470	1,300	3,420	3,540	1,370	1,610	28,160	2,347
Site-04	B16-604 Dairy Farm	273	0	0	0	44,360	20	22,020	21,270	0	0	60	0	0	87,730	7,311
Fire Station Well[a]	Fire Station #2	158	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Monthly total			1,676,114	1,126,005	1,123,673	1,374,261	3,914,314	12,107,737	11,953,161	9,298,573	6,001,589	2,028,625	946,453	1,201,512		
Total annual volume for CFA: **52,752,017**																
a. Pump for the Fire Station Well is inoperable. Pump has not been repaired or replaced.																

Table 3. Critical Infrastructure Test Range Complex water volume for 2014.

Volume in Gallons																
Well	Alias	INL Well ID	January	February	March	April	May	June	July	August	September	October	November	December	Total Annual Volume	Average Monthly Volume
SPERT-1	PBF Deep Well No. 1	280	195,100	91,500	11,900	94,700	45,400	187,700	83,000	129,500	169,600	163,800	162,200	57,200	1,391,600	115,967
SPERT-2	PBF Deep Well No. 2	281	153,500	58,000	94,700	82,700	118,900	120,100	118,900	83,500	119,000	156,400	129,800	141,400	1,376,900	114,742
Monthly total			348,600	149,500	106,600	177,400	164,300	307,800	201,900	213,000	288,600	320,200	292,000	198,600		
Total annual volume for CITRC: **2,768,500**																

Table 4. Idaho Nuclear Technology and Engineering Center water volume for 2014.

			Volume in Gallons													
Well	Alias	INL Well ID	January	February	March	April	May	June	July	August	September	October	November	December	Total Annual Volume	Average Monthly Volume
CPP-01	F-UTI-670	98	9,608,000	10,243,000	7,689,000	9,372,000	8,452,000	10,114,000	10,632,000	8,049,000	11,036,000	9,427,000	7,574,000	8,992,000	111,188,000	9,265,667
CPP-02	F-UTI-671	99	8,742,000	10,440,000	8,384,000	9,996,000	11,471,000	9,786,000	12,028,000	10,229,000	10,512,000	7,470,000	6,999,000	8,718,000	114,775,000	9,564,583
CPP-04 [a]		101	200,847	177,197	175,800	176,482	266,055	185,749	205,116	206,829	217,111	207,803	256,141	190,677	2,465,807	205,484
ICPP-POT-A-012 [a]	F-UTI-699 or CPP-05	1186	200,847	177,197	175,801	176,482	266,055	185,749	205,115	206,830	217,111	207,802	256,141	190,677	2,465,807	205,484
Monthly total			18,751,694	21,037,394	16,424,601	19,720,964	20,455,110	20,271,498	23,070,231	18,691,659	21,982,222	17,312,605	15,085,282	18,091,354		
Total annual volume for INTEC: **230,894,614**																
a. One flow meter was used for potable wells CPP-04 and ICPP-POT-A-012. Operations switched between the wells weekly, so the totals are estimated to be 50% for each well.																

Table 5. Materials and Fuels Complex water volume for 2014.

			Volume in Gallons													
Well	Alias	INL Well ID	January	February	March	April	May	June	July	August	September	October	November	December	Total Annual Volume	Average Monthly Volume
EBR-II #1[a]	EBR-1	150	859,000	837,500	851,500	1,874,500	1,009,500	933,500	1,157,500	988,750	988,750	930,500	704,000	603,000	11,738,000	978,167
EBR-II #2[a]	EBR-II	151	859,000	837,500	851,500	1,874,500	1,009,500	933,500	1,157,500	988,750	988,750	930,500	704,000	603,000	11,738,000	978,167
Monthly total			1,718,000	1,675,000	1,703,000	3,749,000	2,019,000	1,867,000	2,315,000	1,977,500[b]	1,977,500[b]	1,861,000	1,408,000	1,206,000		
Total annual volume for MFC**: 23,476,000**																
a. The two wells share one flow meter. Operations switch between the wells, so the totals are estimated to be 50% for each well. b. A flow meter reading was not recorded in August. The flow volume is the result of the number of gallons recorded from the flow meter reading taken at the end of September divided by 2.																
Depth to water, static water level: Date — EBR-II #1 — EBR-II #2 April 2014 — 660.5 ft bls — 661.5 ft bls November 2014 — 661.5 ft bls — 663.25 ft bls																
bls below land surface																

Table 6. Naval Reactors Facility water volume for 2014.

