Los Alamos NATIONAL LABORATORY EST. 1943

EM-LA

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Date: FEB 2 6 2018
Symbol: EPC-DO: 18-057
LA-UR: 18-20843
Locates Action No.: *U1601822*

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Subject: **Quarterly Report – 2017 Quarter 4, Discharge Permit DP-1835, Class V Underground Injection Control Wells**

Dear Ms. Hunter:

On August 31, 2016, the New Mexico Environment Department (NMED) issued Discharge Permit (DP) 1835 to the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) for the discharge of treated groundwater to the regional aquifer through up to six Class V Underground Injection Control (UIC) wells. Pursuant to Condition No. 10 of the above-referenced discharge permit, DOE/LANS are required to submit quarterly reports for the previous quarter to document:

1. Influent and discharge volumes from the treatment systems;
2. Quarterly groundwater and treated effluent sampling results; and
3. Operations/Maintenance activities.

Pursuant to Condition Nos. 11, 12, and 13 of DP-1835, the quarterly reports shall also contain general information, performance information, and monitoring data of treated effluent from each ion-exchange (IX) treatment system, respectively. During the 2017 October 1st through December 31st (Quarter 4) reporting period, discharge of treated groundwater to the regional aquifer continued under DP-1835. This treated discharge occurred at six UIC wells: CrIN-1, CrIN-2, CrIN-3, CrIN-4, CrIN-5, CrIN-6. The only injection of treated discharge at CrIN-6 was related to functional testing of the well in accordance with the

September 25, 2017 NMED approval for functional testing at CrIN-6. The Quarterly Report – 2017 Quarter 4 (Enclosure 1) provides the information required under DP-1835 for this reporting period. Please contact William J. Foley by telephone at (505) 665-8423 or by email at bfoley@lanl.gov if you have questions regarding this information.

Sincerely,

Benjamine B. Roberts
Division Leader

Sincerely,

Cheryl L. Rodriguez
Program Manager, FPD-II

WF: am

Enclosure(s):

Enclosure 1-Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer - 2017 Quarter 4, DP-1835
Enclosure 2-Treated Effluent Analytical Results Summary Tables – 2017 Quarter 4, DP 1835
Enclosure 3-Groundwater Elevation Contour Map – 2017 Quarter 4, DP-1835
Enclosure 4-Groundwater Monitoring Wells Analytical Results Summary Table – 2017 Quarter 4, DP-1835
Enclosure 5-Distribution Piping/Initial Mechanical Integrity Test Results Submittal Letter, Initial Injection Notification for CrIN-6, NMED Approval, Associated Correspondence
Enclosure 6-Treated Groundwater Injection and Extraction Summary Tables – 2017 Quarter 4, DP-1835
Enclosure 7-Facility Layout Map – 2017 Quarter 4, DP-1835

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Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
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Santa Fe, NM 87502

GROUND WATER
FEB 2 6 2018
BUREAU

Subject: **Quarterly Report – 2017 Quarter 4, Discharge Permit DP-1835, Class V Underground Injection Control Wells**

Dear Ms. Hunter:

On August 31, 2016, the New Mexico Environment Department (NMED) issued Discharge Permit (DP) 1835 to the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) for the discharge of treated groundwater to the regional aquifer through up to six Class V Underground Injection Control (UIC) wells. Pursuant to Condition No. 10 of the above-referenced discharge permit, DOE/LANS are required to submit quarterly reports for the previous quarter to document:

1. Influent and discharge volumes from the treatment systems;
2. Quarterly groundwater and treated effluent sampling results; and
3. Operations/Maintenance activities.

Pursuant to Condition Nos. 11, 12, and 13 of DP-1835, the quarterly reports shall also contain general information, performance information, and monitoring data of treated effluent from each ion-exchange (IX) treatment system, respectively. During the 2017 October 1st through December 31st (Quarter 4) reporting period, discharge of treated groundwater to the regional aquifer continued under DP-1835. This treated discharge occurred at six UIC wells: CrIN-1, CrIN-2, CrIN-3, CrIN-4, CrIN-5, CrIN-6. The only injection of treated discharge at CrIN-6 was related to functional testing of the well in accordance with the

ENCLOSURE 1

Quarterly Report for the Discharge of
Treated Groundwater to the Regional Aquifer –
2017 Quarter 4, DP-1835

EPC-DO: 18-057

LA-UR-18-20843

U1601822

Date: FEB 2 6 2018

ENCLOSURE 1
Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer – 2017 Quarter 4, DP-1835

Introduction. On August 31, 2016, the New Mexico Environment Department (NMED) issued Discharge Permit (DP) 1835 to the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) for the discharge of treated groundwater to the regional aquifer through up to six Class V underground injection control (UIC) wells. Pursuant to Condition No. 10 of the above-referenced discharge permit, DOE/LANS are required to submit quarterly reports.

During the 2017 October 1 through December 31 (Quarter 4) reporting period, discharge of treated groundwater to the regional aquifer occurred at six UIC wells, CrIN-1, CrIN-2, CrIN-3, CrIN-4, CrIN-5 and CrIN-6, under DP-1835. Groundwater originated from three extraction wells, CrEX-1, CrEX-2, and CrEX-3. This groundwater was treated by chromium treatment unit (CTU) CTUA prior to injection at the UIC wells.

Condition No. 10 of DP-1835 required DOE/LANS to submit a quarterly report to NMED by March 1 for the October 1 – December 31 discharge period. Several conditions within the permit identify information to be submitted in the quarterly report. The following information, with condition references, are required in the quarterly report:

1. *Influent and discharge volumes for the ion exchange (IX) treatment systems (Condition No. 10);*
2. *Quarterly treated effluent sampling results from each IX treatment system (Condition Nos. 10 and 13);*
3. *Quarterly depth to groundwater and groundwater quality sampling results (Condition Nos. 10 and 14);*
4. *Any operations/maintenance activities performed (Condition No. 10);*
5. *Any periodic test of mechanical integrity conducted (Condition No. 11);*
6. *Any replacement of primary or secondary IX vessels or associated treatment system infrastructure (Condition No. 11);*
7. *Any well work-overs conducted (Condition No. 11);*
8. *Any additional operational changes with the potential to markedly affect the discharge (Condition No. 11);*
9. *Monthly average, maximum, and minimum values for flow rate and volume of treated effluent transferred to each UIC well (Condition No. 12);*
10. *Totalized monthly volume of treated effluent transferred to each UIC well (Condition No. 12);*
11. *Monthly average, maximum, and minimum values of injection water level, pressure head above static level for each UIC well (Condition No. 12);*
12. *Daily volume injected at each UIC well (Condition No. 12);*
13. *Daily volume pumped from each extraction well (Condition No. 12);*
14. *Facility layout map (Condition No. 12);*
15. *Groundwater Elevation Contour Map (Condition No. 15).*

Each of the above requirements is addressed in this report and referenced enclosures.

ENCLOSURE 1
Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer – 2017 Quarter 4, DP-1835

Requirement 1: Influent and discharge volumes for the IX treatment system. Table 1 provides the influent and discharge volumes for IX treatment systems during 2017 Quarter 4 for activities completed under DP-1835. As previously identified, injection occurred at UIC wells CrIN-1, CrIN-2, CrIN-3, CrIN-4, CrIN-5, and CrIN-6 during the quarter. Treated discharge originated from extraction wells CrEX-1, CrEX-2, and CrEX-3 and was treated with treatment unit CTUA.

Table 1. Total Influent and Discharge Volumes for IX Treatment Systems – 2017 Quarter 4

Treatment Unit	Influent Volume[1,3] (gal)	Effluent Volume[2,3] (gal)
CTUA	5,599,138	5,568,570
CTUB	N/A	N/A
CTUC	N/A	N/A

Notes:
N/A - treatment unit did not treat any groundwater that was subsequently injected during the quarter.
[1] Influent volume based on CrEX-1, CrEX-2, and CrEX-3 extraction volumes.
[2] Effluent volume based on CTU flow meter reading.
[3] Individual flow meter accurate to ±5%

Requirement 2: Quarterly treated effluent sampling results from each IX treatment system. Treated effluent analytical results from samples collected during 2017 Quarter 4 for activities completed under DP-1835 are summarized in Enclosure 2. Perchlorate analysis was not completed by the analytical laboratory for the treated effluent sample collected on October 12 due to a sample temperature exceedance. No results for total chromium, nitrate-nitrogen (NO_3-N), perchlorate, sulfate, total dissolved solids, fluoride, or chloride exceeded 90% of the numeric standards of 20.6.2.3103 New Mexico Administrative Code (NMAC) or 90% of the numeric standards established for tap water in Table A-1 for constituents not listed in 20.6.2.3103 NMAC. The 90% values for chromium, nitrate-nitrogen (NO_3-N), perchlorate, sulfate, total dissolved solids, fluoride, and chloride are 45 µg/L, 9 mg/L, 12.4 µg/L, 540 mg/L, 900 mg/L, 1.44 mg/L, and 225 mg/L, respectively.

The pilot scale molasses and sodium dithionite amendment studies continued during 2017 Quarter 4. It was determined by NMED that no permit was required for the deployment of these amendments and these studies began with NMED conditional approvals during 2017 Quarter 3. In accordance with the NMED conditional approvals iron, manganese, and arsenic sampling in the treated water from extraction wells CrEX-1, CrEX-2, and CrEX-3 was completed with the results being submitted in the quarterly monitoring reports under DP-1835. These results for 2017 Quarter 4 are provided in Enclosure 2. No results for iron, manganese, or arsenic exceeded 90% of the numeric standards of 20.6.2.3103 New Mexico Administrative Code (NMAC). The 90% values for iron, manganese, and arsenic are 900 µg/L, 180 µg/L, and 90 µg/L, respectively.

ENCLOSURE 1
Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer – 2017 Quarter 4, DP-1835

During 2017 Quarter 4 no annual compliance samples were obtained. As previously identified, all groundwater injected under DP-1835 was treated by CTUA. The CTUA annual compliance sample was obtained on February 6, 2017 with results reported in the 2017 Quarter 1 report (EPC-DO: 17-166) in accordance with Condition 13 of DP-1835.

Other than the activities cited in Requirement 4, no additional operational changes occurred during the reporting period.

Requirement 3: Quarterly depth to groundwater and groundwater quality sampling results. Table 2 provides the quarterly groundwater elevation measurements. Enclosure 3 provides a groundwater elevation contour map and an explanation of how this map was generated.

Quarterly groundwater analytical results from samples collected during 2017 Quarter 4 for the monitoring wells listed in Condition No. 14 are summarized in Table 3. Complete results related to these samples are provided in Enclosure 4.

ENCLOSURE 1
Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer – 2017 Quarter 4, DP-1835

Table 2. Groundwater Elevations Summary for Groundwater Monitoring Wells – 2017 Quarter 4

Monitoring Well	Groundwater Elevation[1] (ft)
CrCH-1	5833.12
CrCH-2 S1	5831.50
CrCH-2 S2	5831.29
CrCH-3	5833.59
CrCH-4	5835.03
CrCH-5	5834.43
R-11	5832.73
R-13	5830.94
R-43 S1	5834.87
R-43 S2	5833.72
R-44 S1	5832.04
R-44 S2	5831.67
R-45 S1	5832.25
R-45 S2	5831.75
R-50 S1	5832.92
R-50 S2	5832.34
R-61 S1	5834.11
R-61 S2	5834.10
R-62	5837.73
SIMR-2[2]	5832.19
SIMR-2[3]	-

Notes

[1]Groundwater elevations provided are the average daily value on November 18 from transducers, unless otherwise noted.

[2]Third Quarter 2017 SIMR-2 data reported here in accordance with DP-1835 2017 Quarter 3 Report (EPC-DO: 17-449). Data was unavailable at the time of that report's preparation in accordance with the Memorandum of Agreement between Pueblo de San Ildefonso and DOE/LANS.

[3]Data has been collected but is unavailable at the time of this report's preparation in accordance with the Memorandum of Agreement between Pueblo de San Ildefonso and DOE/LANS. This data will be presented in the next quarterly report.

ENCLOSURE 1
Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer – 2017 Quarter 4, DP-1835

Table 3. Summary Table of Analytical Results for Groundwater Monitoring Wells – 2017 Quarter 4

Location	Sample Date	Analyte[1]						
		Chloride (mg/L)	Perchlorate (µg/L)	Chromium (µg/L)	Fluoride (mg/L)	Nitrate-Nitrite as Nitrogen (mg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
R-11	11/8/2017	3.76	0.707	10	0.335	5.35	9.75	180
R-13	11/8/2017	2.39	0.396	4.65	0.228	0.736	3.19	144
R-43 S1	11/9/2017	8.28	0.847	178	0.270	5.43	17.1	157
R-43 S2	11/9/2017	5.88	0.875	17.5	0.233	3.86	8.78	160
R-44 S1	10/30/2017	2.39	0.406	14.1	0.246	1.08	3.35	140
R-44 S1	11/20/2017	2.19	0.422	15.2	0.275	1.17	3.22	141
R-44 S1	12/18/2017	2.61	0.450	14.3	0.321	1.11	3.75	98.6
R-44 S2	10/30/2017	2.32	0.346	7.75	0.250	0.717	2.71	174
R-44 S2	11/20/2017	2.08	0.339	7.26	0.268	0.725	2.52	156
R-44 S2	12/18/2017	2.52	0.379	7.86	0.310	0.794	3.01	85.7
R-45 S1	10/31/2017	6.10	0.588	42.4	0.223	3.15	9.20	163
R-45 S1	11/20/2017	5.37	0.515	41.7	0.252	2.99	8.47	177
R-45 S1	12/18/2017	6.70	0.642	50.7	0.326	2.91	10.2	94.3
R-45 S2	10/31/2017	6.00	0.557	42.3	0.250	3.02	9.01	164
R-45 S2	10/31/2017	6.18	0.579	42.5	0.276	3.01	9.25	156
R-45 S2	10/31/2017	-	-	47.4	-	-	-	-
R-45 S2	11/20/2017	3.97	0.415	25.5	0.339	0.983	4.95	180
R-45 S2	12/18/2017	4.79	0.420	25.1	0.387	0.905	5.74	133
R-50 S1	10/26/2017	9.46	0.598	150	0.198	2.09	13.2	163
R-50 S1	11/16/2017	9.46	0.614	125	0.206	2.02	13.5	163
R-50 S1	12/14/2017	9.80	0.613	134	0.243	2.10	14.0	153
R-50 S1	12/14/2017	9.80	0.622	136	0.222	2.05	14.0	181
R-50 S2	10/26/2017	2.06	0.348	4.89	0.284	0.489	2.45	146
R-50 S2	11/16/2017	2.05	0.336	5.06	0.258	0.498	2.58	166
R-50 S2	12/14/2017	2.08	0.335	4.62	0.295	0.505	2.73	139
R-62	11/17/2017	14.7	0.805	260	0.104	0.0685	26.4	197

ENCLOSURE 1
Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer – 2017 Quarter 4, DP-1835

Table 3. Summary Table of Analytical Results for Groundwater Monitoring Wells – 2017 Quarter 4 (continued)

Location	Sample Date	Analyte[1]						
		Chloride (mg/L)	Perchlorate (µg/L)	Chromium (µg/L)	Fluoride (mg/L)	Nitrate-Nitrite as Nitrogen (mg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
SIMR-2[2]	7/31/2017	-	-	5.79	-	-	-	-
SIMR-2[2]	8/8/2017	2.15	0.393	4.53	0.187	0.675	2.85	141
SIMR-2[2]	9/27/2017	-	-	3.78	-	-	-	-
SIMR-2[3]	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[1] Reported results are dissolved constituents
[2] 2017 Quarter 3 SIMR-2 data reported here in accordance with DP-1835 2017 Quarter 2 Report (EPC-DO: 17-449). Data was unavailable at the time of that report's preparation in accordance with the Memorandum of Agreement between Pueblo de San Ildefonso and DOE/LANS.
[3] Data has been collected but is unavailable at the time of this report's preparation in accordance with the Memorandum of Agreement between Pueblo de San Ildefonso and DOE/LANS. This data will be presented in the next quarterly report, if available.
NA - Not Available

Requirement 4: Any operations/maintenance activities performed. Limited operations occurred during 2017 Quarter 4 for the extraction, treatment, and injection system. These activities consisted of testing of the entire extraction, treatment, injection system and aquifer testing. Before initial discharge to UIC well CrIN-6, DOE/LANS submitted written notification of the initial injection date to NMED in accordance with Condition 4. NMED approved injection of treated groundwater into CrIN-1 on September 1 and CrIN-6 on September 25. Aquifer testing was approved by NMED on November 21. Correspondence related to these activities is provided in Enclosure 5.

