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Date: **NOV 29 2018**
 Refer To: N3B-18-0321

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

Subject: Submittal of the Quarterly Report for 2018 Quarter 3, 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. During the third quarter of fiscal year 2018, ownership of the discharge permit transferred to Newport News Nuclear BWXT – Los Alamos, LLC (N3B) from LANS. Pursuant to Condition No. 10 of the above-referenced discharge permit, DOE/N3B 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 No. 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 reporting period for calendar year 2018, July 1 through September 30 (Quarter 3), discharge of treated groundwater to the regional aquifer continued under DP-1835. This treated discharge occurred at three UIC wells: CrIN-3, CrIN-4, and CrIN-5. The "Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer – 2018 Quarter 3, DP-1835" (Enclosure 1) provides the information required under DP-1835 for this reporting period.

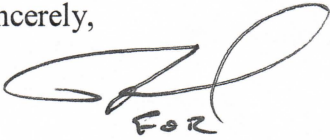
GROUND WATER

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If you have questions, please contact Christian Maupin at (505) 695-4281 (christian.maupin@em-la.doe.gov) or Cheryl Rodriguez at (505) 665-5330 (cheryl.rodriguez@em.doe.gov).

Sincerely,



Frazer Lockhart
Program Manager
Regulatory and Stakeholder Interface
N3B – Los Alamos

Sincerely,



David S. Rhodes, Director
Office of Quality and Regulatory Compliance
Environmental Management
Los Alamos Field Office

FL/DR/CM/CR

Enclosure(s): Two hard copies with electronic files (EM2018-0109):

1. Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer – 2018 Quarter 3, DP-1835
2. Treated Effluent Analytical Results Summary Tables – 2018 Quarter 3, DP-1835
3. Groundwater Elevation Contour Map – 2018 Quarter 3, DP-1835
4. Groundwater Monitoring Wells Analytical Results Summary Table – 2018 Quarter 3, DP-1835
5. Treated Groundwater Injection and Extraction Summary Tables – 2018 Quarter 3, DP-1835
6. Facility Layout Map – 2018 Quarter 3, DP-1835

Cy: (letter and enclosure[s] emailed)
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ENCLOSURE 1

Quarterly Report for the Discharge of
Treated Groundwater to the Regional Aquifer –
2018 Quarter 3, DP-1835

ENCLOSURE 1
Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer –
2018 Quarter 3, 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. During the third quarter of fiscal year 2018, ownership of the discharge permit transferred from LANS to Newport News Nuclear BWXT – Los Alamos (N3B). Pursuant to Condition No. 10 of the above-referenced discharge permit, DOE/N3B are required to submit quarterly reports.

During the 2018 July 1 through September 30 (Quarter 3) reporting period, discharge of treated groundwater to the regional aquifer occurred at three UIC wells: CrIN-3, CrIN-4, and CrIN-5, under DP-1835. Groundwater originated from three extraction wells: CrEX-1, CrEX-2, and CrEX-3. The groundwater was treated by chromium treatment unit (CTU) A before injection at the UIC wells.

Condition No. 10 of DP-1835 requires submission of a quarterly report to NMED by December 1 for the July 1 through September 30 discharge period. Several conditions within the permit identify information to be submitted in the quarterly report. The following information, with condition references, is 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. *Total 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), and*
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 –
2018 Quarter 3, DP-1835

Requirement 1: Influent and discharge volumes for the IX treatment systems. Table E1-1 provides the influent and discharge volumes for IX treatment systems during 2018 Quarter 3 for activities completed under DP-1835. As previously identified, injection occurred at UIC wells CrIN-3, CrIN-4, and CrIN-5 during the quarter. Treated discharge originated from extraction wells CrEX-1, CrEX-2, and CrEX-3 and was treated with treatment unit CTUA.

Table E1-1
Total Influent and Discharge Volumes
for IX Treatment Systems – 2018 Quarter 3

Treatment Unit	Influent Volume^a (gal.)	Effluent Volume^b (gal.)
CTUA	20,756,000	20,687,000
CTUB ^c	n/a ^d	n/a
CTUC ^c	n/a	n/a

Note: Individual flow meter accurate to $\pm 5\%$.

^a Influent volume based on CrEX-1, CrEX-2 and CrEX-3 extraction volumes.

^b Effluent volume based on CTUA flow meter reading.

^c Treatment unit did not treat any groundwater that was subsequently injected during the quarter.

^d n/a = Not applicable.

Requirement 2: Quarterly treated effluent sampling results from each IX treatment system. Treated effluent analytical results from samples collected during 2018 Quarter 3 for activities completed under DP-1835 are summarized in Enclosure 2. No results for total chromium, nitrate-nitrogen, perchlorate, sulfate, total dissolved solids, fluoride, or chloride exceeded 90% of the numeric standards of 20 New Mexico Administrative Code (NMAC) 6.2.3103 or 90% of the numeric standards established for tap water in Table A-1 for constituents not listed in 20 NMAC 6.2.3103. The 90% values for chromium, nitrate-nitrogen, perchlorate, sulfate, total dissolved solids, fluoride, and chloride are 45 $\mu\text{g/L}$, 9 mg/L, 12.4 $\mu\text{g/L}$, 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 2018 Quarter 3. NMED determined 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 2018 Quarter 3 are provided in Enclosure 2. No results for iron, manganese, or arsenic exceeded 90% of the numeric standards of 20 NMAC 6.2.3103. The 90% values for iron, manganese, and arsenic are 900 $\mu\text{g/L}$, 180 $\mu\text{g/L}$, and 90 $\mu\text{g/L}$, respectively.