Volume in Gallons																
Well	Alias	INL Well ID	January	February	March	April	May	June	July	August	September	October	November	December	Total Annual Volume	Average Monthly Volume
NRF-1	1	240	120,000	72,000	0	11,000	0	54,000	10,000	12,000	12,000	0	73,000	292,000	656,000	54,667
NRF-2[a]	2	241	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRF-3[b]	3	242	269,080	122,497	336,044	169,187	164,853	281,277	322,743	101,130	106,794	135,236	88,066	84,806	2,181,713	181,809
NRF-4	4	869	2,069,000	2,113,000	1,300,000	1,017,000	1,828,000	1,649,000	4,495,000	3,438,000	1,773,000	914,000	1,569,000	1,136,000	23,301,000	1,941,750
NRF-14[b]		2204	368,027	484,611	431,342	521,745	481,081	469,592	588,638	390,555	365,767	427,741	229,074	297,797	5,055,970	421,331
Monthly total			2,826,107	2,792,108	2,067,386	1,718,932	2,473,934	2,453,869	5,416,381	3,941,685	2,257,561	1,476,977	1,959,140	1,810,603		
Total annual volume for NRF: **31,194,683**																
a. NRF-2 was removed from service in 2006. Future use will be determined. b. Wells NRF-3 and NRF-14 are used as potable water wells.																
Depth to water, static water level: Date — NRF-3 — NRF-14 May 2014 — 388.11 ft bls — 387.62 ft bls November 2014 — 389.09 ft bls — 388.58 ft bls																

Table 7. Radioactive Waste Management Complex water volume for 2014.

Volume in Gallons																
Well	Alias	INL Well ID	January	February	March	April	May	June	July	August	September	October	November	December	Total Annual Volume	Average Monthly Volume
RWMC Production		268	379,100	332,200	342,500	346,300	348,300	1,069,700	1,320,100	1,053,800	350,700	456,000	308,100	291,000	6,597,800	549,817
PIT 9 Production Well		2155	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Monthly total			379,100	332,200	342,500	346,300	348,300	1,069,700	1,320,100	1,053,800	350,700	456,000	308,100	291,000		
Total annual volume for RWMC: **6,597,800**																

Table 8. Test Area North water volume for 2014.

Volume in Gallons																
Well	Alias	INL Well ID	January	February	March	April	May	June	July	August	September	October	November	December	Total Annual Volume	Average Monthly Volume
ANP-01[a]	TAN-612	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANP-02	TAN-613	70	67,700	111,400	77,000	79,400	128,000	234,500	269,300	286,200	277,600	93,100	36,400	56,800	1,717,400	143,117
FET-1	TAN-632	154	63,900	21,900	19,100	6,400	0	91,000	400,500	278,800	268,100	180,700	143,500	28,700	1,502,600	125,217
FET-2	TAN-639	155	440,300	420,600	392,100	320,000	488,300	641,600	532,500	330,400	232,700	232,200	229,800	502,200	4,762,700	396,892
Monthly total			571,900	553,900	488,200	405,800	616,300	967,100	1,202,300	895,400	778,400	506,000	409,700	587,700		
Total annual volume for TAN: **7,982,700**																
a. Well is maintained as a backup well for ANP-02.																

2.2 Combined Total Volume Diverted from All Production and Potable Water Wells

Table 9 provides the combined total volume from all production and potable water wells at the INL Site during CY 2014. Table 9 includes:

- Total monthly volume of water diverted for each major INL Site facility
- Combined total monthly volume diverted from all the major INL Site facilities
- Monthly average volume diverted for all wells combined
- Monthly maximum volume diverted for all wells combined
- Total annual volume diverted at the INL Site.

Table 9. Idaho National Laboratory water volume totals for 2014.

Volume in Gallons												
Facility	January	February	March	April	May	June	July	August	September	October	November	December
Advanced Test Reactor Complex	38,583,000	33,070,000	41,332,000	37,691,000	47,678,000	45,888,000	33,243,000	49,633,000	32,052,000	39,605,000	27,406,000	29,644,000
Central Facilities Area	1,676,114	1,126,005	1,123,673	1,374,261	3,914,314	12,107,737	11,953,161	9,298,573	6,001,589	2,028,625	946,453	1,201,512
Critical Infrastructure Test Range Complex	348,600	149,500	106,600	177,400	164,300	307,800	201,900	213,000	288,600	320,200	292,000	198,600
Idaho Nuclear Technology and Engineering Center	18,751,694	21,037,394	16,424,601	19,720,964	20,455,110	20,271,498	23,070,231	18,691,659	21,982,222	17,312,605	15,085,282	18,091,354
Materials and Fuels Complex	1,718,000	1,675,000	1,703,000	3,749,000	2,019,000	1,867,000	2,315,000	1,977,500	1,977,500	1,861,000	1,408,000	1,206,000
Naval Reactors Facility	2,826,107	2,792,108	2,067,386	1,718,932	2,473,934	2,453,869	5,416,381	3,941,685	2,257,561	1,476,977	1,959,140	1,810,603
Radioactive Waste Management Complex	379,100	332,200	342,500	346,300	348,300	1,069,700	1,320,100	1,053,800	350,700	456,000	308,100	291,000
Test Area North	571,900	553,900	488,200	405,800	616,300	967,100	1,202,300	895,400	778,400	506,000	409,700	587,700
Monthly Totals	**64,854,515**	**60,736,107**	**63,587,960**	**65,183,657**	**77,669,258**	**84,932,704**	**78,722,073**	**85,704,617**	**65,688,572**	**63,566,407**	**47,814,675**	**53,030,769**
Maximum monthly volume (gallons)	85,704,617 for August 2014											
Total average monthly volume (gallons)	67,624,276											
Annual total for 2014 (gallons)	**811,491,314**											