The limited system operations which occurred during 2017 Quarter 4 consisted of the following:

- Testing of the entire system, except CrIN-6, occurred intermittently between October 2 and October 20.
- Aquifer testing occurred intermittently between November 13 and December 14. This testing including the functional testing of CrIN-6. All injection activities were completed in accordance with DP-1835 requirements and the NMED September 1, September 25, and November 21 approvals.

Operations and maintenance activities completed during 2017 Quarter 4 are listed in Table 4 for the extraction, treatment and injection system.

Table 4. Operations and Maintenance Activity Summary Table – 2017 Quarter 3

Maintenance Date	Elements Impacted	Maintenance Description
Beginning of reporting period through 10/2	CrEX-1, CrEX-2, CrEX-3, CTUA[1], CrIN-1, CrIN-2, CrIN-3, CrIN-4, and CrIN-5	Injection of treated groundwater did not occur due to: 1. Install treatment train B IX units in CTUA. 2. System buildout and testing activities related to bringing CrEX-2, CrEX-3, CrIN-1, CrIN-2, CrIN-3, and CrIN-6 online.
11/21	CTUA	For treatment train A replaced primary IX vessel with the secondary IX vessel and a new secondary IX vessel installed.
12/15 through end of reporting period	CrEX-1, CrEX-2, CrEX-3, CTUA, CrIN-1[2], CrIN-2, CrIN-3, CrIN-4, CrIN-5, and CrIN-6[2]	Injection of treated groundwater did not occur as a precautionary measure with the Laboratory closure between 12/22 and 1/2 since operations are scheduled to resume with a new configuration of extraction from CrEX-1, CrEX-2, and CrEX-3 with injection into CrIN-3, CrIN-4, and CrIN-5.

[1] Treatment unit CTUA contains three treatment trains: train A, train B, and train C.
[2] In accordance with DOE/LANS October 19, 2017 correspondence (EPC-DO-17-392), see Enclosure 5, and NMED's November 21, 2017 correspondence, see Enclosure 5, a recommendation for the final configuration of system operation for the interim measure will be submitted to NMED.

Requirement 5: Any periodic test of mechanical integrity conducted. Periodic testing of mechanical integrity was not conducted during 2017 Quarter 4. In accordance with Condition No. 3, the next required integrity test of these items will occur within 5 yr of the initial test unless an UIC well is reconfigured. In this scenario, a mechanical integrity test before reinjection of treated effluent at that well will be completed pursuant to Condition No. 3.

DOE/LANS submitted documentation demonstrating mechanical integrity of the pipelines connecting extraction wells CrEX-1, CrEX-2, and CrEX-3 to the groundwater treatment system on November 22, 2017. This documentation also included the documentation demonstrating the mechanical integrity of the pipelines connecting the groundwater treatment system with UIC wells CrIN-1, CrIN-2, CrIN-3, CrIN-4, CrIN-5, and CrIN-6 which were completed after and not included in either the November 15, 2016 or August 28, 2017 submittals. In addition, integrity testing documentation for UIC well CrIN-6 was also included. Enclosure 5 contains the submittal letter for this documentation.

Requirement 6: Any replacement of primary or secondary IX vessels or associated treatment system infrastructure. Installation of new primary and secondary IX vessels occurred for treatment unit CTUA treatment train A during the reporting period as cited in Requirement 4.

Requirement 7: Any well work-overs conducted. Well work-overs did not occur during 2017 Quarter 4.

Requirement 8: Any additional operational changes with the potential to markedly affect the discharge. During the reporting period the pilot scale molasses amendment and sodium dithionite amendment studies continued. In accordance with NMED's conditional approval for

these studies iron, manganese, and arsenic sampling in the treated water from extraction wells CrEX-1, CrEX-2, and CrEX-3 during the study are being provided in the quarterly monitoring reports under DP-1835. These results for 2017 Quarter 4 are provided in Enclosure 2.

No results for arsenic, iron, or manganese exceeded 90% of the numeric standards of 20.6.2.3103 NMAC or 90% of the numeric standards established for tap water in Table A-1 for constituents not listed in 20.6.2.3103 NMAC. The 90% values for arsenic, iron, or manganese are 90 µg/L, 900 µg/L, and 180 µg/L, respectively.

Other than the activities cited in Requirement 4, no additional operational changes occurred during the reporting period. During the 2018 Quarter 1 period it is anticipated that treated water from new extraction well CrEX-4 will be injected through the UIC wells.

Requirement 9: Monthly average, maximum, and minimum values for flow rate and volume of treated effluent transferred to each UIC well. Table 5 provides the monthly average, maximum, and minimum values for flow rate and volume of treated effluent transferred to each well in 2017 Quarter 4.

ENCLOSURE 1
Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer – 2017 Quarter 4, DP-1835

Table 5. Flows and Volumes of Treated Effluent Injected – 2017 Quarter 4

UIC Well	Flow rate (gpm)			Daily Volume (gpd)			Total Volume (gal)
	Average[2]	Maximum	Minimum[3]	Average	Maximum	Minimum[3]	
	October						
CrIN-1	44.0	58.0	22.3	20,981	65,186	250	167,846
CrIN-2	49.1	69.6	29.8	19,126	53,807	1,989	153,011
CrIN-3	56.5	84.4	39.8	18,174	60,207	1,504	127,216
CrIN-4	50.8	80.3	27.0	22,300	66,426	193	178,400
CrIN-5	38.3	73.2	4.3	24,527	66,647	155	171,692
CrIN-6[1]	47.2	47.2	47.2	5,906	5,906	5,906	5,906
	November						
CrIN-1	67.6	71.0	55.9	81,376	101,175	19,737	732,382
CrIN-2	64.0	69.3	55.3	127,625	185,283	49,088	510,500
CrIN-3	63.2	70.2	54.6	187,928	339,425	45,595	751,712
CrIN-4	58.7	62.2	54.8	80,609	96,732	39,458	322,436
CrIN-5	66.6	69.9	44.8	82,646	100,653	36,925	743,815
CrIN-6[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	December						
CrIN-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CrIN-2	64.1	69.0	54.2	74,208	103,736	47,045	371,038
CrIN-3	62.1	103.8	29.0	52,889	173,763	6,719	211,557
CrIN-4	62.9	79.0	58.8	77,460	113,431	5,931	697,140
CrIN-5	102.3	108.2	93.4	113,067	145,164	79,181	452,267
CrIN-6[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
N/A = Treated groundwater not injected during the month at this location.
[1] UIC well constructed and injection of treated groundwater occurred only for functional test in accordance with NMED's September 25, 2017 approval.
[2] Average flow rate and daily volume represents arithmetic mean values of results provided during periods when injection of treated groundwater was occurring.
[3] Minimum values represent the minimum daily value which occurred during days when pumping occurred.

Requirement 10: Totalized monthly volume of treated effluent transferred to each UIC well. Table 5 provides totalized monthly volumes of treated effluent transferred to each well. As previously identified, injection occurred at UIC wells CrIN-1, CrIN-2, CrIN-3, CrIN-4, CrIN-5, and CrIN-6 during the quarter.

Requirement 11: Monthly average, maximum, and minimum values of injection water level (pressure) head above static level for each UIC well. Table 6 provides the monthly average, maximum, and minimum values for injection water level above static level for each UIC well. As previously indicated, injection occurred at UIC wells CrIN-1, CrIN-2, CrIN-3, CrIN-4, CrIN-5, and CrIN-6 during the quarter.

Table 6. Water Level Values Above Static Level by UIC Well – 2017 Quarter 4

UIC Well	October			November			December		
	Average[2] (ft)	Maximum (ft)	Minimum (ft)	Average[2] (ft)	Maximum (ft)	Minimum (ft)	Average[2] (ft)	Maximum (ft)	Minimum (ft)
CrIN-1	3.2	5.8	0.0	2.5	4.4	1.9	N/A	N/A	N/A
CrIN-2	2.8	4.9	0.0	2.5	2.5	2.5	4.1	5.0	3.0
CrIN-3	3.1	4.8	1.8	4.1	5.7	1.5	4.6	7.3	3.3
CrIN-4	11.1	43.9	0.0	26.8	28.8	25.8	36.2	89.7	16.9
CrIN-5	4.1	7.3	0.0	7.8	9.2	4.5	10.2	15.2	7.0
CrIN-6[1]	0.9	0.9	0.9	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
N/A = Treated groundwater not injected during the month at this location.
[1] UIC well constructed and injection of treated groundwater occurred only for functional test in accordance with NMED's September 25, 2017 approval.
[2] Average values provide represent arithmetic mean values of results provided during periods when injection of treated groundwater was occurring.

Requirement 12: Daily volume injected at each UIC well. Daily volumes of treated groundwater injected at CrIN-1, CrIN-2, CrIN-3, CrIN-4, CrIN-5, and CrIN-6 during 2017 Quarter 4 are provided in Enclosure 6.

Requirement 13: Daily volume pumped from each extraction well. Daily volumes of groundwater pumped from CrEX-1, CrEX-2, and CrEX-3 during 2017 Quarter 4 which was subsequently treated and injected under this permit, are provided in Enclosure 6.

Requirement 14: Facility layout map. The facility layout map for 2017 Quarter 4 showing the location and number of each well is provided in Enclosure 7.

Requirement 15: Groundwater Elevation Contour Map. Enclosure 3 provides the groundwater elevation contour map and an explanation of how this map was generated.

ENCLOSURE 2

Treated Effluent Analytical
Results Summary Tables –
2017 Quarter 4, DP-1835

EPC-DO: 18-057

LA-UR-18-20843

U1601822

Date: FEB 2 6 2018

Table E2-1
Treated Effluent Analytical Results Summary Table - 2017 Quarter 4, DP-1835

Location ID	Sample ID	Sample Date	Parameter Name	Result	Report Units	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CTUA	CTUA-17-142765	10/02/17	Chloride	78.9	mg/L		Y	Y	EPA:300.0	1.34
CTUA	CTUA-17-142764	10/03/17	Chloride	79.5	mg/L		Y	Y	EPA:300.0	1.34
CTUA	CTUA-17-142766	10/12/17	Chloride	81.7	mg/L		Y	Y	EPA:300.0	1.34
CTUA	CTUA-17-142762	10/16/17	Chloride	86.0	mg/L		Y	Y	EPA:300.0	1.34
CTUA	CTUA-17-142763	10/17/17	Chloride	82.9	mg/L		Y	Y	EPA:300.0	1.34
CTUA	CTUA-17-142759	11/15/17	Chloride	28.8	mg/L		Y	Y	EPA:300.0	0.335
CTUA	CTUA-17-142758	11/20/17	Chloride	10.3	mg/L		Y	Y	EPA:300.0	0.335
CTUA	CTUA-17-142756	11/28/17	Chloride	38.6	mg/L		Y	Y	EPA:300.0	0.670
CTUA	CTUA-17-142753	12/06/17	Chloride	20.0	mg/L		Y	Y	EPA:300.0	0.335
CTUA	CTUA-17-142765	10/02/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-146447	10/02/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-142764	10/03/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-146446	10/03/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-142766	10/12/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-146448	10/12/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-142762	10/16/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-146444	10/16/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-142763	10/17/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-146445	10/17/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-142759	11/15/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-146441	11/15/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-142758	11/20/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-146440	11/20/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-142756	11/28/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-146437	11/28/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-142753	12/06/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-146436	12/06/17	Chromium	3.00	ug/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-17-142765	10/02/17	Fluoride	0.0867	mg/L	J	Y	Y	EPA:300.0	0.033
CTUA	CTUA-17-142764	10/03/17	Fluoride	0.0816	mg/L	J	Y	Y	EPA:300.0	0.033
CTUA	CTUA-17-142766	10/12/17	Fluoride	0.199	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-17-142762	10/16/17	Fluoride	0.227	mg/L		Y	Y	EPA:300.0	0.033