During 2018 Quarter 3, no annual compliance samples were obtained. As previously identified, all groundwater injected under DP-1835 was treated by CTUA. CTUA annual compliance samples for 2018 will be collected later this calendar year.

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

ENCLOSURE 1
Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer –
2018 Quarter 3, DP-1835

Requirement 3: Quarterly depth-to-groundwater and groundwater-quality sampling results. Table E1-2 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 2018 Quarter 3 for the monitoring wells listed in Condition No. 14 are summarized in Table E1-3. Complete results related to these samples are provided in Enclosure 4.

Table E1-2
Groundwater Elevations Summary
for Groundwater Monitoring Wells – 2018 Quarter 3

Monitoring Well	Groundwater Elevation^a (ft)
CrPZ-1	5831.69
CrPZ-2a	5831.69
CrPZ-2b	5831.61
CrPZ-3	5833.17
CrPZ-4	5834.20
CrPZ-5	5833.56
R-11	5832.43
R-13	5830.52
R-43 S1	5833.80
R-43 S2	5832.94
R-44 S1	5831.72
R-44 S2	5831.20
R-45 S1	5831.23
R-45 S2	5831.01
R-50 S1	5833.03
R-50 S2	5832.14
R-61 S1	5833.25
R-61 S2	5833.14
R-62	5837.05
SIMR-2 ^b	5832.25

^a Groundwater elevations provided are based on average August values from transducers.

^b Second Quarter 2018 SIMR-2 data is reported here in accordance with DP-1835 2018 Quarter 2 Report (EM2018-0025). Data was unavailable at the time of that report's preparation in accordance with the memorandum of agreement between San Ildefonso Pueblo and DOE. Data from the current quarter is not available at this time and will be presented in the next quarterly report. Third quarter data are used to support the potentiometric contouring of the groundwater elevation contour map (Figure E3-1, Enclosure 3).

ENCLOSURE 1
Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer –
2018 Quarter 3, DP-1835

Table E1-3
Summary Table of Analytical Results for Groundwater Monitoring Wells – 2018 Quarter 3

Location	Sample Date	Analyte ^a						
		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	07/11/2018	3.83	0.77	7.05	0.426	6.33	10.4	179
R-13	07/13/2018	2.56	0.402	3.83	0.199	0.748	3.54	144
R-43 S1	07/17/2018	8.64	0.869	199	0.300	5.44	18.1	183
R-43 S2	07/18/2018	6.39	0.899	21.8	0.348	3.79	9.39	160
R-44 S1	07/16/2018	2.62	0.44	13	0.215	1.15	3.55	131
R-44 S1	08/08/2018	2.87	0.464	12.1	0.223	1.16	3.54	143
R-44 S1	09/10/2018	4.30	0.456	12.4	0.334	1.19	4.74	139
R-44 S2	07/16/2018	2.24	0.316	5.93	0.265	0.696	2.78	110
R-44 S2	08/08/2018	2.11	0.334	6.2	0.276	0.682	2.57	147
R-44 S2	09/18/2018	2.21	0.364	5.2	0.385	0.622	2.62	114
R-45 S1	07/17/2018	5.73	0.609	42.9	0.257	3.28	8.86	164
R-45 S1	08/08/2018	5.54	0.628	43.2	0.246	3.06	8.39	173
R-45 S1	09/10/2018	5.71	0.605	39.2	0.363	2.82	8.66	136
R-45 S2	07/17/2018	4.66	0.442	28	0.318	0.980	5.68	163
R-45 S2	08/08/2018	4.46	0.439	27.8	0.310	0.905	5.34	260
R-45 S2	09/10/2018	4.68	0.444	27.5	0.401	0.880	5.65	144
R-50 S1	07/13/2018	10.1	0.647	133	0.208	2.35	15.3	199
R-50 S1	08/09/2018	9.50	0.646	135	0.218	2.20	14.0	246
R-50 S1	09/13/2018	10.7	0.62	124	0.368	2.10	14.5	173
R-50 S2	07/16/2018	2.16	0.311	4.18	0.309	0.530	2.68	143
R-50 S2	08/09/2018	2.07	0.342	3.95	0.306	0.528	2.52	149
R-50 S2	09/12/2018	2.15	0.335	4.14	0.430	0.494	2.64	120
R-62	07/20/2018	na ^b	na	na	na	na	na	na
SIMR-2 ^c	04/19/2018	2.21	0.390	5.3	0.204	0.732	2.84	133
SIMR-2	05/15/2018	2.16	0.395	5.09	0.238	0.772	2.82	154
SIMR-2	06/21/2018	Not Sampled. Area was inaccessible because of Stage 3 fire restrictions						

^a Reported results are dissolved constituents.

^b na = Not available. Samples were not analyzed because laboratory received sample package outside of specified preservation temperature range.

^c SIMR-2 data reported here in accordance with the memorandum of agreement and protocol agreement between San Ildefonso Pueblo and DOE.