2.3 Water Use Summary

The INL Site's Federal Reserved Water Right is 35,000 acre-ft/yr (1.14×10^{10} gal/yr) and will not exceed a maximum diversion rate of 80 ft^3/s (35,906 gpm). The total volume of water diverted at the INL Site for CY 2014 was approximately 8.11×10^8 gal (see Table 9) or approximately 7.12% of the annual water right. The maximum monthly volume of water diverted occurred in August. However, the maximum diversion rate occurred in June, at a rate of 4.38 ft^3/s (1,966 gpm). The average monthly volume of water diverted for all INL Site production and potable wells was approximately 6.76×10^7 gal. The INL Site's water use remained well within the established water right.

3. COMPREHENSIVE WELL INVENTORY, REVISION 23

3.1 Idaho National Laboratory New and Modified Wells in Calendar Year 2014

One new well, USGS-139 was constructed at the INL Site in CY 2014. This addition is listed in Table 10. No well modifications were performed in CY 2014.

Well USGS-139 is located in the center of the site (see Figure A-1). The location was chosen to improve water level (head) information for numerical model efforts and to help with gaps in stratigraphy models. Drilling for USGS-139 started September 2013 and was halted in November 2013, until the next spring. Drilling continued in March 2014 and was completed June 5, 2014. Geophysical logs and borehole video data were collected throughout the drilling process to examine well construction, geologic, and hydrologic data. USGS-139 was cored to a depth of 788 ft below land surface (bls) to collect continuous geologic data. It was then re-drilled to 485 ft bls to an 8 inch diameter borehole, and from 485 to 611 ft bls to a 4.85 inch diameter borehole. Final well construction includes an 8 inch diameter carbon steel casing set to 6 ft bls, and a 6 inch diameter carbon steel casing set to 485 ft bls then sealed with 6100 lbs of cement. A dual piezometer system was installed. Piezometer #1(Deep) was constructed with a 1.25 inch diameter Schedule 80 PVC pipe to 775 ft bls and consists of a 0.020 slotted screen from 754 to 774 ft bls. A filter pack consisting of #6-9 silica sand was poured from 775 ft bls up to 745 ft bls. Another filter pack consisting of #16-40 silica sand was poured from 745 up to 740 ft bls. An annular seal consisting of bentonite was placed from 740 ft bls up to 620 ft bls to separate the monitoring zones. Piezometer #2 (Shallow) was constructed with a 1.25 inch diameter Schedule 80 PVC pipe to 611 ft bls and consists of a 0.020 slotted screen from 590 to 610 ft bls. A filter pack consisting of #6-9 silica sand was poured from 620 ft bls up to 460 ft bls. Bentonite casing seal was then poured from 460 ft bls to the surface to seal the piezometers. Figure A-2 provides construction details.

The CWI database maintains detailed well information that can be provided electronically to the State upon request.

Table 10. Idaho National Laboratory new well constructed in Calendar Year 2014.

Well Name	Type	Borehole Depth (ft bls)	Casing Diameter	Construction Material	Status	Location	Driller/ License #	Comments
USGS-139	Monitoring	788	8 in. from 0 to 6 ft bls 6 in. from -1 to 485 ft bls 1.25 in. from -1.46 to 610 ft bls (Slotted from 590 to 610 ft bls) 1.25 in. from-1.47 to 774 ft bls (Slotted from 754 to 774 ft bls)	Carbon steel Carbon steel Schedule 80 PVC Schedule 80 PVC	Active	T4N, R31E, Sec. 28, NE ¼, SE ¼, SW ¼	USGS	Non-CERCLA

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act
USGS United States Geological Survey

3.2 Idaho National Laboratory Wells Decommissioned in Calendar Year 2014

There were no wells decommissioned in calendar year 2014.

The CWI database maintains detailed well information that can be provided electronically to the state upon request.

4. REFERENCES

Department of Justice, Environment and Natural Resources Division, 1990, "Water Rights Agreement between the State of Idaho and the United States, for the United States Department of Energy," CCN 23795.

District Court-SRBA, Fifth Judicial District, Twin Falls County, Idaho, Order of Partial Decree for Water Right 34-10901, (United States Department of Energy, Idaho National Engineering and Environmental Laboratory), Case No. 39576, June 20, 2003, CCN 23795.

District Court-SRBA, Fifth Judicial District, Twin Falls County, Idaho, Final Unified Decree, Case No. 39576, August 25, 2014.

Street, L. V., INEEL, to D. Dunn, IDWR, September 4, 2001, "INEEL Comprehensive Well Surveys and Annual Water Use Reports," CCN 25370.