ENCLOSURE 2

Table E2-1

Treated Effluent Analytical Results Summary Table - 2017 Quarter 4, DP-1835

Location ID	Sample ID	Sample Date	Parameter Name	Result	Report Units	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CTUA	CTUA-17-142763	10/17/17	Fluoride	0.287	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-17-142759	11/15/17	Fluoride	0.195	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-17-142758	11/20/17	Fluoride	0.202	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-17-142756	11/28/17	Fluoride	0.382	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-17-142753	12/06/17	Fluoride	0.245	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-17-142765	10/02/17	Nitrate-Nitrite as Nitrogen	0.064	mg/L		Y	Y	EPA:353.2	0.017
CTUA	CTUA-17-142764	10/03/17	Nitrate-Nitrite as Nitrogen	0.169	mg/L		Y	Y	EPA:353.2	0.017
CTUA	CTUA-17-142766	10/12/17	Nitrate-Nitrite as Nitrogen	0.0645	mg/L		Y	Y	EPA:353.2	0.017
CTUA	CTUA-17-142762	10/16/17	Nitrate-Nitrite as Nitrogen	0.0607	mg/L		Y	Y	EPA:353.2	0.017
CTUA	CTUA-17-142763	10/17/17	Nitrate-Nitrite as Nitrogen	0.175	mg/L		Y	Y	EPA:353.2	0.017
CTUA	CTUA-17-142759	11/15/17	Nitrate-Nitrite as Nitrogen	2.49	mg/L		Y	Y	EPA:353.2	0.170
CTUA	CTUA-17-142758	11/20/17	Nitrate-Nitrite as Nitrogen	3.35	mg/L		Y	Y	EPA:353.2	0.170
CTUA	CTUA-17-142756	11/28/17	Nitrate-Nitrite as Nitrogen	2.07	mg/L		Y	Y	EPA:353.2	0.085
CTUA	CTUA-17-142753	12/06/17	Nitrate-Nitrite as Nitrogen	2.61	mg/L		Y	Y	EPA:353.2	0.170
CTUA	CTUA-17-142765	10/02/17	Perchlorate	0.155	ug/L	J	Y	Y	SW-846:6850	0.050
CTUA	CTUA-17-142764	10/03/17	Perchlorate	0.157	ug/L	J	Y	Y	SW-846:6850	0.050
CTUA	CTUA-17-142762	10/16/17	Perchlorate	0.173	ug/L	J	Y	Y	SW-846:6850	0.050
CTUA	CTUA-17-142763	10/17/17	Perchlorate	0.166	ug/L	J	Y	Y	SW-846:6850	0.050
CTUA	CTUA-17-142759	11/15/17	Perchlorate	0.259	ug/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-17-142758	11/20/17	Perchlorate	0.501	ug/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-17-142756	11/28/17	Perchlorate	0.438	ug/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-17-142753	12/06/17	Perchlorate	0.469	ug/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-17-142765	10/02/17	Sulfate	0.423	mg/L		Y	Y	EPA:300.0	0.133
CTUA	CTUA-17-142764	10/03/17	Sulfate	0.440	mg/L		Y	Y	EPA:300.0	0.133
CTUA	CTUA-17-142766	10/12/17	Sulfate	0.323	mg/L	J	Y	Y	EPA:300.0	0.133
CTUA	CTUA-17-142762	10/16/17	Sulfate	0.361	mg/L	J	Y	Y	EPA:300.0	0.133
CTUA	CTUA-17-142763	10/17/17	Sulfate	0.402	mg/L		Y	Y	EPA:300.0	0.133
CTUA	CTUA-17-142759	11/15/17	Sulfate	20.2	mg/L		Y	Y	EPA:300.0	0.665
CTUA	CTUA-17-142758	11/20/17	Sulfate	14.9	mg/L		Y	Y	EPA:300.0	0.665
CTUA	CTUA-17-142756	11/28/17	Sulfate	18.8	mg/L		Y	Y	EPA:300.0	0.133
CTUA	CTUA-17-142753	12/06/17	Sulfate	30.2	mg/L		Y	Y	EPA:300.0	0.665
CTUA	CTUA-17-142765	10/02/17	Total Dissolved Solids	364	mg/L		Y	Y	EPA:160.1	3.40

Table E2-1
Treated Effluent Analytical Results Summary Table - 2017 Quarter 4, DP-1835

Location ID	Sample ID	Sample Date	Parameter Name	Result	Report Units	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CTUA	CTUA-17-142764	10/03/17	Total Dissolved Solids	291	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-17-142766	10/12/17	Total Dissolved Solids	277	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-17-142762	10/16/17	Total Dissolved Solids	273	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-17-142763	10/17/17	Total Dissolved Solids	249	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-17-142759	11/15/17	Total Dissolved Solids	241	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-17-142758	11/20/17	Total Dissolved Solids	256	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-17-142756	11/28/17	Total Dissolved Solids	271	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-17-142753	12/06/17	Total Dissolved Solids	206	mg/L		Y	Y	EPA:160.1	3.40

Notes:

U - in the lab qualifier column means analyte is classified as not detected.

J - in the lab qualifier comment means the analyte is classified as estimated.

N - in the detect flag column means the analyte was undetected.

Y - in the detect flag column means the analyte was detected.

Table E2-2
Treated Effluent Analytical Results Summary Table Related To Molasses and
Sodium Dithionate Pilot Studies NMED Conditional Approval - 2017 Quarter 4, DP-1835

Location ID	Sample ID	Sample Date	Parameter Name	Result	Report Units	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CTUA	CTUA-17-146447	10/02/17	Arsenic	2.00	ug/L	U	N	Y	SW-846:6020	2.00
CTUA	CTUA-17-146446	10/03/17	Arsenic	2.00	ug/L	U	N	Y	SW-846:6020	2.00
CTUA	CTUA-17-146448	10/12/17	Arsenic	2.00	ug/L	U	N	Y	SW-846:6020	2.00
CTUA	CTUA-17-146444	10/16/17	Arsenic	2.00	ug/L	U	N	Y	SW-846:6020	2.00
CTUA	CTUA-17-146445	10/17/17	Arsenic	2.00	ug/L	U	N	Y	SW-846:6020	2.00
CTUA	CTUA-17-146441	11/15/17	Arsenic	2.00	ug/L	U	N	Y	SW-846:6020	2.00
CTUA	CTUA-17-146440	11/20/17	Arsenic	2.00	ug/L	U	N	Y	SW-846:6020	2.00
CTUA	CTUA-17-146437	11/28/17	Arsenic	2.04	ug/L	J	Y	Y	SW-846:6020	2.00
CTUA	CTUA-17-146436	12/06/17	Arsenic	2.5	ug/L	J	Y	Y	SW-846:6020	2.00
CTUA	CTUA-17-146447	10/02/17	Iron	30.0	ug/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-17-146446	10/03/17	Iron	30.0	ug/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-17-146448	10/12/17	Iron	30.0	ug/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-17-146444	10/16/17	Iron	30.0	ug/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-17-146445	10/17/17	Iron	30.0	ug/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-17-146441	11/15/17	Iron	30.0	ug/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-17-146440	11/20/17	Iron	30.0	ug/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-17-146437	11/28/17	Iron	30.0	ug/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-17-146436	12/06/17	Iron	30.0	ug/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-17-146447	10/02/17	Manganese	2.00	ug/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-17-146446	10/03/17	Manganese	2.00	ug/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-17-146448	10/12/17	Manganese	2.00	ug/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-17-146444	10/16/17	Manganese	2.09	ug/L	J	Y	Y	SW-846:6010C	2.00
CTUA	CTUA-17-146445	10/17/17	Manganese	2.00	ug/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-17-146441	11/15/17	Manganese	2.00	ug/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-17-146440	11/20/17	Manganese	2.00	ug/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-17-146437	11/28/17	Manganese	2.00	ug/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-17-146436	12/06/17	Manganese	2.00	ug/L	U	N	Y	SW-846:6010C	2.00

Notes:

U - in the lab qualifier column means analyte is classified as not detected.

J - in the lab qualifier comment means the analyte is classified as estimated.

N - in the detect flag column means the analyte was undetected.

Y - in the detect flag column means the analyte was detected.

ENCLOSURE 3

Groundwater Elevation Contour Map –
2017 Quarter 4, DP-1835

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Date: FEB 2 6 2018

ENCLOSURE 3

Explanation of groundwater elevation contour map. The regional aquifer beneath Los Alamos National Laboratory (LANL) is a complex hydrogeological system. The top of the aquifer is predominantly under phreatic (water-table) conditions, including in the area of the chromium plume beneath Mortandad Canyon. Groundwater flow directions and fluxes that control contaminant transport in the aquifer are generally dictated by the shape of the regional water table. The general shape of the regional water table beneath Pajarito Plateau is predominantly controlled by the areas of regional recharge to the west (the flanks of Sierra de los Valles and the Pajarito fault zone) and discharge to the east (the Rio Grande and the White Rock Canyon Springs). At more local scales such as the chromium site, the structure of the regional phreatic flow is also expected to be influenced by (1) local infiltration zones (e.g., beneath canyons); (2) heterogeneity and anisotropy in the aquifer properties; and (3) discharge zones (municipal water-supply wells, springs, and extraction wells within the chromium project area).

At the chromium site, the water-table elevations vary in time as a result of transient effects that include (1) extraction-well pumping in the chromium project area from extraction wells, (2) injection wells, and pumping of Los Alamos County's water-supply wells. The effects of water-supply pumping are very small compared to the local effect that may be caused by extraction and injection at project wells. Furthermore, a long-term water decline of about 0.5-1 ft/yr is observed in the regional water levels throughout the aquifer beneath the Pajarito Plateau. The decline might be caused by long-term changes in the aquifer recharge and discharge conditions.

Because of the long-term declines and pumping transients described above, the water-level data and the respective water-table maps are time dependent and representative of specific periods of time. This water-table map uses the average water-level data for November 2017. The averaged water levels are computed for the well screens near the water table in the chromium project area. Well screens deeper in the aquifer (>~75 ft) such as R-35a, R-44 Screen 2 and R-45 Screen 2 are not included in the analysis. The averaged water levels applied in the contouring process are shown next to each well in Figure E3-1.

The process of water-table contouring is theoretically constrained by conformity rules: (1) the contour lines should be perpendicular to the flowpaths and (2) the length and the width of the flownet cells formed by the contour lines between two adjacent flowpaths should have the same ratios. These rules are theoretically valid only for the case of two-dimensional (lateral) groundwater flow in a uniform, isotropic aquifer with no recharge/discharge sources within flownet cells. Deviations from the conformity rules are caused by three-dimensional flow effects, aquifer heterogeneity and anisotropy as well as groundwater recharge/discharge wells/zones. This water table map, Figure E3-1, is contoured by attempting to satisfy the following goals simultaneously: (1) to match the water-level data at the monitoring wells, (2) to generally preserve flownet conformity, (3) to account for pumping effects, (4) to account for injection effects, and (5) to account for conceptual models of groundwater flow in the regional aquifer. The contouring is performed using a combination of manual and automated techniques; the automated contouring is done using the Minimum Curvature Surface method.

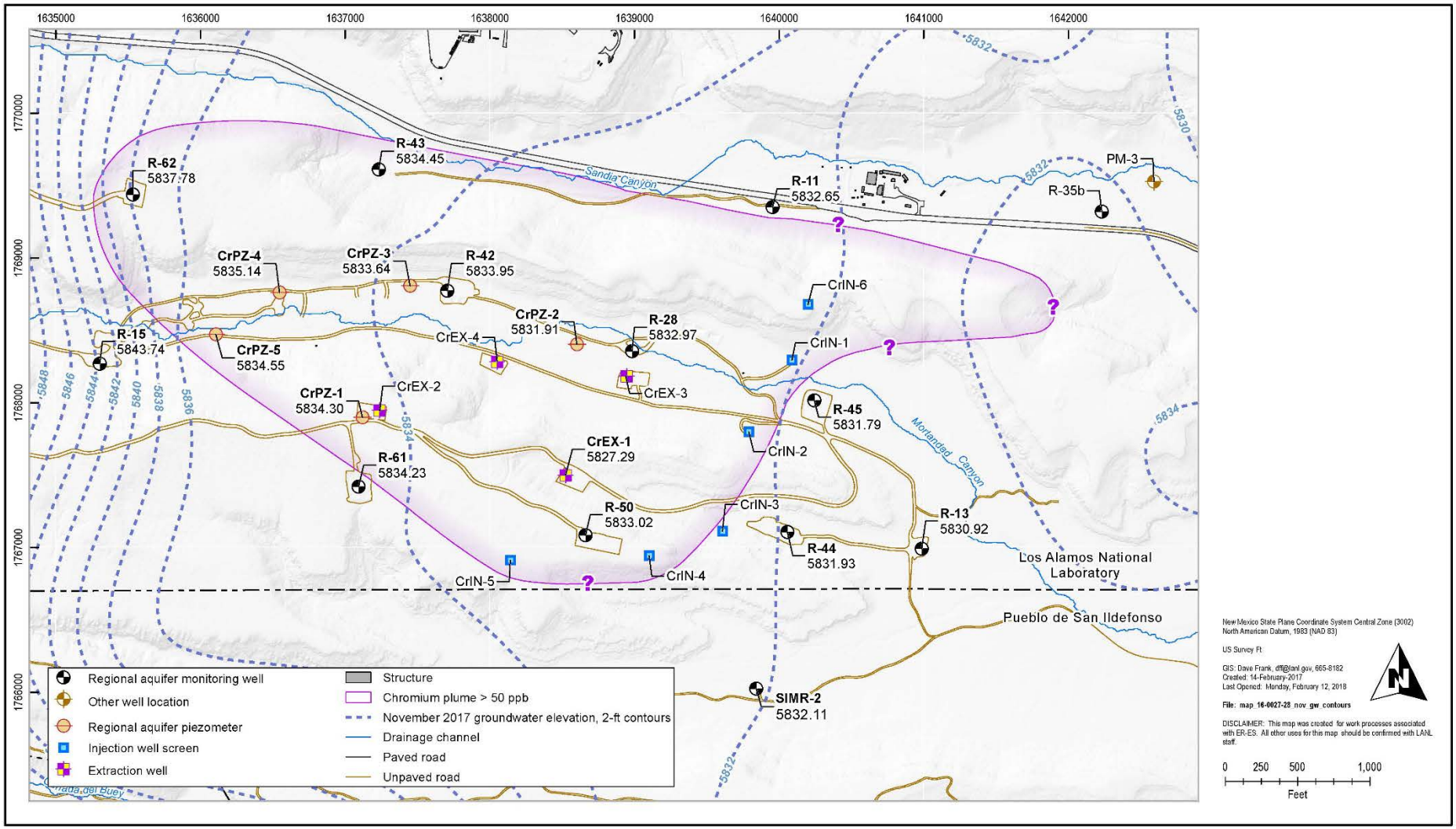
Long-term water-level data suggests that the water table is quite flat in the area of the chromium plume. The low gradient in this area may be related to: (1) the relatively high permeability of Puye Formation and Miocene pumiceous sediments, (2) anisotropy of the regional aquifer, (3) localized aquifer recharge along the canyons above the regional aquifer, (4) faults or other lineaments that affect regional-scale hydraulic conductivity, and (5) nearby water-supply

pumping. Note that observations of transients in the water levels observed at the monitoring wells within the plume (e.g., R-28, R-11, R-36, R-35b, R-42, R-43, and R-50) do not appear to be substantially affected by the water-supply pumping at the nearby production wells (PM-3, PM-5, PM-2, PM-4, and O-4) (LANL 2009, 107453).

During this reporting period functional testing and aquifer testing related to system operation occurred. Specifically, pumping from CrEX-1, CrEX-2, and/or CrEX-3 occurred on intermittently between October 2 through December 15. Injection wells CrIN-1, CrIN-2, CrIN-3, CrIN-4, CrIN-5, and/or CrIN-6 received treated water during the reporting period.