Requirement 4: Any operations/maintenance activities performed. Extraction, treatment, and injection operations continued during 2018 Quarter 3. These activities consisted of long-term functional testing primarily at CrEX-1, CrEX-2, CrEX-3, CrIN-3, CrIN-4, and CrIN-5. Tracers were deployed into chromium injection wells CrIN-3, CrIN-4, and CrIN-5 between September 11 and 18, 2018. Beginning this quarter, the operation of CrEX-3 has resulted in the

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Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer –
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plugging of the treatment system influent filters after 3–4 days of operation. CrEX-3 is currently being operated intermittently and an evaluation of the water quality in this well is underway to assess filter plugging.

Operations and maintenance activities completed during 2018 Quarter 3 are listed in Table E1-4 for the extraction, treatment, and injection system.

Table E1-4
Operations and Maintenance Activity Summary Table – 2018 Quarter 3

Maintenance Date	Elements Impacted	Maintenance Description
7/1/18 through 7/22/18	CrEX-1, CrEX-2, CrEX-3, CTUA, CrIN-3, CrIN-4, CrIN-5	Extraction, treatment, and injection of treated groundwater occurred per operational plan.
7/12/18	CTUA*	IX vessel exchanges were completed as follows: Treatment train A – replaced primary IX vessel with the secondary IX vessel; new secondary IX vessel installed.
7/17/18	CTUA*	IX vessel exchanges were completed as follows: • Treatment train B – replaced primary IX vessel with the secondary IX vessel; new secondary IX vessel installed. • Treatment train C – replaced primary IX vessel with the secondary IX vessel; new secondary IX vessel installed. • Both influent and all three effluent filter bags were replaced.
7/22/18 through 8/16/18	CrEX-1, CrEX-2, CTUA, CrIN-3, CrIN-4, CrIN-5	CrEX-3 shut down because of observed high pressure in system. Extraction, treatment, and injection of treated groundwater occurred per operational plan.
7/23/18	CTUA*	Both influent filter bags were replaced.
8/16/18	CTUA*	IX vessel exchanges were completed as follows: Treatment train A – replaced primary IX vessel with the secondary IX vessel; new secondary IX vessel installed.
8/16/18 through 8/17/18	CrEX-1, CrEX-2, CrEX-3, CTUA, CrIN-3, CrIN-4, CrIN-5	CrEX-3 turned on for 24-hr period to allow wellhead sample collection. Extraction, treatment, and injection of treated groundwater occurred per operational plan.
8/17/18 through 9/19/18	CrEX-1, CrEX-2, CTUA, CrIN-3, CrIN-4, CrIN-5	CrEX-3 shut down because of observed high pressure in system. Extraction, treatment, and injection of treated groundwater occurred per operational plan.
8/22/18	CTUA*	IX vessel exchanges were completed as follows: • Treatment train B – replaced primary IX vessel with the secondary IX vessel; new secondary IX vessel installed. • Treatment train C – replaced primary IX vessel with the secondary IX vessel; new secondary IX vessel installed. Both influent filter bags were replaced.
9/11/18 and 9/12/18	CrIN-3	Tracer was deployed to CrIN-3. Approximately 15,000 gal. of water was pumped from well, mixed with tracer, and reinjected into the well.
9/13/18 and 9/17/18	CrIN-4	Tracer was deployed to CrIN-4. Approximately 15,000 gal. of water was pumped from well, mixed with tracer, and reinjected into the well.
9/14/18 and 9/18/18	CrIN-5	Tracer was deployed to CrIN-5. Approximately 15,000 gal. of water was pumped from well, mixed with tracer, and reinjected into the well.

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Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer –
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Table E1-4 (continued)

Maintenance Date	Elements Impacted	Maintenance Description
9/19/18 through 9/30/18	CrEX-1, CrEX-2, CrEX-3, CTUA, CrIN-3, CrIN-4, CrIN-5	CrEX-3 turned back on. Extraction, treatment, and injection of treated groundwater occurred per operational plan.
9/25/18	CTUA*	IX vessel exchanges were completed as follows: • Treatment train A – replaced primary IX vessel with the secondary IX vessel; new secondary IX vessel installed. • Treatment train B – replaced primary IX vessel with the secondary IX vessel; new secondary IX vessel installed. • Treatment train C – replaced primary IX vessel with the secondary IX vessel; new secondary IX vessel installed. Both influent filter bags were replaced.
9/30/18	CrEX-1, CrEX-2, CTUA, CrIN-3, CrIN-4, CrIN-5	CrEX-3 shut down because of observed high pressure in system. Extraction, treatment, and injection of treated groundwater occurred per operational plan.
10/1/18	CTUA*	Both influent filter bags were replaced.

*Treatment unit CTUA contains three treatment trains: train A, train B, and train C.

Requirement 5: Any periodic test of mechanical integrity conducted. Periodic testing of mechanical integrity was not conducted or reported to NMED during 2018 Quarter 3. In accordance with Condition No. 3, the next required integrity test of these items will occur within 5 years of the initial test unless a UIC well is reconfigured. Under this scenario, a mechanical integrity test before reinjection of treated effluent at that well will be completed pursuant to Condition No. 3.