Appendix A

Map and Construction Diagram for New Well in 2014

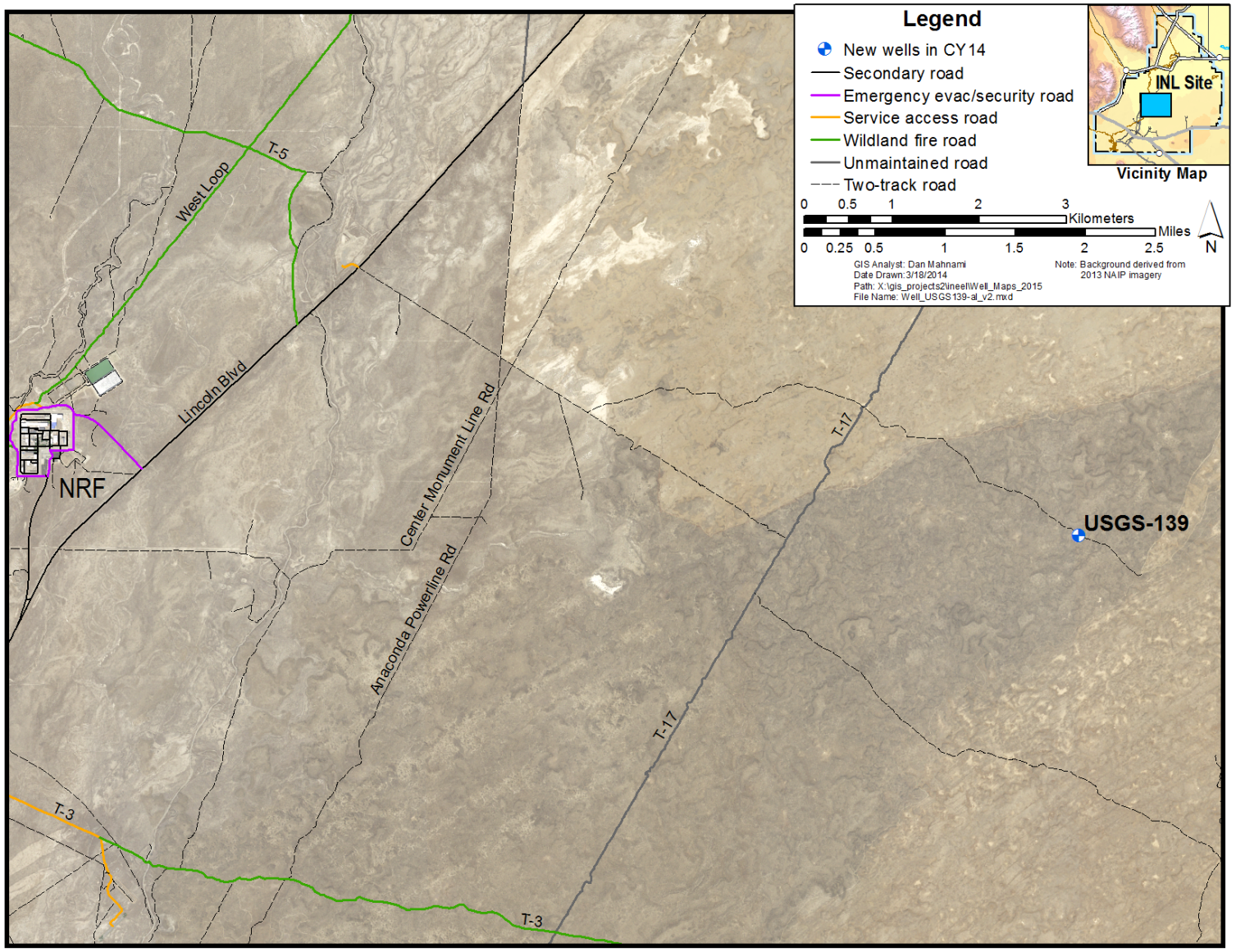
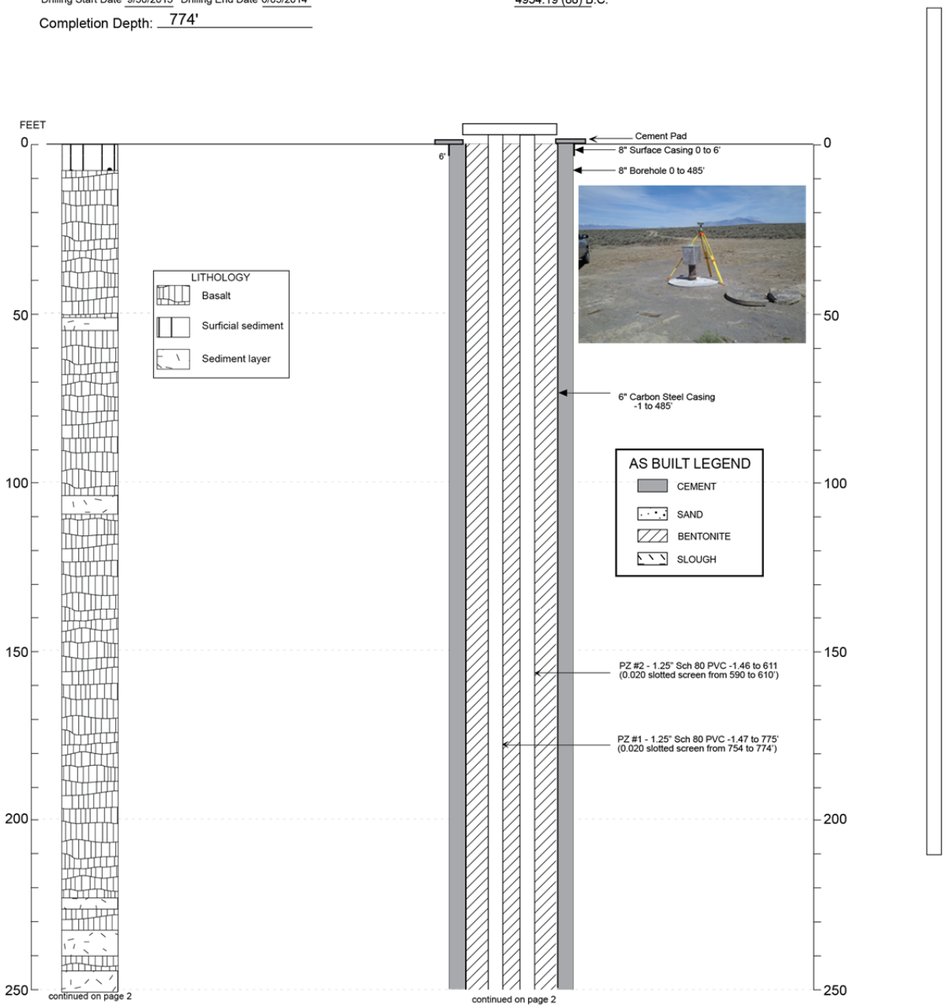