ENCLOSURE 3

Figure E3-1. Groundwater Elevation Contour Map – 2017 Quarter 4, DP-1835



ENCLOSURE 4

Groundwater Monitoring Wells
Analytical Results Summary Table –
2017 Quarter 4, DP-1835

EPC-DO: 18-057

LA-UR-18-20843

U1601822

Date: FEB 2 6 2018

ENCLOSURE 4
Table E4-1

Groundwater Monitoring Wells Analytical Results Summary Table - 2017 Quarter 4, DP1835

Sample	Location ID	Sample Date	Parameter Name	Result	Report Units	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CASA-18-147991	R-11	11-08-2017	Chloride	3.76	mg/L		Y	Y	EPA:300.0	0.2
CASA-18-147991	R-11	11-08-2017	Perchlorate	0.707	ug/L		Y	Y	SW-846:6850	0.2
CASA-18-147991	R-11	11-08-2017	Chromium	10	ug/L		Y	Y	SW-846:6020	10.0
CASA-18-147991	R-11	11-08-2017	Fluoride	0.335	mg/L		Y	Y	EPA:300.0	0.1
CASA-18-147991	R-11	11-08-2017	Nitrate-Nitrite as Nitrogen	5.35	mg/L		Y	Y	EPA:353.2	0.25
CASA-18-147991	R-11	11-08-2017	Sulfate	9.75	mg/L		Y	Y	EPA:300.0	0.4
CASA-18-147991	R-11	11-08-2017	Total Dissolved Solids	180	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-148057	R-13	11-08-2017	Chloride	2.39	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-148057	R-13	11-08-2017	Perchlorate	0.396	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-148057	R-13	11-08-2017	Chromium	4.65	ug/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-148057	R-13	11-08-2017	Fluoride	0.228	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-148057	R-13	11-08-2017	Nitrate-Nitrite as Nitrogen	0.736	mg/L		Y	Y	EPA:353.2	0.05
CAMO-18-148057	R-13	11-08-2017	Sulfate	3.19	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-148057	R-13	11-08-2017	Total Dissolved Solids	144	mg/L		Y	Y	EPA:160.1	14.3
CASA-18-147993	R-43 S1	11-09-2017	Chloride	8.28	mg/L		Y	Y	EPA:300.0	0.2
CASA-18-147993	R-43 S1	11-09-2017	Perchlorate	0.847	ug/L		Y	Y	SW-846:6850	0.2
CASA-18-147993	R-43 S1	11-09-2017	Chromium	178	ug/L		Y	Y	SW-846:6020	10.0
CASA-18-147993	R-43 S1	11-09-2017	Fluoride	0.270	mg/L		Y	Y	EPA:300.0	0.1
CASA-18-147993	R-43 S1	11-09-2017	Nitrate-Nitrite as Nitrogen	5.43	mg/L		Y	Y	EPA:353.2	0.5
CASA-18-147993	R-43 S1	11-09-2017	Sulfate	17.1	mg/L		Y	Y	EPA:300.0	0.4
CASA-18-147993	R-43 S1	11-09-2017	Total Dissolved Solids	157	mg/L		Y	Y	EPA:160.1	14.3
CASA-18-147994	R-43 S2	11-09-2017	Chloride	5.88	mg/L		Y	Y	EPA:300.0	0.2
CASA-18-147994	R-43 S2	11-09-2017	Perchlorate	0.875	ug/L		Y	Y	SW-846:6850	0.2
CASA-18-147994	R-43 S2	11-09-2017	Chromium	17.5	ug/L		Y	Y	SW-846:6020	10.0
CASA-18-147994	R-43 S2	11-09-2017	Fluoride	0.233	mg/L		Y	Y	EPA:300.0	0.1
CASA-18-147994	R-43 S2	11-09-2017	Nitrate-Nitrite as Nitrogen	3.86	mg/L		Y	Y	EPA:353.2	0.5
CASA-18-147994	R-43 S2	11-09-2017	Sulfate	8.78	mg/L		Y	Y	EPA:300.0	0.4
CASA-18-147994	R-43 S2	11-09-2017	Total Dissolved Solids	160	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-147638	R-44 S1	10-30-2017	Chloride	2.39	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-147638	R-44 S1	10-30-2017	Perchlorate	0.406	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-147638	R-44 S1	10-30-2017	Chromium	14.1	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-147638	R-44 S1	10-30-2017	Fluoride	0.246	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-147638	R-44 S1	10-30-2017	Nitrate-Nitrite as Nitrogen	1.08	mg/L		Y	Y	EPA:353.2	0.05
CAMO-18-147638	R-44 S1	10-30-2017	Sulfate	3.35	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-147638	R-44 S1	10-30-2017	Total Dissolved Solids	140	mg/L		Y	Y	EPA:160.1	14.3

ENCLOSURE 4
Table E4-1

Groundwater Monitoring Wells Analytical Results Summary Table - 2017 Quarter 4, DP1835

Sample	Location ID	Sample Date	Parameter Name	Result	Report Units	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CAMO-18-148061	R-44 S1	11-20-2017	Chloride	2.19	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-148061	R-44 S1	11-20-2017	Perchlorate	0.422	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-148061	R-44 S1	11-20-2017	Chromium	15.2	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-148061	R-44 S1	11-20-2017	Fluoride	0.275	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-148061	R-44 S1	11-20-2017	Nitrate-Nitrite as Nitrogen	1.17	mg/L		Y	Y	EPA:353.2	0.05
CAMO-18-148061	R-44 S1	11-20-2017	Sulfate	3.22	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-148061	R-44 S1	11-20-2017	Total Dissolved Solids	141	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-150340	R-44 S1	12-18-2017	Chloride	2.61	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-150340	R-44 S1	12-18-2017	Perchlorate	0.450	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-150340	R-44 S1	12-18-2017	Chromium	14.3	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-150340	R-44 S1	12-18-2017	Fluoride	0.321	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-150340	R-44 S1	12-18-2017	Nitrate-Nitrite as Nitrogen	1.11	mg/L		Y	Y	EPA:353.2	0.25
CAMO-18-150340	R-44 S1	12-18-2017	Sulfate	3.75	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-150340	R-44 S1	12-18-2017	Total Dissolved Solids	98.6	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-147639	R-44 S2	10-30-2017	Chloride	2.32	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-147639	R-44 S2	10-30-2017	Perchlorate	0.346	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-147639	R-44 S2	10-30-2017	Chromium	7.75	ug/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-147639	R-44 S2	10-30-2017	Fluoride	0.250	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-147639	R-44 S2	10-30-2017	Nitrate-Nitrite as Nitrogen	0.717	mg/L		Y	Y	EPA:353.2	0.05
CAMO-18-147639	R-44 S2	10-30-2017	Sulfate	2.71	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-147639	R-44 S2	10-30-2017	Total Dissolved Solids	174	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-148062	R-44 S2	11-20-2017	Chloride	2.08	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-148062	R-44 S2	11-20-2017	Perchlorate	0.339	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-148062	R-44 S2	11-20-2017	Chromium	7.26	ug/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-148062	R-44 S2	11-20-2017	Fluoride	0.268	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-148062	R-44 S2	11-20-2017	Nitrate-Nitrite as Nitrogen	0.725	mg/L		Y	Y	EPA:353.2	0.05
CAMO-18-148062	R-44 S2	11-20-2017	Sulfate	2.52	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-148062	R-44 S2	11-20-2017	Total Dissolved Solids	156	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-150341	R-44 S2	12-18-2017	Chloride	2.52	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-150341	R-44 S2	12-18-2017	Perchlorate	0.379	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-150341	R-44 S2	12-18-2017	Chromium	7.86	ug/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-150341	R-44 S2	12-18-2017	Fluoride	0.310	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-150341	R-44 S2	12-18-2017	Nitrate-Nitrite as Nitrogen	0.794	mg/L		Y	Y	EPA:353.2	0.05
CAMO-18-150341	R-44 S2	12-18-2017	Sulfate	3.01	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-150341	R-44 S2	12-18-2017	Total Dissolved Solids	85.7	mg/L		Y	Y	EPA:160.1	14.3

ENCLOSURE 4
Table E4-1

Groundwater Monitoring Wells Analytical Results Summary Table - 2017 Quarter 4, DP1835

Sample	Location ID	Sample Date	Parameter Name	Result	Report Units	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CAMO-18-147640	R-45 S1	10-31-2017	Chloride	6.10	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-147640	R-45 S1	10-31-2017	Perchlorate	0.588	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-147640	R-45 S1	10-31-2017	Chromium	42.4	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-147640	R-45 S1	10-31-2017	Fluoride	0.223	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-147640	R-45 S1	10-31-2017	Nitrate-Nitrite as Nitrogen	3.15	mg/L		Y	Y	EPA:353.2	0.25
CAMO-18-147640	R-45 S1	10-31-2017	Sulfate	9.20	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-147640	R-45 S1	10-31-2017	Total Dissolved Solids	163	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-148063	R-45 S1	11-20-2017	Chloride	5.37	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-148063	R-45 S1	11-20-2017	Perchlorate	0.515	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-148063	R-45 S1	11-20-2017	Chromium	41.7	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-148063	R-45 S1	11-20-2017	Fluoride	0.252	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-148063	R-45 S1	11-20-2017	Nitrate-Nitrite as Nitrogen	2.99	mg/L		Y	Y	EPA:353.2	0.5
CAMO-18-148063	R-45 S1	11-20-2017	Sulfate	8.47	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-148063	R-45 S1	11-20-2017	Total Dissolved Solids	177	mg/L	H	Y	Y	EPA:160.1	14.3
CAMO-18-150342	R-45 S1	12-18-2017	Chloride	6.70	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-150342	R-45 S1	12-18-2017	Perchlorate	0.642	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-150342	R-45 S1	12-18-2017	Chromium	50.7	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-150342	R-45 S1	12-18-2017	Fluoride	0.326	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-150342	R-45 S1	12-18-2017	Nitrate-Nitrite as Nitrogen	2.91	mg/L		Y	Y	EPA:353.2	0.05
CAMO-18-150342	R-45 S1	12-18-2017	Sulfate	10.2	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-150342	R-45 S1	12-18-2017	Total Dissolved Solids	94.3	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-147641	R-45 S2	10-31-2017	Chloride	6.00	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-147641	R-45 S2	10-31-2017	Perchlorate	0.557	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-147641	R-45 S2	10-31-2017	Chromium	42.3	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-147641	R-45 S2	10-31-2017	Fluoride	0.250	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-147641	R-45 S2	10-31-2017	Nitrate-Nitrite as Nitrogen	3.02	mg/L		Y	Y	EPA:353.2	0.5
CAMO-18-147641	R-45 S2	10-31-2017	Sulfate	9.01	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-147641	R-45 S2	10-31-2017	Total Dissolved Solids	164	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-147681	R-45 S2	10-31-2017	Chloride	6.18	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-147681	R-45 S2	10-31-2017	Perchlorate	0.579	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-147681	R-45 S2	10-31-2017	Chromium	42.5	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-147681	R-45 S2	10-31-2017	Chromium	47.4	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-147681	R-45 S2	10-31-2017	Fluoride	0.276	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-147681	R-45 S2	10-31-2017	Nitrate-Nitrite as Nitrogen	3.01	mg/L		Y	Y	EPA:353.2	0.5
CAMO-18-147681	R-45 S2	10-31-2017	Sulfate	9.25	mg/L		Y	Y	EPA:300.0	0.4

ENCLOSURE 4
Table E4-1

Groundwater Monitoring Wells Analytical Results Summary Table - 2017 Quarter 4, DP1835

Sample	Location ID	Sample Date	Parameter Name	Result	Report Units	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CAMO-18-147681	R-45 S2	10-31-2017	Total Dissolved Solids	156	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-148064	R-45 S2	11-20-2017	Chloride	3.97	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-148064	R-45 S2	11-20-2017	Perchlorate	0.415	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-148064	R-45 S2	11-20-2017	Chromium	25.5	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-148064	R-45 S2	11-20-2017	Fluoride	0.339	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-148064	R-45 S2	11-20-2017	Nitrate-Nitrite as Nitrogen	0.983	mg/L		Y	Y	EPA:353.2	0.05
CAMO-18-148064	R-45 S2	11-20-2017	Sulfate	4.95	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-148064	R-45 S2	11-20-2017	Total Dissolved Solids	180	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-150343	R-45 S2	12-18-2017	Chloride	4.79	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-150343	R-45 S2	12-18-2017	Perchlorate	0.420	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-150343	R-45 S2	12-18-2017	Chromium	25.1	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-150343	R-45 S2	12-18-2017	Fluoride	0.387	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-150343	R-45 S2	12-18-2017	Nitrate-Nitrite as Nitrogen	0.905	mg/L		Y	Y	EPA:353.2	0.25
CAMO-18-150343	R-45 S2	12-18-2017	Sulfate	5.74	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-150343	R-45 S2	12-18-2017	Total Dissolved Solids	133	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-147642	R-50 S1	10-26-2017	Chloride	9.46	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-147642	R-50 S1	10-26-2017	Perchlorate	0.598	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-147642	R-50 S1	10-26-2017	Chromium	150	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-147642	R-50 S1	10-26-2017	Fluoride	0.198	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-147642	R-50 S1	10-26-2017	Nitrate-Nitrite as Nitrogen	2.09	mg/L		Y	Y	EPA:353.2	0.25
CAMO-18-147642	R-50 S1	10-26-2017	Sulfate	13.2	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-147642	R-50 S1	10-26-2017	Total Dissolved Solids	163	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-148065	R-50 S1	11-16-2017	Chloride	9.46	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-148065	R-50 S1	11-16-2017	Perchlorate	0.614	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-148065	R-50 S1	11-16-2017	Chromium	125	ug/L	N	Y	Y	SW-846:6020	10.0
CAMO-18-148065	R-50 S1	11-16-2017	Fluoride	0.206	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-148065	R-50 S1	11-16-2017	Nitrate-Nitrite as Nitrogen	2.02	mg/L		Y	Y	EPA:353.2	0.25
CAMO-18-148065	R-50 S1	11-16-2017	Sulfate	13.5	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-148065	R-50 S1	11-16-2017	Total Dissolved Solids	163	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-150344	R-50 S1	12-14-2017	Chloride	9.80	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-150344	R-50 S1	12-14-2017	Perchlorate	0.613	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-150344	R-50 S1	12-14-2017	Chromium	134	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-150344	R-50 S1	12-14-2017	Fluoride	0.243	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-150344	R-50 S1	12-14-2017	Nitrate-Nitrite as Nitrogen	2.10	mg/L		Y	Y	EPA:353.2	0.25
CAMO-18-150344	R-50 S1	12-14-2017	Sulfate	14.0	mg/L		Y	Y	EPA:300.0	0.4

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Table E4-1

Groundwater Monitoring Wells Analytical Results Summary Table - 2017 Quarter 4, DP1835