Requirement 6: Any replacement of primary or secondary IX vessels or associated treatment system infrastructure. Installation of new primary and secondary IX vessels occurred at various times for treatment unit CTUA (all three treatment trains) during the reporting period as cited in Requirement 4.

Requirement 7: Any well work-overs conducted. Well work-overs did not occur during 2018 Quarter 3.

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, analytical results from iron, manganese, and arsenic testing of the treated water from the extraction wells during the study are being provided in the quarterly monitoring reports under DP-1835. These results for 2018 Quarter 3 are provided in Enclosure 2.

No results for arsenic, iron, or manganese exceeded 90% of the numeric standards of 20 NMAC 6.2.3103 or 90% of the numeric standards established for tap water in Table A-1 for constituents not listed in 20 NMAC 6.2.3103. The 90% values for arsenic, iron, and 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.

ENCLOSURE 1
Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer –
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Requirement 9: Monthly average, maximum, and minimum values for flow rate and volume of treated effluent transferred to each UIC well. Table E1-5 provides the monthly average, maximum, and minimum values for flow rate and volume of treated effluent transferred to each well in 2018 Quarter 3.

Table E1-5
Flows and Volumes of Treated Effluent Injected – 2018 Quarter 3

Injection Well	Flow rate (gpm ^a)			Daily Volume (gal.)			Total Volume (gal.)
	Average ^b	Maximum	Minimum ^c	Average ^b	Maximum	Minimum ^c	
July 2018							
CrIN-1	0.0	0.0	0.0	0	0	0	0
CrIN-2	0.0	0.0	0.0	0	0	0	0
CrIN-3	44.3	60.9	1.8	63,769	87,628	2,643	1,913,065
CrIN-4	64.2	66.6	26.2	92,453	95,861	37,767	2,773,590
CrIN-5	58.0	62.6	22.8	83,504	90,183	32,865	2,505,105
CrIN-6 ^d	n/a ^e	n/a	n/a	n/a	n/a	n/a	n/a
August 2018							
CrIN-1	0.0	0.0	0.0	0	0	0	0
CrIN-2	0.0	0.0	0.0	0	0	0	0
CrIN-3	37.7	44.1	10.6	54,299	63,448	15,327	1,628,971
CrIN-4	56.8	66.7	38.5	81,854	95,978	55,401	2,537,487
CrIN-5	55.2	59.5	33.8	79,433	85,609	48,702	2,462,408
CrIN-6 ^d	n/a	n/a	n/a	n/a	n/a	n/a	n/a
September 2018							
CrIN-1	0.0	0.0	0.0	0	0	0	0
CrIN-2	0.0	0.0	0.0	0	0	0	0
CrIN-3	45.3	62.2	13.5	65,177	89,601	19,502	1,955,306
CrIN-4	58.8	63.2	44.1	84,643	90,965	63,446	2,539,302
CrIN-5	58.0	63.7	43.8	83,508	91,688	63,080	2,505,247
CrIN-6 ^d	n/a	n/a	n/a	n/a	n/a	n/a	n/a

^a gpm = gallons per minute.

^b Average flow rate and daily volume represent arithmetic mean values of results provided during periods when injection of treated groundwater was occurring.

^c Minimum values represent the minimum daily value which occurred during days when pumping occurred.

^d UIC well was constructed and injection of treated groundwater did not occur during the quarter in accordance with NMED's correspondence on September 25, 2017.

^e n/a = Not applicable. Treated groundwater not injected during the month at this location.

Requirement 10: Total monthly volume of treated effluent transferred to each UIC well. Table E1-5 provides total monthly volumes of treated effluent transferred to each well. As

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Quarterly Report for the Discharge of Treated Groundwater to the Regional Aquifer –
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previously identified, injection occurred at UIC wells CrIN-3, CrIN-4, and CrIN-5 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 E1-6 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-3, CrIN-4, and CrIN-5 during the quarter.

Table E1-6
Water-Level Values Above Static Level by UIC Well – 2018 Quarter 3

UIC Well	July			August			September		
	Average ^a (ft)	Maximum (ft)	Minimum (ft)	Average ^a (ft)	Maximum (ft)	Minimum (ft)	Average ^a (ft)	Maximum (ft)	Minimum (ft)
CrIN-1	n/a ^b	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CrIN-2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CrIN-3	25.1	29.4	10.5	17.3	20.6	10.1	29.9	44.2	2.5
CrIN-4	41.0	45.0	35.4	38.8	42.9	24.3	25.4	49.5	3.3
CrIN-5	56.5	62.9	46.9	60.0	66.7	29.2	35.9	75.2	0.0
CrIN-6 ^c	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

^a Average values provided represent arithmetic mean values of maximum daily values during periods when injection of treated groundwater was occurring.

^b n/a = Not applicable. Treated groundwater not injected during the month at this location.

^c UIC well was constructed and injection of treated groundwater did not occur during the quarter in accordance with NMED's correspondence on September 25, 2017.

Requirement 12: Daily volume injected at each UIC well. Daily volumes of treated groundwater injected at CrIN-3, CrIN-4, and CrIN-5 during 2018 Quarter 3 are provided in Enclosure 5.

Requirement 13: Daily volume pumped from each extraction well. Daily volumes of groundwater pumped from CrEX-1, CrEX-2, and CrEX-3 during 2018 Quarter 3, which was subsequently treated and injected under this permit, are provided in Enclosure 5.