Figure A-1. Map showing location of new well USGS-139.

WELL NAME: **USGS-139**
WELL ID: **2221**
Facility: INL
Well Type: Monitoring
Well Status: Active
Year Drilled: 2013
Total Depth: 788'
Drilling Start Date 9/30/2013 Drilling End Date 6/05/2014
Completion Depth: 774'

Driller: USGS
Date Drawn: 1/27/2015
Geologist: M Hodges
Drill Method: Air/Mist Rotary/core
Drill Fluid: Air/Water/Mud
Land Surface: 4950.68 (29) B.C.
4954.19 (88) B.C.



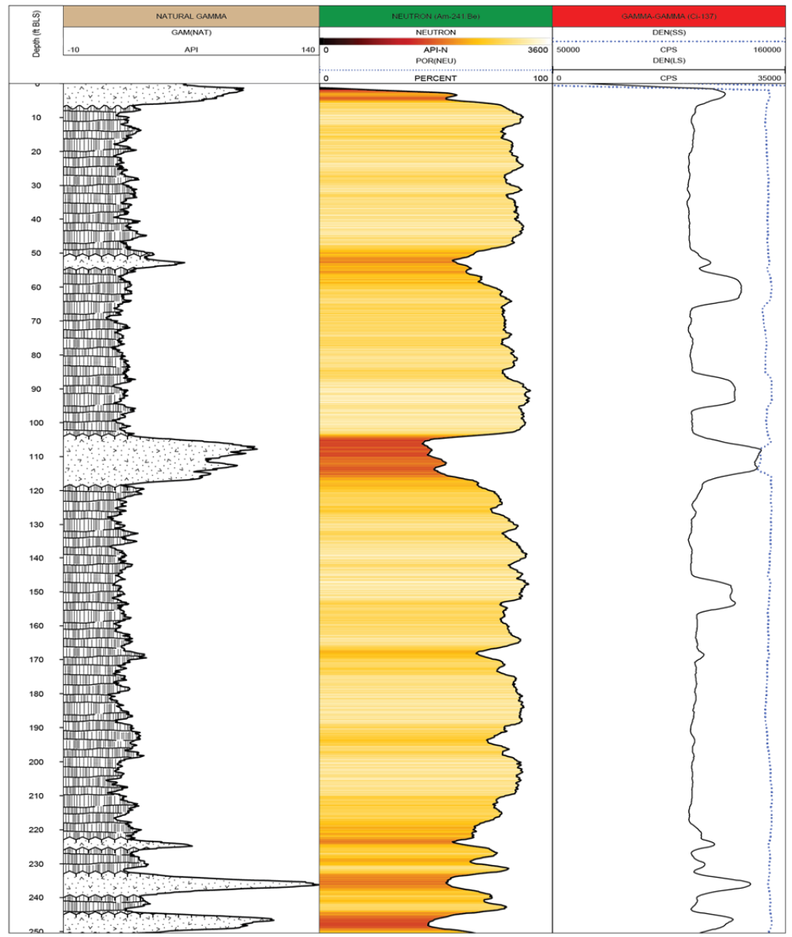
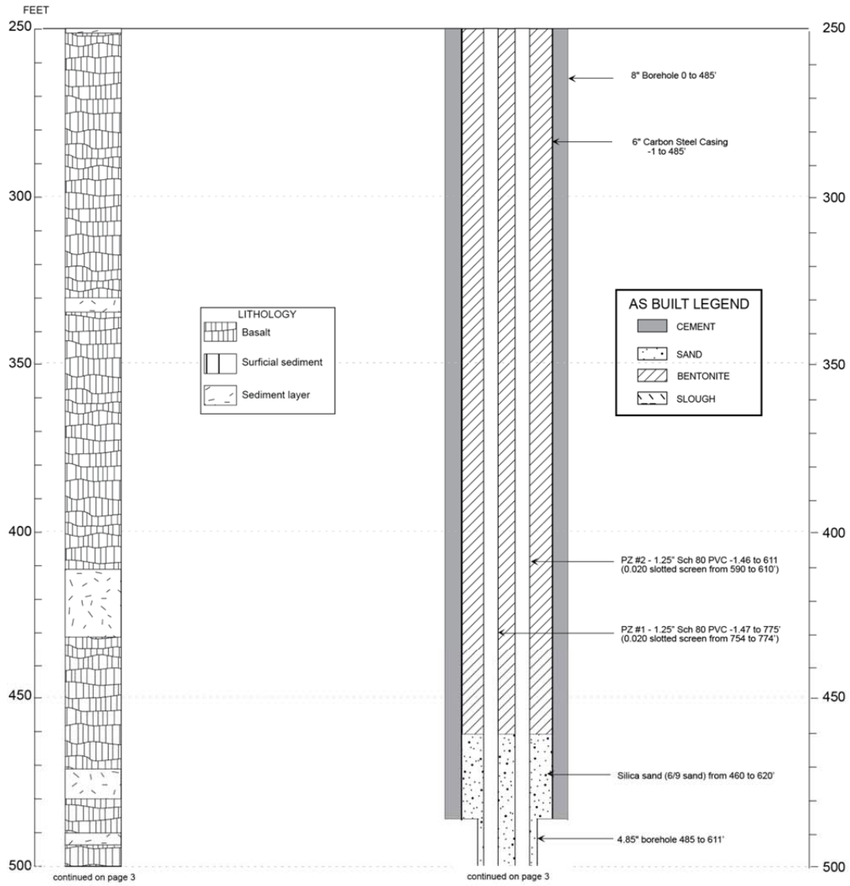


Figure A-2. Construction diagram for new well USGS-139.

WELL NAME: USGS-139



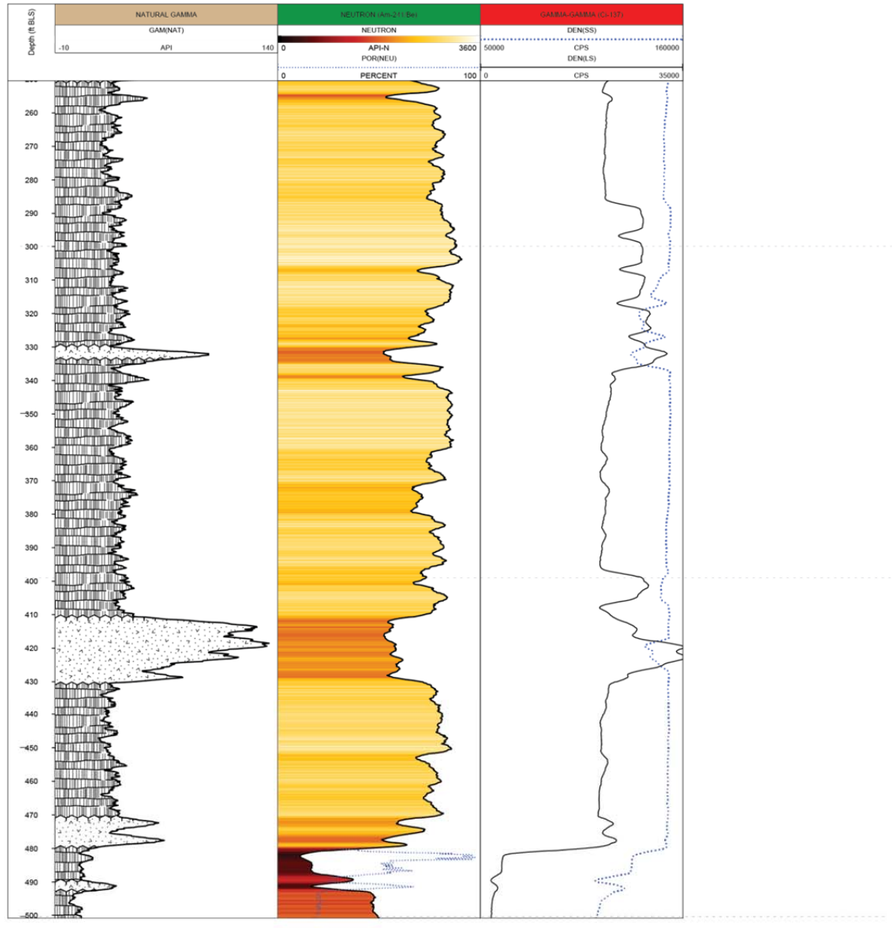


Figure A-2. (continued).