Sample	Location ID	Sample Date	Parameter Name	Result	Report Units	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CAMO-18-150344	R-50 S1	12-14-2017	Total Dissolved Solids	153	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-150363	R-50 S1	12-14-2017	Chloride	9.80	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-150363	R-50 S1	12-14-2017	Perchlorate	0.622	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-150363	R-50 S1	12-14-2017	Chromium	136	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-150363	R-50 S1	12-14-2017	Fluoride	0.222	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-150363	R-50 S1	12-14-2017	Nitrate-Nitrite as Nitrogen	2.05	mg/L		Y	Y	EPA:353.2	0.25
CAMO-18-150363	R-50 S1	12-14-2017	Sulfate	14.0	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-150363	R-50 S1	12-14-2017	Total Dissolved Solids	181	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-147643	R-50 S2	10-26-2017	Chloride	2.06	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-147643	R-50 S2	10-26-2017	Perchlorate	0.348	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-147643	R-50 S2	10-26-2017	Chromium	4.89	ug/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-147643	R-50 S2	10-26-2017	Fluoride	0.284	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-147643	R-50 S2	10-26-2017	Nitrate-Nitrite as Nitrogen	0.489	mg/L		Y	Y	EPA:353.2	0.05
CAMO-18-147643	R-50 S2	10-26-2017	Sulfate	2.45	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-147643	R-50 S2	10-26-2017	Total Dissolved Solids	146	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-148066	R-50 S2	11-16-2017	Chloride	2.05	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-148066	R-50 S2	11-16-2017	Perchlorate	0.336	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-148066	R-50 S2	11-16-2017	Chromium	5.06	ug/L	JN	Y	Y	SW-846:6020	10.0
CAMO-18-148066	R-50 S2	11-16-2017	Fluoride	0.258	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-148066	R-50 S2	11-16-2017	Nitrate-Nitrite as Nitrogen	0.498	mg/L		Y	Y	EPA:353.2	0.05
CAMO-18-148066	R-50 S2	11-16-2017	Sulfate	2.58	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-148066	R-50 S2	11-16-2017	Total Dissolved Solids	166	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-150345	R-50 S2	12-14-2017	Chloride	2.08	mg/L		Y	Y	EPA:300.0	0.2
CAMO-18-150345	R-50 S2	12-14-2017	Perchlorate	0.335	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-150345	R-50 S2	12-14-2017	Chromium	4.62	ug/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-150345	R-50 S2	12-14-2017	Fluoride	0.295	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-150345	R-50 S2	12-14-2017	Nitrate-Nitrite as Nitrogen	0.505	mg/L		Y	Y	EPA:353.2	0.05
CAMO-18-150345	R-50 S2	12-14-2017	Sulfate	2.73	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-150345	R-50 S2	12-14-2017	Total Dissolved Solids	139	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-148068	R-62	11-17-2017	Chloride	14.7	mg/L		Y	Y	EPA:300.0	0.4
CAMO-18-148068	R-62	11-17-2017	Perchlorate	0.805	ug/L		Y	Y	SW-846:6850	0.2
CAMO-18-148068	R-62	11-17-2017	Chromium	260	ug/L		Y	Y	SW-846:6020	10.0
CAMO-18-148068	R-62	11-17-2017	Fluoride	0.104	mg/L		Y	Y	EPA:300.0	0.1
CAMO-18-148068	R-62	11-17-2017	Nitrate-Nitrite as Nitrogen	0.0685	mg/L		Y	Y	EPA:353.2	0.05
CAMO-18-148068	R-62	11-17-2017	Sulfate	26.4	mg/L		Y	Y	EPA:300.0	0.8

ENCLOSURE 4
Table E4-1

Groundwater Monitoring Wells Analytical Results Summary Table - 2017 Quarter 4, DP1835

Sample	Location ID	Sample Date	Parameter Name	Result	Report Units	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CAMO-18-148068	R-62	11-17-2017	Total Dissolved Solids	197	mg/L		Y	Y	EPA:160.1	14.3
CAMO-17-142239	SIMR-2[2]	07-31-2017	Chromium	5.79	ug/L		Y	Y	EPA:200.8	-
CAMO-17-141987	SIMR-2[2]	08-08-2018	Chloride	2.15	mg/L		Y	Y	EPA:300.0	0.200
CAMO-17-141987	SIMR-2[2]	08-08-2018	Perchlorate	0.393	ug/L		Y	Y	SW-846:6850	0.200
CAMO-17-141987	SIMR-2[2]	08-08-2018	Chromium	4.53	ug/L	J	Y	Y	SW-846:6020	10.0
CAMO-17-141987	SIMR-2[2]	08-08-2018	Fluoride	0.187	mg/L		Y	Y	EPA:300.0	0.100
CAMO-17-141987	SIMR-2[2]	08-08-2018	Nitrate-Nitrite as Nitrogen	0.675	mg/L		Y	Y	EPA:353.2	0.050
CAMO-17-141987	SIMR-2[2]	08-08-2018	Sulfate	2.85	mg/L		Y	Y	EPA:300.0	0.400
CAMO-17-141987	SIMR-2[2]	08-08-2018	Total Dissolved Solids	141	mg/L		Y	Y	EPA:160.1	14.3
CAMO-17-147713	SIMR-2[2]	09-27-2017	Chromium	3.78	ug/L		Y	Y	EPA:200.8	-
-	SIMR-2[1]	-	-	-	-	-	-	-	-	-

Notes:

[1] Fourth Quarter 2017 data has been collected but is unavailable at the time of this report's preparation in accordance with the Memorandum of Agreement between Pueblo de San Ildefonso and DOE/LANS. This data will be presented in the next quarterly report.

[2] Third Quarter 2017 SIMR-2 data reported here in accordance with DP-1835 Third Quarter 2017 Report (EPC-DO: 17-449). Data was unavailable at the time of that report's preparation in accordance with the Memorandum of Agreement between Pueblo de San Ildefonso and DOE/LANS.

J - in the lab qualifier comment means the analyte is classified as estimated.

H - in the lab qualifier comment means the analytical holding time for the analyte was exceeded.

N - in the lab qualifier comment means the matrix spike sample recovery was not within the specified control limits.

Y - in the detect flag column means the analyte was detected.

Y - in the filtered column means the sample was filtered.

ENCLOSURE 5

Distribution Piping/Initial Mechanical
Integrity Test Results Submittal Letter,
Initial Injection Notification for CrIN-6,
NMED Approval, and Associated Correspondence

EPC-DO: 18-057

LA-UR-18-20843

U1601822

Date: FEB 2 6 2018

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Date: NOV 2 2 2017
Symbol: EPC-DO: 17-465
LA-UR: 17-29978
Locates Action No.: U1601822

GROUND WATER
NOV 22 2017
BUREAU

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Subject: **Integrity Testing of Injection Well CrIN-6 and Distribution Piping from Extraction Wells to Injection Wells, Discharge Permit DP-1835, Class V Underground Injection Control Wells**

Dear Ms. Hunter:

In accordance with Condition No. 3 of Discharge Permit DP-1835, the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) are submitting mechanical integrity test results to the New Mexico Environment Department (NMED) for the Chromium Pipeline and Infrastructure Project. This submittal includes the results for (1) injection well CrIN-6 and (2) the piping from CrEX-1, CrEX-2, and CrEX-3 to the groundwater treatment system and the distribution piping connecting the groundwater system to underground injection wells CrIN-1, CrIN-2, CrIN-3, CrIN-4, and CrIN-5.

Integrity Testing of Injection Wells

Mechanical integrity test methods for the injection wells were submitted to NMED by DOE/LANS on November 10, 2016 (EPC-DO-16-341). Test methods were approved by NMED on November 22, 2016 (email communication, Mr. Greg Huey (NMED) to Mr. Bob Beers (LANS)). The mechanical integrity test results for CrIN-1, CrIN-2, and CrIN-3 were previously submitted to NMED on December 9, 2016 (EPC-DO-16-365). The mechanical integrity test results for CrIN-4 and CrIN-5 on November 15, 2016 (EPC-DO-16-345).

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Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
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1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Subject: **Integrity Testing of Injection Well CrIN-6 and Distribution Piping from Extraction Wells to Injection Wells, Discharge Permit DP-1835, Class V Underground Injection Control Wells**

Dear Ms. Hunter:

In accordance with Condition No. 3 of Discharge Permit DP-1835, the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) are submitting mechanical integrity test results to the New Mexico Environment Department (NMED) for the Chromium Pipeline and Infrastructure Project. This submittal includes the results for (1) injection well CrIN-6 and (2) the piping from CrEX-1, CrEX-2, and CrEX-3 to the groundwater treatment system and the distribution piping connecting the groundwater system to underground injection wells CrIN-1, CrIN-2, CrIN-3, CrIN-4, and CrIN-5.

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The NMED-approved test methods were followed during the mechanical integrity testing at injection well CrIN-6. Video logs and test results are presented below. In addition, Enclosure 1 contains the as-built specifications for CrIN-6.

1. **Video Logging**. The principal reasons for video logging new wells are to (1) ensure the physical integrity and placement of casings and screens and (2) establish a baseline for future evaluations. The video logs are collected following well development and aquifer testing. Generally, they are a final check of the physical construction of the well.

   The condition and set depths of the well casing and screen are inspected. Also available from these videos are static water level, water clarity, condition of the filter pack behind the screen, casing joint condition, and any unusual condition in the sump space. Additional video logging may be performed if an injection/pumping system is removed from the well. The original video log will be used as a comparison to evaluate conditions that may affect water well performance, such as mineral encrustation or biofouling within the well screen interval.

   Enclosure 2 contains the video log (on CD) of injection well CrIN-6.

2. **Column Pipe.** The column pipe for the injection wells is a spline-lock coupling design manufactured by Johnson Screens. Each coupled union (20-ft pipe joints) is a mating pin-and-box with two inner o-rings and two stainless-steel wire-rope splines. The column pipe is tested for leaks during installation because it relies on the precise installation of the o-rings for sealing. Testing of the column pipe is a hydrostatic test that is also, by default, an additional pressure test of the Baski flow-control valve (FCV) and check valve between the FCV and pump shroud. The FCV in the injection well is open (full flow) at zero pressure. To test the column pipe, the FCV must be pressurized to a shut-in condition (zero flow). The column pipe in each injection well is tested three times as the downhole assembly is installed: once early in the process, a second time approximately at the half way point, and a third time when the assembly is fully installed. The FCV is pressurized and the column pipe is filled with potable water. Upon filling to the top, the water level in the column pipe is observed to see if it remains static or if it falls.

   Table 1 provides the results from hydrostatic tests of the column pipe at injection well CrIN-6.

Table 1. Results from Column Pipe and FCV Testing at Injection Well CrIN-6

Test	Date	Pressure	Duration	Result
FCV: initial pressure	7/22/17	160 psi	57 min	pass
Column pipe: hydrostatic #1, 20 ft of pipe above FCV	7/23/17	160 psi	15 min	pass
Column pipe: hydrostatic #2, 520 ft of pipe above FCV	7/23/17	350 psi	35 min	pass
Column pipe: hydrostatic #3, 1020 ft of pipe above FCV	7/24/17	410 psi	55 min	FCV: pass Pipe: fail

3. **FCV Installation and Testing.** Critical to the performance and operational integrity of an injection well is the FCV. The FCV regulates recharge injection flow into the well and provides controlled, noncavitating head loss from the column pipe. Because of the design of the FCV, injected water will enter the wells under significantly reduced pressure and velocity. The FCV is pneumatically adjustable, which will allow flexibility in optimizing flows for particular injection wells. The injection wells may require pumping periodically to prevent and/or remedy well-screen plugging. A submersible pump is installed inside a pump shroud beneath the FCV. A check valve is installed between the FCV and pump to allow pumping with a single column pipe when the FCV is shut-in (closed).

   Pressure testing of the FCVs at injection well CrIN-6 was conducted per the manufacturer's installation guidance. Testing is conducted to confirm the connections at the control line to FCV fittings and the FCV liquid inflation chamber and inflatable element. The FCVs are new equipment and are thoroughly tested by the manufacturer before shipping.

   Table 1 provides the results from testing the FCV at injection well CrIN-6.

   The final hydrostatic test of the column pipe at CrIN-6 demonstrated a slow leak. The water level in the pipe was observed for several days and eventually fell to the static water level in the well. It is believed that the single check valve located below the FCV in the system was disturbed and became unseated because the column pipe passed previous tests and the water level inside the pipe fell to a level below previously tested joints. The submersible pump was tested and operated on its performance curve indicating no significant leak. Results of the installation testing do not compromise the functionality of the injection system or well. The injection/pumping system in CrIN-6 will be monitored to assess whether a problem exists that warrants removing the system.

Integrity Testing of Distribution Piping

On October 14, 2016 DOE/LANS submitted a mechanical integrity test method to NMED for the Chromium Pipeline and Infrastructure Project (EPC-DO-16-299). NMED approved the test method on October 17, 2016. Results for the piping from CrEX-1 to the groundwater treatment system and for the distribution piping from the groundwater treatment system to CrIN-4 and CrIN-5 were submitted to NMED on November 15, 2016 (EPC-DO-16-345). Additional results for the pipelines connecting extraction wells CrEX-1, CrEX-2, and CrEX-3 to the groundwater treatment system and the distribution piping connecting the groundwater treatment system with injection wells CrIN-1, CrIN-2, CrIN-3, CrIN-4 and CrIN-5 were submitted to NMED on August 28, 2017 (EPC-DO: 17-302).

DOE/LANS has completed integrity testing of additional segments of piping in accordance with the NMED-approved test methods for the: high-density polyethylene (HDPE) pipelines connecting extraction wells CrEX-1, CrEX-2, and CrEX-3 to the groundwater treatment system and for the distribution piping connecting the groundwater treatment system with injection wells CrIN-1, CrIN-2, CrIN-3, CrIN-4, CrIN-5, and CrIN-6 which were not included in either the November 15, 2016 or the August 28, 2017 submittals. Enclosure 3 provides a cross-reference of the integrity testing completed to date. Enclosure 4 contains the inspection reports (on CD) of these tests. All test results demonstrated satisfactory pipe integrity per the specified test method.

Please contact William J. Foley by telephone at (505) 665-8423 or by email at bfoley@lanl.gov if you have questions regarding this information.

Sincerely,

John C. Bretzke
Division Leader

Sincerely,

Cheryl L. Rodriguez
Program Manager, FPD-II

JCB/CLR/MTS/WJF:am

Enclosure(s):

1) As-Built Specifications for CrIN-6
2) Video logs (CD) From Injection Well CrIN-6 (upon request)
3) Summary Table of Distribution Piping Integrity Test Results
4) Distribution Piping Integrity Test Results (CD) for Pipelines Connecting Extraction Wells With Injection Wells (upon request)

Copy: Shelly Lemon, NMED/SWQB, Santa Fe, NM, (E-File)
John E. Kieling, NMED/HWB, Santa Fe, NM, (E-File)
Stephen M. Yanicak, NMED/DOE/OB, (E-File)
Steve Pullen, NMED/GWQB, Santa Fe, NM, (E-File)
Douglas E. Hintze, EM-LA, (E-File)
David S. Rhodes, EM-LA, (E-File)
Cheryl L. Rodriguez, EM-LA, (E-File)
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Enrique Torres, ADEM, (E-File)
Bruce Robinson, ADEM-PO, (E-File)
Stephani F. Swickley, ADEM-PO, (E-File)
Danny Katzman, ADEM-PO, (E-File)
Michael T. Saladen, EPC-CP, (E-File)
Robert S. Beers, EPC-CP, (E-File)
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Date: SEP 2 2 2016
Symbol: EPC-DO: 17-372
LA-UR: 17-28304
Locates Action No.: U1601822

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Subject: **Notification of Commencement of Injection at CrIN-6, Discharge Permit DP-1835, Class V Underground Injection Control Wells**

Dear Ms. Hunter:

In accordance with Condition No. 4 of Discharge Permit DP-1835, the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) are providing notification to the New Mexico Environment Department (NMED) that the discharge of treated groundwater to injection well CrIN-6 will commence on or after September 25, 2017 as part of a system-wide functional testing that also includes injection into injection wells CrIN-1, -2, -3, -4 and -5. DOE/LANS will follow with an email notification to NMED 24 hrs before the initial injection.

The following information is being provided in accordance with our September 13, 2017 meeting and addresses several conditions in NMED's September 1, 2017 correspondence to DOE/LANS related to the initial discharge to injection well CrIN-6:

- Functional testing will be conducted to test both individual components and wells in the extraction-treatment-injection system, and system-scale extraction-treatment-injection utilizing three extraction wells and six injection wells in various configurations. Functional testing will involve discharge of only treated water into the injection wells.