Requirement 14: Facility layout map. The facility layout map for 2018 Quarter 3 showing the location and number of each well is provided in Enclosure 6.

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 –
2018 Quarter 3, DP-1835

Table E2-1
Treated Effluent Analytical Results Summary Table - 2018 Quarter 3, DP-1835

Location ID	Sample ID	Sample Date	Parameter Name	Result	Report Unit	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CTUA	CTUA-18-46	07/03/2018	Chloride	22.5	mg/L		Y	Y	EPA:300.0	0.335
CTUA	CTUA-18-47	07/10/2018	Chloride	22.1	mg/L		Y	Y	EPA:300.0	0.268
CTUA	CTUA-18-48	07/18/2018	Chloride	56.3	mg/L		Y	Y	EPA:300.0	0.670
CTUA	CTUA-18-49	07/27/2018	Chloride	20.2	mg/L		Y	Y	EPA:300.0	0.268
CTUA	CTUA-18-50	08/01/2018	Chloride	22.4	mg/L		Y	Y	EPA:300.0	0.067
CTUA	CTUA-18-51	08/07/2018	Chloride	18.5	mg/L		Y	Y	EPA:300.0	0.335
CTUA	CTUA-18-160579	08/14/2018	Chloride	19.1	mg/L		Y	Y	EPA:300.0	0.335
CTUA	CTUA-18-160580	08/21/2018	Chloride	19.0	mg/L		Y	Y	EPA:300.0	0.268
CTUA	CTUA-18-160581	08/28/2018	Chloride	18.1	mg/L		Y	Y	EPA:300.0	0.268
CTUA	CTUA-18-160582	09/05/2018	Chloride	18.7	mg/L		Y	Y	EPA:300.0	0.268
CTUA	CTUA-18-160583	09/12/2018	Chloride	18.3	mg/L		Y	Y	EPA:300.0	0.268
CTUA	CTUA-18-160584	09/18/2018	Chloride	19.1	mg/L		Y	Y	EPA:300.0	0.335
CTUA	CTUA-18-160585	09/26/2018	Chloride	67.2	mg/L		Y	Y	EPA:300.0	0.670
CTUA	CTUA-18-46	07/03/2018	Chromium	ND	µg/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-18-47	07/10/2018	Chromium	ND	µg/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-18-48	07/18/2018	Chromium	ND	µg/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-18-49	07/27/2018	Chromium	ND	µg/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-18-50	08/01/2018	Chromium	ND	µg/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-18-51	08/07/2018	Chromium	ND	µg/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-18-160579	08/14/2018	Chromium	ND	µg/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-18-160580	08/21/2018	Chromium	ND	µg/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-18-160581	08/28/2018	Chromium	ND	µg/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-18-160582	09/05/2018	Chromium	ND	µg/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-18-160583	09/12/2018	Chromium	ND	µg/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-18-160584	09/18/2018	Chromium	ND	µg/L	U	N	Y	SW-846:6020	3.00
CTUA	CTUA-18-160585	09/26/2018	Chromium	ND	µg/L	U	N	Y	SW-846:6020	3.00

Table E2-1
Treated Effluent Analytical Results Summary Table - 2018 Quarter 3, DP-1835

Location ID	Sample ID	Sample Date	Parameter Name	Result	Report Unit	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CTUA	CTUA-18-46	07/03/2018	Fluoride	0.307	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-18-47	07/10/2018	Fluoride	0.302	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-18-48	07/18/2018	Fluoride	0.295	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-18-49	07/27/2018	Fluoride	0.238	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-18-50	08/01/2018	Fluoride	0.213	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-18-51	08/07/2018	Fluoride	0.225	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-18-160579	08/14/2018	Fluoride	0.277	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-18-160580	08/21/2018	Fluoride	0.268	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-18-160581	08/28/2018	Fluoride	0.227	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-18-160582	09/05/2018	Fluoride	0.218	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-18-160583	09/12/2018	Fluoride	0.202	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-18-160584	09/18/2018	Fluoride	0.254	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-18-160585	09/26/2018	Fluoride	0.334	mg/L		Y	Y	EPA:300.0	0.033
CTUA	CTUA-18-46	07/03/2018	Nitrate-Nitrite as Nitrogen	3.70	mg/L		Y	Y	EPA:353.2	0.170
CTUA	CTUA-18-47	07/10/2018	Nitrate-Nitrite as Nitrogen	3.98	mg/L		Y	Y	EPA:353.2	0.085
CTUA	CTUA-18-48	07/18/2018	Nitrate-Nitrite as Nitrogen	1.39	mg/L		Y	Y	EPA:353.2	0.085
CTUA	CTUA-18-49	07/27/2018	Nitrate-Nitrite as Nitrogen	3.17	mg/L		Y	Y	EPA:353.2	0.170
CTUA	CTUA-18-50	08/01/2018	Nitrate-Nitrite as Nitrogen	2.83	mg/L		Y	Y	EPA:353.2	0.170
CTUA	CTUA-18-51	08/07/2018	Nitrate-Nitrite as Nitrogen	2.80	mg/L		Y	Y	EPA:353.2	0.170
CTUA	CTUA-18-160579	08/14/2018	Nitrate-Nitrite as Nitrogen	2.78	mg/L		Y	Y	EPA:353.2	0.085
CTUA	CTUA-18-160580	08/21/2018	Nitrate-Nitrite as Nitrogen	3.52	mg/L		Y	Y	EPA:353.2	0.170