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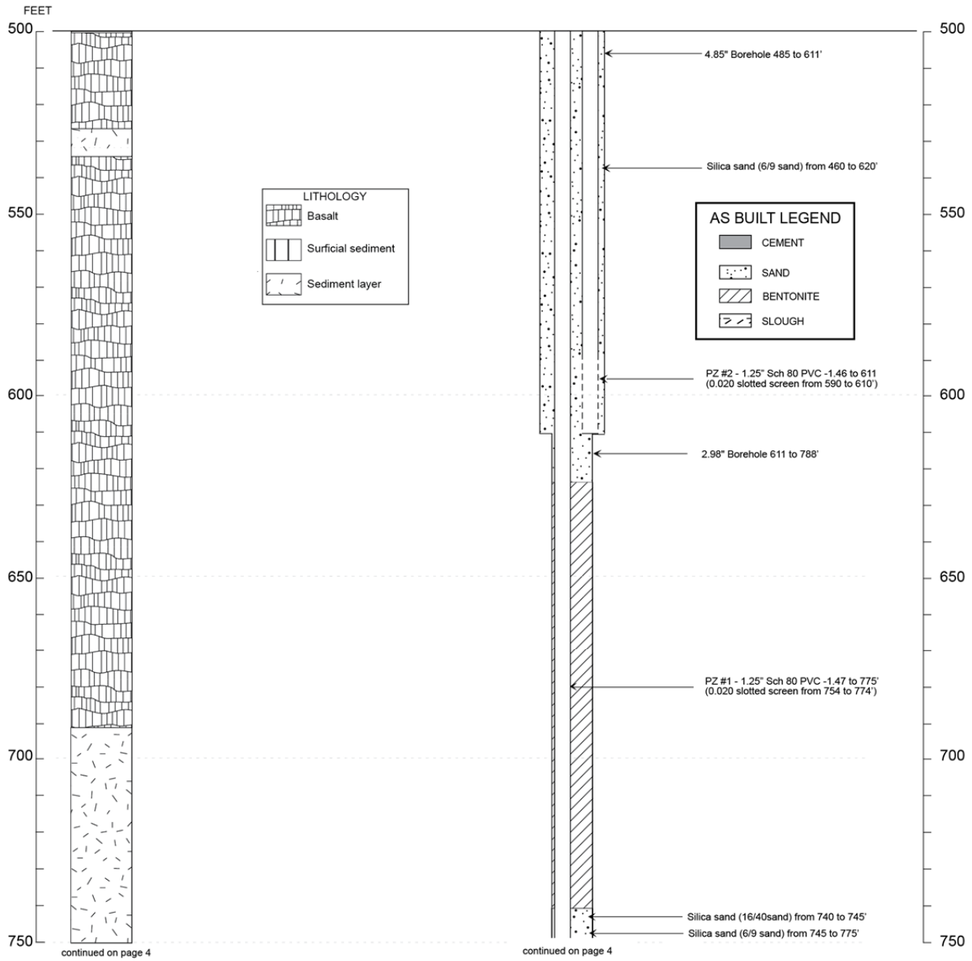