- The initial discharge to CrIN-6 will be conducted solely as part of the functional testing described above. The exact duration and discharge rate of functional testing in CrIN-6 is not known, but an estimated upper volume limit of discharge specifically into CrIN-6 will be approximately 230,000 gallons.

- The limited duration and volume of discharge into CrIN-6 for functional testing does not constitute full-scale injection of treated groundwater.

As discussed during the September 13, 2017 meeting, DOE/LANS requests approval from NMED for inclusion of CrIN-6 in the functional testing of the extraction/injection system. Please contact William J. Foley by telephone at (505) 665-8423 or by email at bfoley@lanl.gov if you have questions regarding this information.

Sincerely,

John C. Bretzke
Division Leader

Sincerely,

Cheryl L. Rodriguez
Program Manager, FPD-II

JCB/CLR/MTS/WJF:am

Copy: Shelly Lemon, NMED/SWQB, Santa Fe, NM, (E-File)
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Danny Katzman, ADEM-PO, (E-File)
G. Fordham, ER-ES, (E-File)
Michael T. Saladen, EPC-CP, (E-File)
Robert S. Beers, EPC-CP, (E-File)
William J. Foley, EPC-CP, (E-File)

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GROUND WATER
SEP 22 2017
BUREAU

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Subject: **Notification of Commencement of Injection at CrIN-6, Discharge Permit DP-1835, Class V Underground Injection Control Wells**

Dear Ms. Hunter:

In accordance with Condition No. 4 of Discharge Permit DP-1835, the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) are providing notification to the New Mexico Environment Department (NMED) that the discharge of treated groundwater to injection well CrIN-6 will commence on or after September 25, 2017 as part of a system-wide functional testing that also includes injection into injection wells CrIN-1, -2, -3, -4 and -5. DOE/LANS will follow with an email notification to NMED 24 hrs before the initial injection.

The following information is being provided in accordance with our September 13, 2017 meeting and addresses several conditions in NMED's September 1, 2017 correspondence to DOE/LANS related to the initial discharge to injection well CrIN-6:

- Functional testing will be conducted to test both individual components and wells in the extraction-treatment-injection system, and system-scale extraction-treatment-injection utilizing three extraction wells and six injection wells in various configurations. Functional testing will involve discharge of only treated water into the injection wells.

From:	Foley, William Joseph
To:	Steve Pullen; Michelle Hunter
Cc:	Rhodes, David; Rodriguez, Cheryl; Swickley, Stephani Fuller; Katzman, Danny; Saladen, Michael Thomas; Beers, Bob; Garcia, Gary A
Subject:	Discharge Permit DP-1835: Notification of commencement of discharge from CrEX-1, CrEX-2, and CrEX-3 to injection wells CrIN-1, CrIN-2, CrIN-3, CrIN-4 and CrIN-5
Date:	Friday, September 1, 2017 7:50:00 AM

Dear Mr. Pullen and Ms. Hunter,

The U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) will begin discharging into injection wells CrIN-1, CrIN-2, and CrIN-3 on or after September 5, 2017 under Discharge Permit DP-1835. The initial discharge will be related to functional testing of the extraction, treatment and injection system. In accordance, with our July 13, 2017 correspondence (EPC-DO-17-264) we are providing NMED with email notification 24 hrs prior to commencing discharge. This notification is for injection of treated groundwater from extraction wells CrEX-1, CrEX-2, and CrEX-3 into injection wells CrIN-1, CrIN-2, CrIN-3, CrIN-4 and CrIN-5.

Please do not hesitate to contact me if you have questions regarding this notification.

Sincerely,

William Foley
Los Alamos National Security, LLC
505-665-8423

SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau
1190 South St. Francis Drive (87505)
P.O. Box 5469, Santa Fe, New Mexico 87502-5469
Phone (505) 827-2900 Fax (505) 827-2965
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BUTCH TONGATE
Cabinet Secretary

J.C. BORREGO
Deputy Secretary

September 1, 2017

John C. Bretzke, Division Leader
Environmental and Compliance Division
Los Alamos National Laboratory
PO Box 1663, K491
Los Alamos, NM 87545

Cheryl L. Rodriguez, Program Manager,
FPD-II
Environmental Management
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, NM 87544

RE: LANL, DP-1835, Notification to Temporarily Limit Injection into CrIN-1 and CrIN-6

Dear Mr. Bretzke and Ms. Rodriguez,

On December 13, 2016, the United States Department of Energy (DOE) and Los Alamos National Security, LLC (LANS) (collectively the Permittees) submitted the *Drilling Work Plan for Groundwater Injection Well CrIN-6* (Work Plan), proposing a new location for CrIN-6 with the stated purpose of achieving hydraulic control of off-site plume migration. Prior to implementing this Work Plan by injecting treated groundwater in to CrIN-6, the New Mexico Environment Department (NMED) requires the Permittees provide justification for this action by addressing, at a minimum, recent NMED sampling results collected at CrIN-6 indicating chromium contamination at 270 µg/L and the potential that injection into CrIN-6, in conjunction with injection at the nearby injection well CrIN-1, would accelerate the uncontrolled migration of chromium contamination in the regional drinking-water aquifer.

The Permittees' method of achieving hydraulic control of the chromium plume is to strategically pump groundwater from an extraction well and to inject treated groundwater into injection wells located along the downgradient margin of the plume as defined by the 50 µg/L New Mexico groundwater standard for the constituent.

On August 31, 2016, NMED issued Discharge Permit 1835 (DP-1835) to the Permittees. NMED's purpose in issuing DP-1835 is to control injection of effluent via six Class V Underground Injection Control (UIC) wells into the regional aquifer beneath Los Alamos National Laboratory (LANL) to protect and preserve groundwater. Condition 2 states that the Permittees shall operate in a manner such that the standards and requirements of Sections 20.6.2.3101 and 20.6.2.3103

NMAC are not violated. Subsection A(2) of 20.6.2.3101 NMAC states in-part that the purpose of Sections 20.6.2.3000 through 20.6.2.3114 NMAC is to ensure that no degradation of the groundwater beyond the existing concentration will be allowed.

NMED would consider any action that knowingly and intentionally causes the migration of groundwater contaminated above New Mexico groundwater standards to an area with lesser concentrations to be a violation of the Permittees' groundwater discharge permit.

Recent analytical results obtained by NMED and data provided by the Permittees for CrIN-6 indicate a significant change in the understanding of groundwater flow and contaminant transport in the vicinity of CrIN-6. The NMED analytical results reveal that the chromium concentration associated with the CrIN-6 at the time of sampling was 270 µg/L, significantly exceeding 20.6.2.3103 NMAC groundwater standards and contrary to expectations as depicted in the Permittees' 2016 Work Plan.

NMED is concerned that injection of treated groundwater into CrIN-6 has the potential to exacerbate the degradation of groundwaters in violation of DP-1835. NMED considers it probable that the increased hydraulic gradient resulting from the injection into CrIN-6 will result in an accelerated eastward migration of the chromium plume and may drive contamination downward to deeper non-impacted hydrostratigraphic units within the regional aquifer. Another concern is that the vertical and lateral extent of chromium contamination surrounding CrIN-6 is unknown. NMED has similar concerns regarding injection into CrIN-1 located less than 500 feet south-southwest of CrIN-6.

Prior to full-scale injection of treated water into CrIN-1 and CrIN-6, NMED requires that the Permittees provide additional hydraulic and chemical data on the associated portion of the regional aquifer, and information demonstrating that injection into these wells will not have an adverse impact on the vertical and downgradient horizontal extents of chromium contamination. The demonstration shall include a delineation of the eastern and vertical extents of the 50 µg/L chromium concentration within the plume and sufficient hydrogeological and geochemical information to allow a reasonably accurate prediction of the impact that injection into CrIN-6 and CrIN-1 will have on the chromium plume. Initial discharge related to the functional testing of CrIN-1 is permissible.

Please contact Steve Pullen at (505) 827-2962 if you require any additional information.

Sincerely,

Michelle Hunter, Chief
Ground Water Quality Bureau

MH:SP

cc (electronic): John Kieling, NMED-HWB
Michael Dale, NMED-HWB
Steve Yanicak, NMED-DOEOB
Bruce Yurdin, NMED-WPD
Robert Italiano, NMED-DII
Steve Pullen, NMED-GWQB
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David Rhodes, SOE-EM-LA (david.rhodes@em.doe.gov)
Stephanie Swickley, ADEM ER Program (sfuller@lanl.gov)
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read file
DP-1835 file

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P.O. Box 26110
Santa Fe, NM 87502

Subject: **Notification of Commencement of Injection at CrIN-6, Discharge Permit DP-1835, Class V Underground Injection Control Wells**

Dear Ms. Hunter:

In accordance with Condition No. 4 of Discharge Permit DP-1835, the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) are providing notification to the New Mexico Environment Department (NMED) that the discharge of treated groundwater to injection well CrIN-6 will commence on or after September 25, 2017 as part of a system-wide functional testing that also includes injection into injection wells CrIN-1, -2, -3, -4 and -5. DOE/LANS will follow with an email notification to NMED 24 hrs before the initial injection.

The following information is being provided in accordance with our September 13, 2017 meeting and addresses several conditions in NMED's September 1, 2017 correspondence to DOE/LANS related to the initial discharge to injection well CrIN-6:

- Functional testing will be conducted to test both individual components and wells in the extraction-treatment-injection system, and system-scale extraction-treatment-injection utilizing three extraction wells and six injection wells in various configurations. Functional testing will involve discharge of only treated water into the injection wells.

- The initial discharge to CrIN-6 will be conducted solely as part of the functional testing described above. The exact duration and discharge rate of functional testing in CrIN-6 is not known, but an estimated upper volume limit of discharge specifically into CrIN-6 will be approximately 230,000 gallons.

- The limited duration and volume of discharge into CrIN-6 for functional testing does not constitute full-scale injection of treated groundwater.

As discussed during the September 13, 2017 meeting, DOE/LANS requests approval from NMED for inclusion of CrIN-6 in the functional testing of the extraction/injection system. Please contact William J. Foley by telephone at (505) 665-8423 or by email at bfoley@lanl.gov if you have questions regarding this information.

Sincerely,

John C. Bretzke
Division Leader

Sincerely,

Cheryl L. Rodriguez
Program Manager, FPD-II

JCB/CLR/MTS/WJF:am

Copy: Shelly Lemon, NMED/SWQB, Santa Fe, NM, (E-File)
John E. Kieling, NMED/HWB, Santa Fe, NM, (E-File)
Stephen M. Yanicak, NMED/DOE/OB, (E-File)
Steve Pullen, NMED/SWQB, Santa Fe, NM, (E-File)
Douglas E. Hintze, EM-LA, (E-File)
David S. Rhodes, EM-LA, (E-File)
Dave Nickless, EM-LA, (E-File)
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Date: SEP 2 2 2016
Symbol: EPC-DO: 17-372
LA-UR: 17-28304
Locates Action No.: U1601822

GROUND WATER
SEP 22 2017
BUREAU

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Subject: **Notification of Commencement of Injection at CrIN-6, Discharge Permit DP-1835, Class V Underground Injection Control Wells**

Dear Ms. Hunter:

In accordance with Condition No. 4 of Discharge Permit DP-1835, the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) are providing notification to the New Mexico Environment Department (NMED) that the discharge of treated groundwater to injection well CrIN-6 will commence on or after September 25, 2017 as part of a system-wide functional testing that also includes injection into injection wells CrIN-1, -2, -3, -4 and -5. DOE/LANS will follow with an email notification to NMED 24 hrs before the initial injection.

The following information is being provided in accordance with our September 13, 2017 meeting and addresses several conditions in NMED's September 1, 2017 correspondence to DOE/LANS related to the initial discharge to injection well CrIN-6:

- Functional testing will be conducted to test both individual components and wells in the extraction-treatment-injection system, and system-scale extraction-treatment-injection utilizing three extraction wells and six injection wells in various configurations. Functional testing will involve discharge of only treated water into the injection wells.

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ENVIRONMENT DEPARTMENT

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BUTCH TONGATE
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J.C. BORREGO
Deputy Secretary

September 25, 2017

John C. Bretzke, Division Leader
Environmental and Compliance Division
Los Alamos National Laboratory
PO Box 1663, K491
Los Alamos, NM 87545

Cheryl L. Rodriguez, Program Manager,
FPD-II
Environmental Management
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, NM 87544

RE: NMED Response - Notification of Commencement of Injection at CrIN-6, Discharge Permit DP-1835, Class V Underground Injection Control Wells

Dear Mr. Bretzke and Ms. Rodriguez,

On September 22, 2017, the United States Department of Energy (DOE) and Los Alamos National Security, LLC (LANS) (collectively the Permittees) submitted to the New Mexico Environment Department (NMED) a notification of commencement of injection at CrIN-6 (Notification). The Notification is submitted in accordance with Condition No. 4 of Discharge Permit DP-1835. The Notification states that the discharge of treated groundwater to injection well CrIN-6 will commence on or after September 25, 2017, as part of a system-wide "functional" test that also includes injection into injection wells CrIN-1, -2, -3, -4 and -5. The Notification requests approval from NMED for inclusion of CrIN-6 in the functional testing of the extraction/injection system. Notifications of commencement of injection at CrINs 1, 2 and 3 occurred on July 13, 2017, and for CrINs 4 and 5 on November 3, 2016. Injection into six wells was originally proposed by the Permittees in an Interim Measures Work Plan for Chromium Plume Control (Work Plan) dated May 26, 2015.

The Notification describes functional testing as a test of both individual components and wells in the extraction-treatment-injection system and system-scale extraction-treatment-injection utilizing three extraction wells and six injection wells in various configurations. This functional test has been described as a short-term, small-volume test, tantamount to a test-drive, and the Notification specifies that the initial discharge to CrIN-6 will be limited to an upper volume limit of 230,000 gallons.

NMED notified the Permittees of its concerns regarding injection into CrIN-6 in correspondence dated September 1, 2017. Among those concerns is that full-scale injection into wells CrIN-1 and CrIN-6 has the potential to exacerbate the degradation of groundwater quality in violation of DP-1835. NMED's correspondence required that prior to full-scale injection into CrIN-1 and CrIN-6 the Permittees are to provide the agency additional hydraulic and chemical data on the associated portion of the regional aquifer.

NMED acknowledges that the Permittees' Notification is for functional testing of the extraction-treatment-injection system, that the proposed injection is not a full-scale implementation of the Work Plan, and that the proposed injection into CrIN-6 is not contrary to NMED's September 1, 2017, correspondence. NMED understands that after the completion of functional testing the Permittees will submit an operational and hydraulic test work plan to NMED that will fully describe how the operational and hydraulic testing is anticipated to further the understanding of the characteristics of the injection wells (how each accepts water), including CrIN-6, and how testing should provide an overall technical and operational path forward that will adequately address key technical uncertainties. For these reasons NMED approves injection into all wells, including CrIN-6, for the purposes of functional testing.

NMED would like to express its appreciation to the Permittees for their aggressive actions towards achieving the plume control objective of Chromium Interim Measure.

Please contact Steve Pullen at (505) 827-2962 if you require any additional information.