Table E2-1
Treated Effluent Analytical Results Summary Table - 2018 Quarter 3, DP-1835

Location ID	Sample ID	Sample Date	Parameter Name	Result	Report Unit	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CTUA	CTUA-18-160581	08/28/2018	Nitrate-Nitrite as Nitrogen	3.80	mg/L		Y	Y	EPA:353.2	0.170
CTUA	CTUA-18-160582	09/05/2018	Nitrate-Nitrite as Nitrogen	2.76	mg/L		Y	Y	EPA:353.2	0.085
CTUA	CTUA-18-160583	09/12/2018	Nitrate-Nitrite as Nitrogen	3.03	mg/L		Y	Y	EPA:353.2	0.170
CTUA	CTUA-18-160584	09/18/2018	Nitrate-Nitrite as Nitrogen	2.68	mg/L		Y	Y	EPA:353.2	0.170
CTUA	CTUA-18-160585	09/26/2018	Nitrate-Nitrite as Nitrogen	ND	mg/L	U	N	Y	EPA:353.2	0.017
CTUA	CTUA-18-46	07/03/2018	Perchlorate	0.303	µg/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-18-47	07/10/2018	Perchlorate	0.337	µg/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-18-48	07/18/2018	Perchlorate	0.174	µg/L	J	Y	Y	SW-846:6850	0.050
CTUA	CTUA-18-49	07/27/2018	Perchlorate	0.216	µg/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-18-50	08/01/2018	Perchlorate	0.227	µg/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-18-51	08/07/2018	Perchlorate	0.231	µg/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-18-160579	08/14/2018	Perchlorate	0.236	µg/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-18-160580	08/21/2018	Perchlorate	0.205	µg/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-18-160581	08/28/2018	Perchlorate	0.283	µg/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-18-160582	09/05/2018	Perchlorate	0.328	µg/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-18-160583	09/12/2018	Perchlorate	0.37	µg/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-18-160584	09/18/2018	Perchlorate	0.363	µg/L		Y	Y	SW-846:6850	0.050
CTUA	CTUA-18-160585	09/26/2018	Perchlorate	0.144	µg/L	J	Y	Y	SW-846:6850	0.050
CTUA	CTUA-18-46	07/03/2018	Sulfate	32.4	mg/L		Y	Y	EPA:300.0	0.665
CTUA	CTUA-18-47	07/10/2018	Sulfate	32.3	mg/L		Y	Y	EPA:300.0	0.532
CTUA	CTUA-18-48	07/18/2018	Sulfate	10.3	mg/L		Y	Y	EPA:300.0	0.133
CTUA	CTUA-18-49	07/27/2018	Sulfate	28.0	mg/L		Y	Y	EPA:300.0	0.532
CTUA	CTUA-18-50	08/01/2018	Sulfate	27.5	mg/L		Y	Y	EPA:300.0	0.665
CTUA	CTUA-18-51	08/07/2018	Sulfate	26.9	mg/L		Y	Y	EPA:300.0	0.665

Table E2-1
Treated Effluent Analytical Results Summary Table - 2018 Quarter 3, DP-1835

Location ID	Sample ID	Sample Date	Parameter Name	Result	Report Unit	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CTUA	CTUA-18-160579	08/14/2018	Sulfate	27.6	mg/L		Y	Y	EPA:300.0	0.665
CTUA	CTUA-18-160580	08/21/2018	Sulfate	21.3	mg/L		Y	Y	EPA:300.0	0.532
CTUA	CTUA-18-160581	08/28/2018	Sulfate	12.1	mg/L		Y	Y	EPA:300.0	0.133
CTUA	CTUA-18-160582	09/05/2018	Sulfate	27.2	mg/L		Y	Y	EPA:300.0	0.532
CTUA	CTUA-18-160583	09/12/2018	Sulfate	26.3	mg/L		Y	Y	EPA:300.0	0.532
CTUA	CTUA-18-160584	09/18/2018	Sulfate	27.2	mg/L		Y	Y	EPA:300.0	0.665
CTUA	CTUA-18-160585	09/26/2018	Sulfate	0.292	mg/L	J	Y	Y	EPA:300.0	0.133
CTUA	CTUA-18-46	07/03/2018	Total Dissolved Solids	247	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-18-47	07/10/2018	Total Dissolved Solids	229	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-18-48	07/18/2018	Total Dissolved Solids	273	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-18-49	07/27/2018	Total Dissolved Solids	207	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-18-50	08/01/2018	Total Dissolved Solids	203	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-18-51	08/07/2018	Total Dissolved Solids	259	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-18-160579	08/14/2018	Total Dissolved Solids	239	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-18-160580	08/21/2018	Total Dissolved Solids	237	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-18-160581	08/28/2018	Total Dissolved Solids	213	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-18-160582	09/05/2018	Total Dissolved Solids	219	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-18-160583	09/12/2018	Total Dissolved Solids	229	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-18-160584	09/18/2018	Total Dissolved Solids	231	mg/L		Y	Y	EPA:160.1	3.40
CTUA	CTUA-18-160585	09/26/2018	Total Dissolved Solids	280	mg/L		Y	Y	EPA:160.1	3.40

Notes:

ND in the Result column means the analyte was not detected.