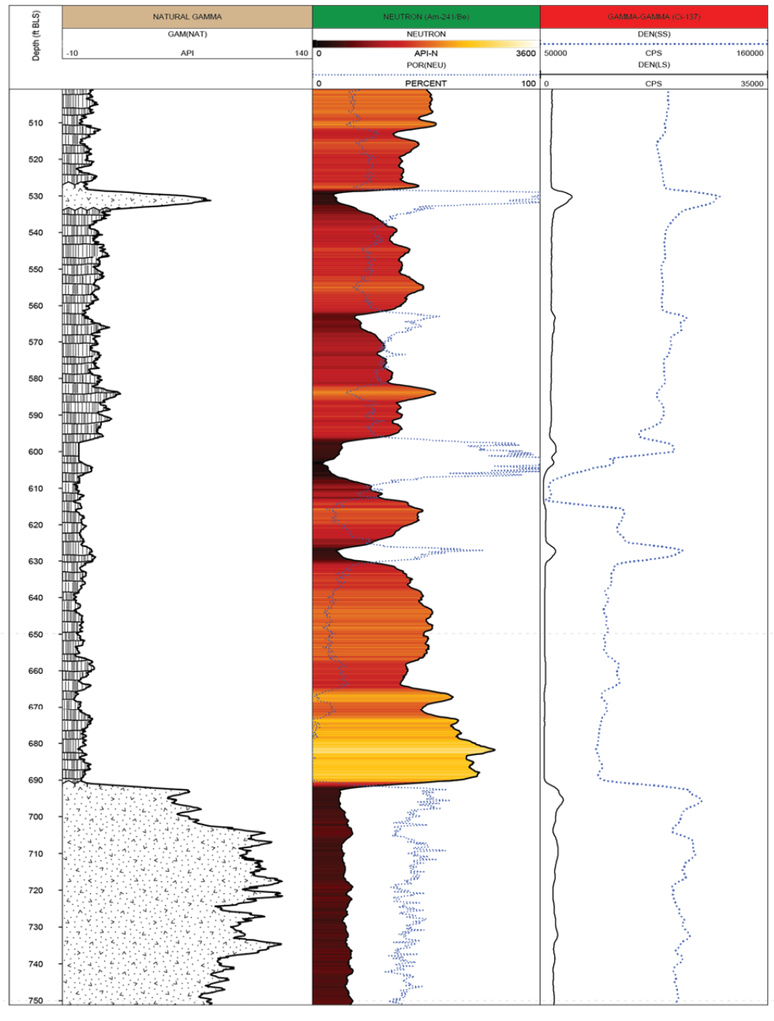

Figure A-2. (continued).

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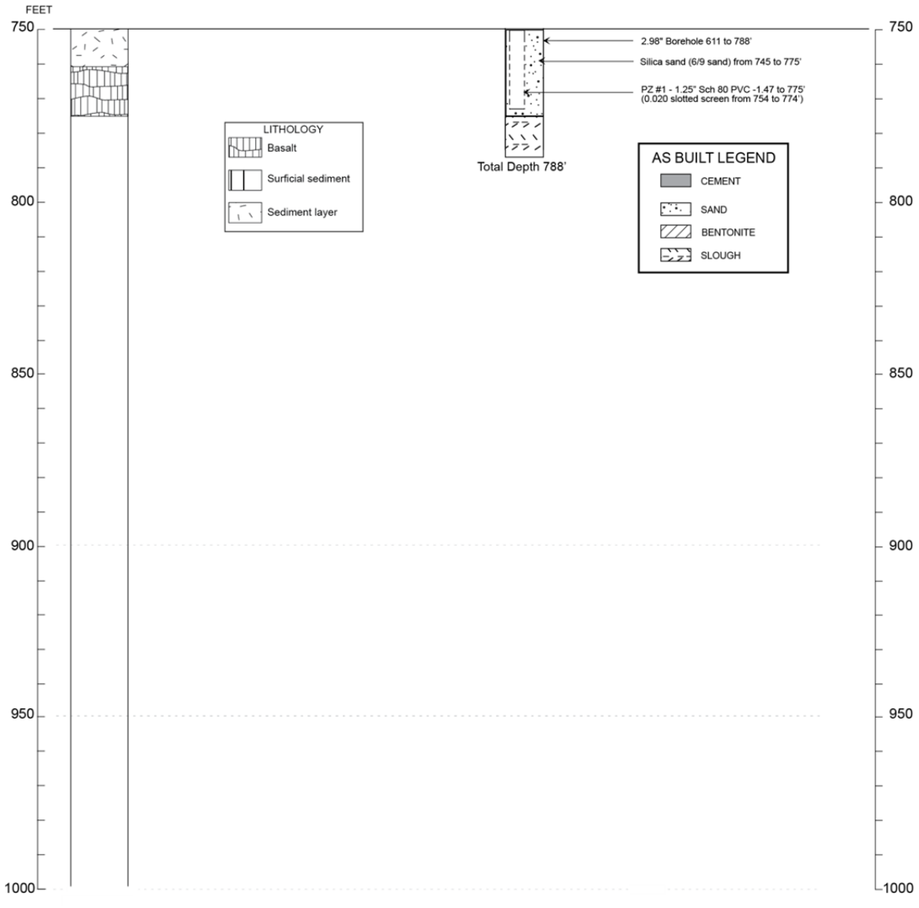

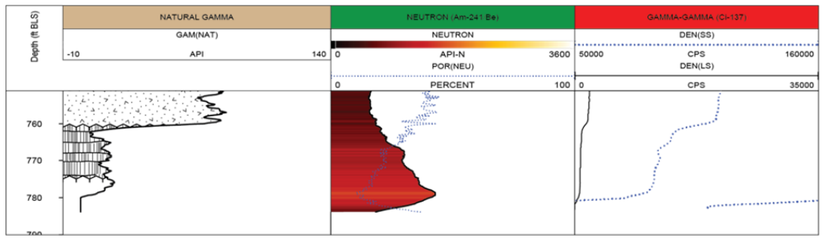

Figure A-2. (continued).