Sincerely,

Michelle Hunter, Chief
Ground Water Quality Bureau

MH:SP

cc (electronic): John Kieling, NMED-HWB
Michael Dale, NMED-HWB
Robert Murphy, NMED-HWB
Steve Yanicak, NMED-DOEOB
Bruce Yurdin, NMED-WPD
Robert Italiano, NMED-DII
Patrick Longmire, NMED-GWQB
Steve Pullen, NMED-GWQB
Bruce Robinson, ADEM ER Program (robinson@lanl.gov)
David Rhodes, SOE-EM-LA (david.rhodes@em.doe.gov)
Stephanie Swickley, ADEM ER Program (sfuller@lanl.gov)
Bob Beers, LANS (bbeers@lanl.gov)
Danny Katzman, LANS, (katzman@lanl.gov)

read file
DP-1835 file

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Date: OCT 19 2017
Symbol: EPC-DO: 17-392
LA-UR: 17-28466
Locates Action No.: U1601822

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Subject: **Path Forward in Response to NMED's September 1, 2017 Notification to Temporarily Limit Injection into CrIN-1 and CrIN-6, Discharge Permit DP-1835**

Dear Ms. Hunter:

In July 2017, injection well CrIN-6 was installed under Discharge Permit (DP)-1835 and the Chromium Plume Control Interim Measure, approved by the New Mexico Environment Department (NMED) with modification October 15, 2015 and Drilling Work Plan for Groundwater Injection Well CrIN-6 approved by NMED January 4, 2017. Groundwater samples collected from CrIN-6 indicate chromium concentrations around 270 parts per billion. Following receipt of the CrIN-6 chromium data, a technical meeting was held on August 21, 2017 with your staff and staff from the NMED Hazardous Waste Bureau during which a path forward for evaluating CrIN-6 was discussed. Department of Energy and Los Alamos National Security (DOE/LANS) staff committed in that meeting that no injection would occur in CrIN-6 until additional information had been collected, evaluated, and discussed with NMED.

On September 1, 2017, DOE/LANS received a letter from the NMED, *LANL, DP-1835, Notification to Temporarily Limit Injection into CrIN-1 and CrIN-6* (Enclosure 1). Subsequently, on September 13, 2017, DOE/LANS staff met with NMED staff to discuss content of the above-referenced letter and propose a path forward. As expressed in this meeting, as well as the August 21st meeting, DOE/LANS fully understand and agree that prior to full-scale injection of treated water into CrIN-6, the Laboratory will conduct a thorough technical evaluation and present the findings to NMED for review. The evaluation will help address whether the standards and requirements of DP-1835 and the objectives of the Interim Measure

for plume control will be met and ensure that groundwater will be protected. A similar evaluation was conducted by the Laboratory and approved by NMED for CrIN-4 and CrIN-5 prior to their operation.

On September 25, 2017, the NMED GWB approved DOE/LANS' September 22, 2017 startup notification under DP-1835 for 72-hr functional testing in CrIN-6. The notification and approval allow limited injection of no greater than 230,000 gal into CrIN-6 as part of functional testing that will also include injection into CrIN-1, 2, 3, 4, and 5. In addition to the functional testing, DOE/LANS intend to conduct an aquifer test involving continuous extraction and sampling at CrIN-6. This aquifer test at CrIN-6 will occur for 7-10 days. Treated water from the aquifer test will be dispositioned in accordance with Work Plan #5 under DP-1793. The goal is to conduct both the functional testing and the extraction testing in the late October or early November timeframe. Restrictions under DP-1793 could dictate fewer days of extraction because land application is prohibited during freezing temperatures.

As discussed in the August 21, 2017 meeting and in several meetings with NMED staff since that time, following the aquifer test involving extraction at CrIN-6, DOE/LANS will then begin operational and hydraulic testing on the full extraction and injection system, including CrIN-6. The operational and hydraulic testing is of limited duration and is not expected to exceed 10 days of injection into any injection well. The test will be configured in a manner that provides information on injection hydraulics of individual wells for future operational purposes, and hydraulic information for the aquifer surrounding injection locations for the purpose of optimizing full-scale operational approaches for plume control.

Data from these tests will be used to improve site groundwater models, particularly in the vicinity of CrIN-6. The models would then be used to support the evaluation required in NMED's September 1, 2017 letter of whether full-scale injection into CrIN-6 and CrIN-1 will have an adverse impact on the vertical and downgradient horizontal extent of chromium contamination. Similar to functional testing, the short-term operational and hydraulic testing described above does not constitute full-scale injection into CrIN-6 and CrIN-1 and is, therefore, acceptable under the terms of NMED's September 1, 2017 letter.

DOE/LANS also emphasized in the September 13th meeting, and subsequent September 28, 2017 meeting, the priority and need to continue operation of the interim measure at the Laboratory boundary with the Pueblo de San Ildefonso using CrIN-3, CrIN-4, and CrIN-5. All parties agreed that the interim measure is a priority and that NMED's September 1st letter did not have implications on operation of CrIN-3, CrIN-4, and CrIN-5 for the interim measure.

DOE/LANS anticipate having a recommendation on the path forward for CrIN-6 and CrIN-1 as well as the need for additional delineation of the extent of chromium contamination by February 28, 2018. No full-scale injection will occur in CrIN-6 and CrIN-1 following the short-term operational and hydraulic testing, and is unlikely to occur in CrIN-2, until NMED GWQB has approved the recommendation.

Please contact William J. Foley by telephone at (505) 665-8423 or by email at bfoley@lanl.gov, or Cheryl Rodriguez by telephone (505) 665-5330 or by email at cheryl.rodriguez@em.doe.gov if you have questions.

Sincerely,

John C. Bretzke
Division Leader

Sincerely,

Cheryl L. Rodriguez
Program Manager, FPD-II

JCB/CLR/MTS/WJF:am

Copy: Shelly Lemon, NMED/SWQB, Santa Fe, NM, (E-File)
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Date: OCT 19 2017
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Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

GROUND WATER
OCT 19 2017
BUREAU

Subject: **Path Forward in Response to NMED's September 1, 2017 Notification to Temporarily Limit Injection into CrIN-1 and CrIN-6, Discharge Permit DP-1835**

Dear Ms. Hunter:

In July 2017, injection well CrIN-6 was installed under Discharge Permit (DP)-1835 and the Chromium Plume Control Interim Measure, approved by the New Mexico Environment Department (NMED) with modification October 15, 2015 and Drilling Work Plan for Groundwater Injection Well CrIN-6 approved by NMED January 4, 2017. Groundwater samples collected from CrIN-6 indicate chromium concentrations around 270 parts per billion. Following receipt of the CrIN-6 chromium data, a technical meeting was held on August 21, 2017 with your staff and staff from the NMED Hazardous Waste Bureau during which a path forward for evaluating CrIN-6 was discussed. Department of Energy and Los Alamos National Security (DOE/LANS) staff committed in that meeting that no injection would occur in CrIN-6 until additional information had been collected, evaluated, and discussed with NMED.

On September 1, 2017, DOE/LANS received a letter from the NMED, *LANL, DP-1835, Notification to Temporarily Limit Injection into CrIN-1 and CrIN-6* (Enclosure 1). Subsequently, on September 13, 2017, DOE/LANS staff met with NMED staff to discuss content of the above-referenced letter and propose a path forward. As expressed in this meeting, as well as the August 21st meeting, DOE/LANS fully understand and agree that prior to full-scale injection of treated water into CrIN-6, the Laboratory will conduct a thorough technical evaluation and present the findings to NMED for review. The evaluation will help address whether the standards and requirements of DP-1835 and the objectives of the Interim Measure

From:	Foley, William Joseph
To:	Steve Pullen; Michelle Hunter
Cc:	Rhodes, David; Rodriguez, Cheryl; Swickley, Stephani Fuller; Katzman, Danny; Saladen, Michael Thomas; Beers, Bob; Garcia, Gary A
Subject:	Discharge Permit DP-1835: Notification of commencement of discharge to injection well CrIN-6
Date:	Wednesday, October 25, 2017 4:12:00 PM

Dear Mr. Pullen and Ms. Hunter,

The U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) will begin discharging into injection well CrIN-6 on or after October 27, 2017 under Discharge Permit DP-1835. The initial discharge will be related to functional testing of the extraction, treatment and injection system as it relates to this well. In accordance, with our September 22, 2017 correspondence (EPC-DO-17-372) and approved by NMED on September 25, 2017, we are providing NMED with email notification 24 hrs prior to commencing discharge.

Please do not hesitate to contact me if you have questions regarding this notification.

Sincerely,

William Foley
Los Alamos National Security, LLC
505-665-8423

State of New Mexico
ENVIRONMENT DEPARTMENT

Office of the Secretary

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Governor

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Lieutenant Governor

BUTCH TONGATE
Cabinet Secretary

J. C. BORREGO
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

November 21, 2017

Doug Hintze, Manager
U.S. Department of Energy
EM-Los Alamos Field Office
LANL MS-M984
P.O. Box 1663
Los Alamos, NM 87545-1663

Bruce Robinson
Program Director
Environmental Remediation Associate
Los Alamos National Laboratory
P.O. Box 1663, MS M991
Los Alamos, NM 87545

RE: PATH FORWARD IN RESPONSE TO NMED'S SEPTEMBER 1, 2017 NOTIFICATION TO TEMPORARILY LIMIT INJECTION INTO CrIN-1 AND CrIN-6, DISCHARGE PERMIT DP-1835
EPA ID#NM0890010515
HWB-LANL-MISC

Dear Messrs. Hintze and Robinson:

The New Mexico Environment Department ("NMED") has received the United States Department of Energy ("DOE") and the Los Alamos National Security L.L.C.'s ("LANS") (collectively, the "Permittees") correspondence titled *Path Forward in Response to NMED's September 1, 2017 Notification to Temporarily Limit Injection into CrIN-1 and CrIN-6, Discharge Permit DP-1835* ("Response") dated October 19, 2017 and referenced by LA-UR-17-28466. The Permittees' Response addresses the injection of treated water into the regional aquifer as part of the Permittees' planned functional and operational test of the interim measure ("IM") well system. NMED has reviewed the Permittees' Response and provides the following for clarification and contextual purposes, in relation to the IM for the chromium plume, and also provides the Permittees direction specific to the Permittees' planned operational testing and associated 10-day (maximum) injection at CrIN-6.

The NMED Ground Water Quality Bureau ("GWQB") Discharge Permit 1835 ("DP-1835") allows for the discharge of pumped and treated water into the regional aquifer through up to six Class V Underground Injection Control ("UIC") wells at Los Alamos National Laboratory ("LANL") in support of the IM for the chromium plume. The IM is addressed in the 2016 Compliance Order on Consent ("Consent Order") between DOE and NMED that is implemented and enforced by NMED's Hazardous Waste Bureau ("HWB"). The Permittees' submitted an *Interim Measures Work Plan for Chromium Plume Control* ("IM Work Plan") to NMED's HWB on May 26, 2015. NMED approved the IM Work Plan on October 15, 2015. The Permittees submitted the *Drilling Work Plan for Groundwater Injection Well CrIN-6* ("CrIN-6 Drilling Work Plan") on December 13, 2016. The CrIN-6 Drilling Work Plan was approved by NMED on January 4, 2017. The installation of CrIN-6 was completed in July 2017. At the conclusion of aquifer testing at CrIN-6, chromium concentrations ranged from 250 to 270 ppb.

On September 28, 2017, the Permittees met with GWQB and HWB staff to present their proposed operational-test work plan consisting of four test activities including one 5-day pumping test at CrIN-6 and three extraction, treat and re-injection scenarios. The three test-activity scenarios include extraction at the three CrEX wells with concurrent injection at select CrIN wells. NMED concurs with the Permittees proposed plan with the exception of injection at CrIN-6. Given the uncertainties in the vertical and horizontal extent of chromium contamination associated with CrIN-6 and the lack of adequate knowledge concerning the groundwater-flow regime surrounding and downgradient of CrIN-6, postponing operational injection testing at CrIN-6 is the most responsible path forward. The Permittees should submit an updated model as well as submit the following information: 1) all numerical modeling input parameters, including uncertainties and technical defensibility, along with modeling results (i.e., predictions), that reflect new data inputs, including data inputs from CrIN-1 and CrIN-6, through July 2017; 2) model-based particle tracking analyses and results specific to short-duration hydraulic flooding at CrIN-6; and 3) capture-zone delineations for CrIN-6 by **March 30, 2018**. More robust characterization of the plume and the associated hydrology in the area around CrIN-6 along with updated modeling predictions, particle tracking, etc., will provide NMED and the Permittees a better understanding of what effect operational-test injection at CrIN-6 will have on the plume.

NMED approves the following test activities:

1. Conduct a five to seven-day pumping test at CrIN-6 with treatment of contaminated groundwater;

2. Pumping at CrEX (extraction) wells 1, 2 and 3, treatment of pumped groundwater, and re-injection at CrIN (injection) wells 1, 3, and 5 for up to 10 days;

3. Pumping at two or three CrEX wells (1, 2 and 3), treatment of pumped groundwater, and re-injection at CrIN wells 2 and 4 for up to 10 days; and

4. Pumping at two or three CrEX wells (1, 2 and 3), treatment of pumped groundwater, and re-injection at CrIN wells 4 and 5, for 5 to 10 days.

The Permittees must submit a schedule for operational testing to NMED by November 20, 2017. The schedule can be submitted through written correspondence and or via E-mail.

Additionally, NMED agrees with the Permittees that IM actions specific to injection at CrIN-3, CrIN-4 and CrIN-5 near the facility boundary with the Pueblo de San Ildefonso should be restored or re-initiated as soon as possible so that IM plume-control performance requirements can be monitored and assessed accordingly.

If you have any questions regarding this correspondence, please contact John Kieling, HWB Chief, at 505-476-6035.

Sincerely,

JCB2r

Juan Carlos Borrego
Deputy Secretary
Acting Resource Protection Division Director

cc: J. Kieling, NMED HWB
N. Dhawan, NMED HWB
M. Dale, NMED HWB
B. Yurdin, NMED WPD
M. Hunter, NMED GWQB
S. Pullen, NMED GWQB
S. Lucas Kamat, NMED DOE OB
S. Yanicak, NMED DOE OB, MS M894
L. King, EPA 6MM-RC
R. Martinez, Pueblo de San Ildefonso
D. Chavarria, Santa Clara Pueblo
C. Rodriguez, DOE-EM-LA, MS A216
J. Buckley, LANL, ADESH-EPC-CP, MS K490
K. Ellers, LANL, ADEM, MS M992
S. Swickley, LANL, ADEM ER, MS M992

File: Reading and LANL 2017

ESHID-602763

COMMUNICATION RECORD FORM

Date: 11/29/2017	**Time**: 1:42 PM	**Author/Org**: Bruce Robinson/ADEM
Regulator/Customer and Organization: John Kieling/NMED CC: Michelle Hunter, Juan Borrego/NMED		**Communication Type**: ☐ Meeting face-to-face ☐ Telephone ☒ Email

Project/Subject: **Schedule for Operational Testing**

Highlights of the Discussion (who, what, where, when, & how):

The NMED's November 21, 2017 letter re: "Path Forward in Response to NMED's September 1, 2017 Notification to Temporarily Limit Injection into CrIN-1 and CrIN-6, Discharge Permit DP-1835" requires the Permittees to submit a schedule for operational testing. Please note that some of the activities have been completed or are underway, as agreed to by NMED in email correspondence dated November 9, 2017.