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J in the Lab Qualifier column means the analyte is classified as estimated.

Y in the Detect Flag column means the analyte was detected.

N in the Detect Flag column means the analyte was not detected.

Y in the Filtered column means the sample was filtered.

N in the Filtered column means the sample was not filtered.

Table E2-2
Treated Effluent Analytical Results Summary Table Related to Molasses and
Sodium Dithionate Pilot Studies NMED Conditional Approval - 2018 Quarter 3, DP-1835

Location ID	Sample ID	Sample Date	Parameter Name	Result	Report Unit	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CTUA	CTUA-18-46	07/03/2018	Arsenic	2.39	µg/L	J	Y	Y	SW-846:6020	2.00
CTUA	CTUA-18-47	07/10/2018	Arsenic	ND	µg/L	U	N	Y	SW-846:6020	2.00
CTUA	CTUA-18-48	07/18/2018	Arsenic	4.12	µg/L	J	Y	Y	SW-846:6020	2.00
CTUA	CTUA-18-49	07/27/2018	Arsenic	3.3	µg/L	J	Y	Y	SW-846:6020	2.00
CTUA	CTUA-18-50	08/01/2018	Arsenic	2.16	µg/L	J	Y	Y	SW-846:6020	2.00
CTUA	CTUA-18-51	08/07/2018	Arsenic	3.12	µg/L	J	Y	Y	SW-846:6020	2.00
CTUA	CTUA-18-160579	08/14/2018	Arsenic	3.55	µg/L	J	Y	Y	SW-846:6020	2.00
CTUA	CTUA-18-160580	08/21/2018	Arsenic	3.47	µg/L	J	Y	Y	SW-846:6020	2.00
CTUA	CTUA-18-160581	08/28/2018	Arsenic	3.81	µg/L	J	Y	Y	SW-846:6020	2.00
CTUA	CTUA-18-160582	09/05/2018	Arsenic	2.77	µg/L	J	Y	Y	SW-846:6020	2.00
CTUA	CTUA-18-160583	09/12/2018	Arsenic	5.33	µg/L		Y	Y	SW-846:6020	2.00
CTUA	CTUA-18-160584	09/18/2018	Arsenic	3.4	µg/L	J	Y	Y	SW-846:6020	2.00
CTUA	CTUA-18-160585	09/26/2018	Arsenic	4.1	µg/L	J	Y	Y	SW-846:6020	2.00
CTUA	CTUA-18-46	07/03/2018	Iron	ND	µg/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-18-47	07/10/2018	Iron	ND	µg/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-18-48	07/18/2018	Iron	ND	µg/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-18-49	07/27/2018	Iron	ND	µg/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-18-50	08/01/2018	Iron	ND	µg/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-18-51	08/07/2018	Iron	ND	µg/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-18-160579	08/14/2018	Iron	ND	µg/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-18-160580	08/21/2018	Iron	ND	µg/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-18-160581	08/28/2018	Iron	ND	µg/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-18-160582	09/05/2018	Iron	ND	µg/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-18-160583	09/12/2018	Iron	ND	µg/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-18-160584	09/18/2018	Iron	ND	µg/L	U	N	Y	SW-846:6010C	30.0
CTUA	CTUA-18-160585	09/26/2018	Iron	ND	µg/L	U	N	Y	SW-846:6010C	30.0

Table E2-2
Treated Effluent Analytical Results Summary Table Related to Molasses and
Sodium Dithionate Pilot Studies NMED Conditional Approval - 2018 Quarter 3, DP-1835

Location ID	Sample ID	Sample Date	Parameter Name	Result	Report Unit	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CTUA	CTUA-18-46	07/03/2018	Manganese	ND	µg/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-18-47	07/10/2018	Manganese	ND	µg/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-18-48	07/18/2018	Manganese	3.63	µg/L	J	Y	Y	SW-846:6010C	2.00
CTUA	CTUA-18-49	07/27/2018	Manganese	ND	µg/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-18-50	08/01/2018	Manganese	ND	µg/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-18-51	08/07/2018	Manganese	ND	µg/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-18-160579	08/14/2018	Manganese	ND	µg/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-18-160580	08/21/2018	Manganese	ND	µg/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-18-160581	08/28/2018	Manganese	ND	µg/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-18-160582	09/05/2018	Manganese	ND	µg/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-18-160583	09/12/2018	Manganese	ND	µg/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-18-160584	09/18/2018	Manganese	ND	µg/L	U	N	Y	SW-846:6010C	2.00
CTUA	CTUA-18-160585	09/26/2018	Manganese	9.13	µg/L	J	Y	Y	SW-846:6010C	2.00

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Y in the Detect Flag column means the analyte was detected.

N in the Detect Flag column means the analyte was not detected.

Y in the Filtered column means the sample was filtered.

N in the Filtered column means the sample was not filtered.