With that, the following schedule describes dates for **activities completed or underway**, and an estimated start date for the remaining activity.

- Activity 1 involved pumping at CrIN-6 for 7 days beginning on 11/1/17 and completed on 11/7/17.
- Activity 2 involved extraction at CrEX-1, 2, and 3 with injection occurring at CrIN-1, 3, and 5. Activity 2 began on November 13, 2017 and was terminated on November 21.
- Activity 3 involves extraction at 2 or 3 extraction wells with injection at CrIN-2 and 4 for up to 10 days; this activity began on November 27, 2017 after a 5-day aquifer recovery period.
- Activity 4 involves extraction at 2 or 3 extraction wells with injection at CrIN-4 and 5 for 5 to 10 days; this activity is scheduled to begin on December 11, 2017 after a 4 to 5-day aquifer recovery period that will follow Activity 3.

Action Item	Resolution/Completion
1. No actions	1.
2.	2.
3.	3.
4.	4.

Required Signatures		
	Author: [signature]	Date: 12/4/2017
	Manager: N/A	Date:

Required Distribution: Records, comm_rec@lanl.gov

Additional Distribution: Bruce Robinson, Randy Erickson, Stephani Swickley, Danny Katzman

Transmit completed forms via email to doc_mgr@lanl.gov.

Formalizing Regulatory Communications	*Los Alamos National Laboratory*

ENCLOSURE 6

Treated Groundwater Injection and Extraction Summary Tables – 2017 Quarter 4, DP-1835

EPC-DO: 18-057

LA-UR-18-20857

U1601822

Date: FEB 2 6 2018

Table E6-1
Daily Extraction Summary Table -
2017 Quarter 4, DP1835

Date	CrEX-1 (gal)	CrEX-2 (gal)	CrEX-3 (gal)
10/1/2017	-	-	-
10/2/2017	12,000	4,000	155
10/3/2017	5,559	5,316	5,724
10/4/2017	-	-	-
10/5/2017	-	-	-
10/6/2017	-	-	-
10/7/2017	-	-	-
10/8/2017	-	-	-
10/9/2017	-	-	-
10/10/2017	-	-	-
10/11/2017	-	-	-
10/12/2017	14,532	-	13,420
10/13/2017	-	-	-
10/14/2017	-	-	-
10/15/2017	-	-	-
10/16/2017	9,702	10,648	7,302
10/17/2017	44,973	41,636	36,150
10/18/2017	79,604	76,457	61,969
10/19/2017	82,243	80,812	64,646
10/20/2017	44,761	43,230	34,560
10/21/2017	-	-	-
10/22/2017	-	-	-
10/23/2017	-	-	-
10/24/2017	-	-	-
10/25/2017	-	-	-
10/26/2017	-	-	-
10/27/2017	-	-	-
10/28/2017	-	-	-
10/29/2017	-	-	-
10/30/2017	-	-	-
10/31/2017	-	-	-
11/1/2017	-	-	-
11/2/2017	-	-	-
11/3/2017	-	-	-
11/4/2017	-	-	-
11/5/2017	-	-	-
11/6/2017	-	-	-
11/7/2017	-	-	-
11/8/2017	-	-	-
11/9/2017	-	-	-
11/10/2017	-	-	-

Table E6-1
Daily Extraction Summary Table -
2017 Quarter 4, DP1835

Date	CrEX-1 (gal)	CrEX-2 (gal)	CrEX-3 (gal)
11/11/2017	-	-	-
11/12/2017	-	-	-
11/13/2017	51,820	49,271	30,922
11/14/2017	63,045	63,062	48,059
11/15/2017	106,082	107,034	81,669
11/16/2017	105,984	107,122	81,717
11/17/2017	105,763	106,979	81,756
11/18/2017	105,833	107,049	81,730
11/19/2017	105,667	106,955	81,742
11/20/2017	105,771	106,759	81,762
11/21/2017	61,039	61,612	47,333
11/22/2017	-	-	-
11/23/2017	-	-	-
11/24/2017	-	-	-
11/25/2017	-	-	-
11/26/2017	-	-	-
11/27/2017	41,624	40,796	-
11/28/2017	98,227	100,167	-
11/29/2017	198,741	101,996	-
11/30/2017	346,452	102,062	-
12/1/2017	-	102,086	-
12/2/2017	-	102,618	-
12/3/2017	-	102,310	-
12/4/2017	41,611	95,492	-
12/5/2017	98,635	101,430	-
12/6/2017	47,676	49,710	-
12/7/2017	-	-	-
12/8/2017	-	-	-
12/9/2017	-	-	-
12/10/2017	-	-	-
12/11/2017	55,641	49,153	17,458
12/12/2017	107,734	96,007	42,742
12/13/2017	99,660	93,278	81,573
12/14/2017	60,080	56,542	44,701
12/15/2017	-	-	-
12/16/2017	-	-	-
12/17/2017	-	-	-
12/18/2017	-	-	-
12/19/2017	-	-	-
12/20/2017	-	-	-
12/21/2017	-	-	-

Table E6-1
Daily Extraction Summary Table -
2017 Quarter 4, DP1835

Date	CrEX-1 (gal)	CrEX-2 (gal)	CrEX-3 (gal)
12/22/2017	-	-	-
12/23/2017	-	-	-
12/24/2017	-	-	-
12/25/2017	-	-	-
12/26/2017	-	-	-
12/27/2017	-	-	-
12/28/2017	-	-	-
12/29/2017	-	-	-
12/30/2017	-	-	-
12/31/2017	-	-	-

Notes:
"- If groundwater was extracted on this day"
from this location it was not treated and injected through the UIC wells.

Table E6-2
Daily Injection Summary Table -
2017 Quarter 4, DP1835

Date	CrIN-1 (gal)	CrIN-2 (gal)	CrIN-3 (gal)	CrIN-4 (gal)	CrIN-5 (gal)	CrIN-6[1] (gal)
10/1/2017	0	0	0	0	0	0
10/2/2017	1,804	3,573	1,881	193	0	0
10/3/2017	2,424	2,143	2,844	888	155	0
10/4/2017	0	0	0	0	11,855	0
10/5/2017	0	0	0	0	0	0
10/6/2017	0	0	0	0	0	0
10/7/2017	0	0	0	0	0	0
10/8/2017	0	0	0	0	0	0
10/9/2017	0	0	0	0	0	0
10/10/2017	0	0	0	0	0	0
10/11/2017	2,969	9,271	1,504	0	0	0
10/12/2017	1,080	1,989	3,205	13,231	0	0
10/13/2017	0	0	0	0	0	0
10/14/2017	0	0	0	0	0	0
10/15/2017	0	0	0	0	0	0
10/16/2017	250	0	0	13,699	9,190	0
10/17/2017	36,533	49,172	31,340	8,923	1,225	0
10/18/2017	65,186	53,807	60,207	19,749	16,210	0
10/19/2017	57,600	28,954	26,235	66,426	66,647	0
10/20/2017	0	0	0	55,291	66,409	0
10/21/2017	0	0	0	0	0	0
10/22/2017	0	0	0	0	0	0
10/23/2017	0	0	0	0	0	0
10/24/2017	0	0	0	0	0	0
10/25/2017	0	0	0	0	0	0
10/26/2017	0	0	0	0	0	0
10/27/2017	0	0	0	0	0	0
10/28/2017	0	0	0	0	0	0
10/29/2017	0	0	0	0	0	0
10/30/2017	0	0	0	0	0	0
10/31/2017	0	4,100	0	0	0	5,906
11/1/2017	0	0	0	0	0	0
11/2/2017	0	0	0	0	0	0
11/3/2017	0	0	0	0	0	0
11/4/2017	0	0	0	0	0	0
11/5/2017	0	0	0	0	0	0
11/6/2017	0	0	0	0	0	0
11/7/2017	0	0	0	0	0	0
11/8/2017	0	0	0	0	0	0
11/9/2017	0	0	0	0	0	0

Table E6-2
Daily Injection Summary Table -
2017 Quarter 4, DP1835

Date	CrIN-1 (gal)	CrIN-2 (gal)	CrIN-3 (gal)	CrIN-4 (gal)	CrIN-5 (gal)	CrIN-6[1] (gal)
11/10/2017	0	0	0	0	0	0
11/11/2017	0	0	0	0	0	0
11/12/2017	0	0	0	0	0	0
11/13/2017	19,737	0	45,595	0	36,925	0
11/14/2017	60,503	0	232,671	0	60,123	0
11/15/2017	98,857	0	0	0	100,593	0
11/16/2017	98,185	0	339,425	0	100,653	0
11/17/2017	97,926	0	0	0	100,582	0
11/18/2017	98,157	0	0	0	100,414	0
11/19/2017	99,038	0	0	0	99,957	0
11/20/2017	101,175	0	134,020	0	88,598	0
11/21/2017	58,804	0	0	0	55,970	0
11/22/2017	0	0	0	0	0	0
11/23/2017	0	0	0	0	0	0
11/24/2017	0	0	0	0	0	0
11/25/2017	0	0	0	0	0	0
11/26/2017	0	0	0	0	0	0
11/27/2017	0	49,088	0	39,458	0	0
11/28/2017	0	109,966	0	94,361	0	0
11/29/2017	0	185,283	0	96,732	0	0
11/30/2017	0	166,162	0	91,886	0	0
12/1/2017	0	0	0	93,481	0	0
12/2/2017	0	88,946	0	96,898	0	0
12/3/2017	0	83,523	0	89,799	0	0
12/4/2017	0	47,045	0	83,673	0	0
12/5/2017	0	103,736	0	89,696	0	0
12/6/2017	0	47,788	0	45,986	0	0
12/7/2017	0	0	0	0	0	0
12/8/2017	0	0	0	0	0	0
12/9/2017	0	0	0	0	0	0
12/10/2017	0	0	0	0	0	0
12/11/2017	0	0	23,167	78,244	79,181	0
12/12/2017	0	0	7,908	113,431	142,818	0
12/13/2017	0	0	173,763	5,931	145,164	0
12/14/2017	0	0	6,719	0	85,103	0
12/15/2017	0	0	0	0	0	0
12/16/2017	0	0	0	0	0	0
12/17/2017	0	0	0	0	0	0
12/18/2017	0	0	0	0	0	0
12/19/2017	0	0	0	0	0	0

Table E6-2
Daily Injection Summary Table -
2017 Quarter 4, DP1835

Date	CrIN-1 (gal)	CrIN-2 (gal)	CrIN-3 (gal)	CrIN-4 (gal)	CrIN-5 (gal)	CrIN-6[1] (gal)
12/20/2017	0	0	0	0	0	0
12/21/2017	0	0	0	0	0	0
12/22/2017	0	0	0	0	0	0
12/23/2017	0	0	0	0	0	0
12/24/2017	0	0	0	0	0	0
12/25/2017	0	0	0	0	0	0
12/26/2017	0	0	0	0	0	0
12/27/2017	0	0	0	0	0	0
12/28/2017	0	0	0	0	0	0
12/29/2017	0	0	0	0	0	0
12/30/2017	0	0	0	0	0	0
12/31/2017	0	0	0	0	0	0

Notes:
[1] UIC well constructed and injection of treated groundwater occurred only for functional test in accordance with NMED's September 25, 2017 approval.

ENCLOSURE 7

Facility Layout Map –
2017 Quarter 4, DP-1835

EPC-DO: 18-057

LA-UR-18-20843

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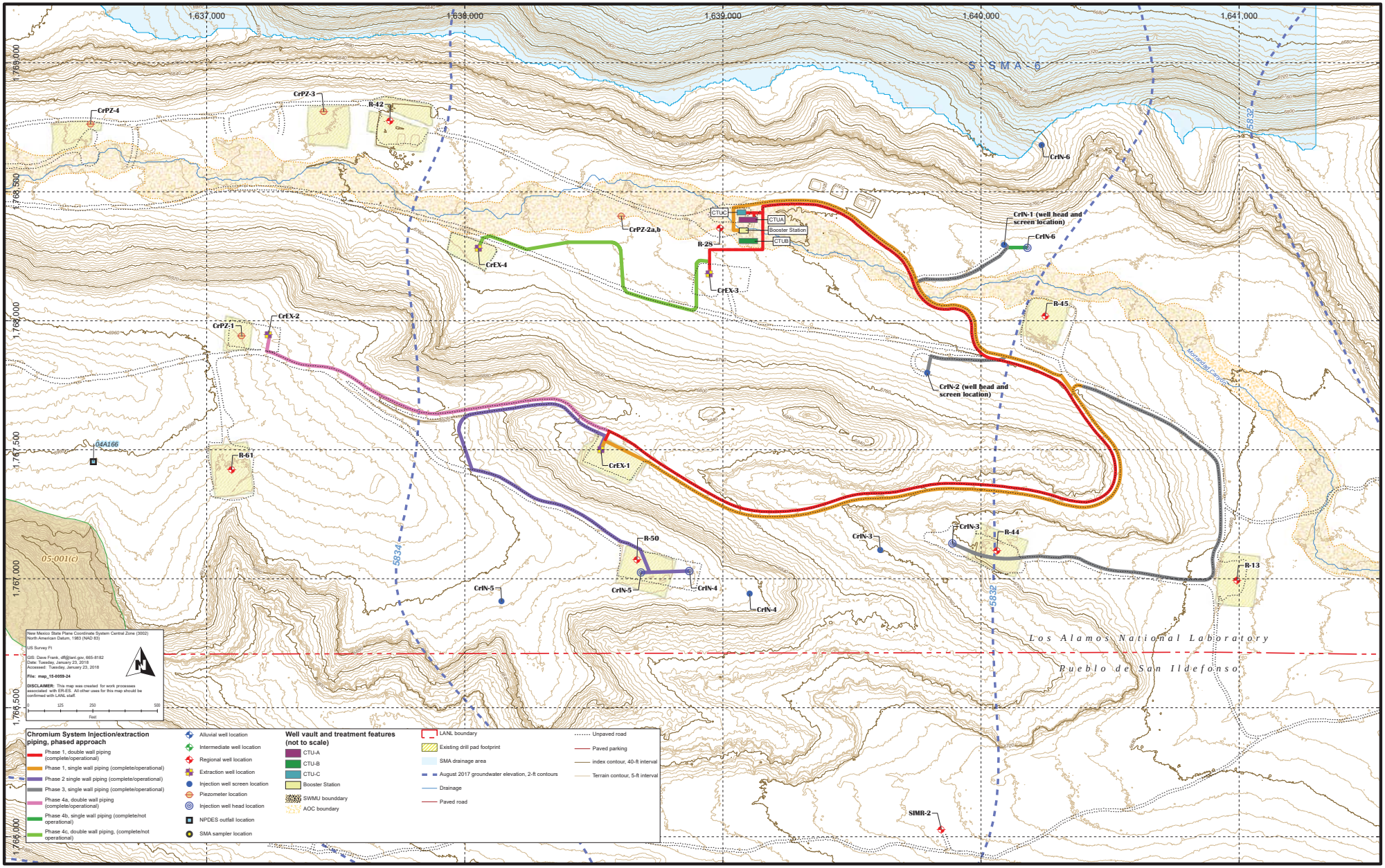
Date: FEB 2 6 2018



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