ENCLOSURE 3

Groundwater Elevation Contour Map –
2018 Quarter 3, DP-1835

ENCLOSURE 3

Groundwater Elevation Contour Map – 2018 Quarter 3, DP-1835

Explanation of groundwater elevation contour map. The regional aquifer beneath Los Alamos National Laboratory (LANL) is a complex hydrogeological system. The shape of the regional water table beneath the Pajarito Plateau is predominantly controlled by the areas of recharge to the west (i.e., the flanks of the Sierra de los Valles and the Pajarito fault zone) and discharge to the east (i.e., the Rio Grande and the White Rock Canyon Springs). At more local scales such as the chromium area, the structure of the regional water table and groundwater flow is also expected to be influenced by (1) local infiltration zones and recharge areas (e.g., beneath canyons), (2) heterogeneity and anisotropy in the aquifer properties, and (3) discharge and injection locations (municipal water-supply wells and extraction/injection wells within the chromium project area).

Long-term water-level data, contaminant transport observations (travel times and direction of migration), and calibrated model results are all lines of evidence that suggest that the water table was relatively flat in the area of the chromium plume before the implementation of CrEX extraction and CrIN injection wells. Steeper gradients are found to the west because of the mountain-front recharge and to the east towards the Rio Grande. The low ambient gradient in the chromium site area could be related to the relatively high permeability of the Puye Formation and Miocene pumiceous sediments, anisotropy of the regional aquifer, localized recharge along the canyons above the regional aquifer, faults or other lineaments that affect regional-scale hydraulic conductivity, and nearby water-supply pumping. Although it is difficult to infer absolute groundwater flow directions from the relatively flat contours in the chromium plume area, groundwater elevation data and contaminant transport observations indicate that flow direction is generally to the east-southeast. Any southerly component to the inferred groundwater flow direction may be related to the effects of stratigraphy.

Water-table elevations in the chromium plume area can vary temporally as a result of transient effects that include injection into and extraction from the chromium interim measure infrastructure wells and pumping of Los Alamos County's water-supply wells. This is discussed for the case of 2018 Quarter 3 below.

Effects on flow direction from water-supply pumping are small compared with the local effects caused by extraction and injection at project wells. Observations of transients in the water levels observed at the monitoring wells within the plume area 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).

A long-term decline of approximately 0.5 to 1 ft/yr has been observed in the regional water levels throughout the aquifer beneath the Pajarito Plateau. The decline could 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 contour maps are variable over time and, therefore, each map is representative of specific periods of time. Figure E3-1 depicts the average water-level data and water table contour map for August 2018. General flow direction is indicated by vectors on Figure E3-1, with potential variability indicated by the angle between the vectors.

ENCLOSURE 3

Groundwater Elevation Contour Map – 2018 Quarter 3, DP-1835

To generate this contour map, average water levels are calculated using values from the middle month of the 3-mo reporting period. Monitoring wells within and surrounding the plume are used, including wells not presented on the map. Those surrounding wells provide useful control points for contouring along the edges of the area of interest for this report. Only well screens near the water table are used for contouring. Most of the well screens selected are less than 75 ft below the water table, with the exception of R-13, R-21, R-31 screen 2, R-32, R-37 screen 2, and R-40 screen 2. At locations with a history of water-level data for which there are no data for the present quarter, values can be estimated using linear regression based on relationships with other nearby wells. For 2018 Quarter 3, this was the case for R-25, R-31, and R-41. These wells are not within the plume area but are useful constraints in the surrounding directions.

During this reporting period, the following interim measure infrastructure wells were consistently operated: CrEX-1, CrEX-2, CrIN-3, CrIN-4, and CrIN-5. CrEX-3 was operated intermittently as described in Enclosure 1. Pumping at these wells began on May 23, 2018, and therefore may have started to have had a minor influence upon water levels during the last quarter's map (2018 Quarter 2). During Quarter 3, an influence is readily recognized and is demonstrated by a cone of depression in the area of the extraction wells (Figure E3-1).

CrEX-3 was operated from May 23 through July 23, 2018, for a 24-hr interval from 8/16 until 8/17, and from 9/19 until 9/30. Therefore, the 2018 Quarter 3 (August) map (Figure E3-1) shows the influence of pumping primarily at CrEX-1 and CrEX-2, where a 3-ft decrease in water level is seen in CrPZ-1 since the 2018 Quarter 2 average.

Simple interpolation methods for water table data from a complex heterogeneous site could produce maps that do not represent physically realistic hydrological systems. This water table map is contoured by incorporating process knowledge of groundwater hydraulics (e.g., flownet conformity rules) as well as conceptual models of groundwater flow in the project area, as described above. Key inputs to the conceptual model include knowledge of long-term operations of extraction and injection wells, water-level elevations in monitoring wells near extraction and injection points, and cross-hole tracer data between injection wells and monitoring wells.

Because of the spatial coverage of wells and piezometers available as control points and because of the regional structure of significantly steeper gradients to the east and west of the chromium plume area, additional control points are used to provide estimated water-level elevations in areas that do not have sufficient data to provide constraints. As additional analysis is performed using historical and developing data sets from both existing wells and data from anticipated proposed wells, the use of these control points will be reanalyzed, adjusted, or discontinued based on additional supporting data.

Reference

LANL (Los Alamos National Laboratory), October 2009. "Investigation Report for Sandia Canyon," Los Alamos National Laboratory document LA-UR-09-6450, Los Alamos, New Mexico.

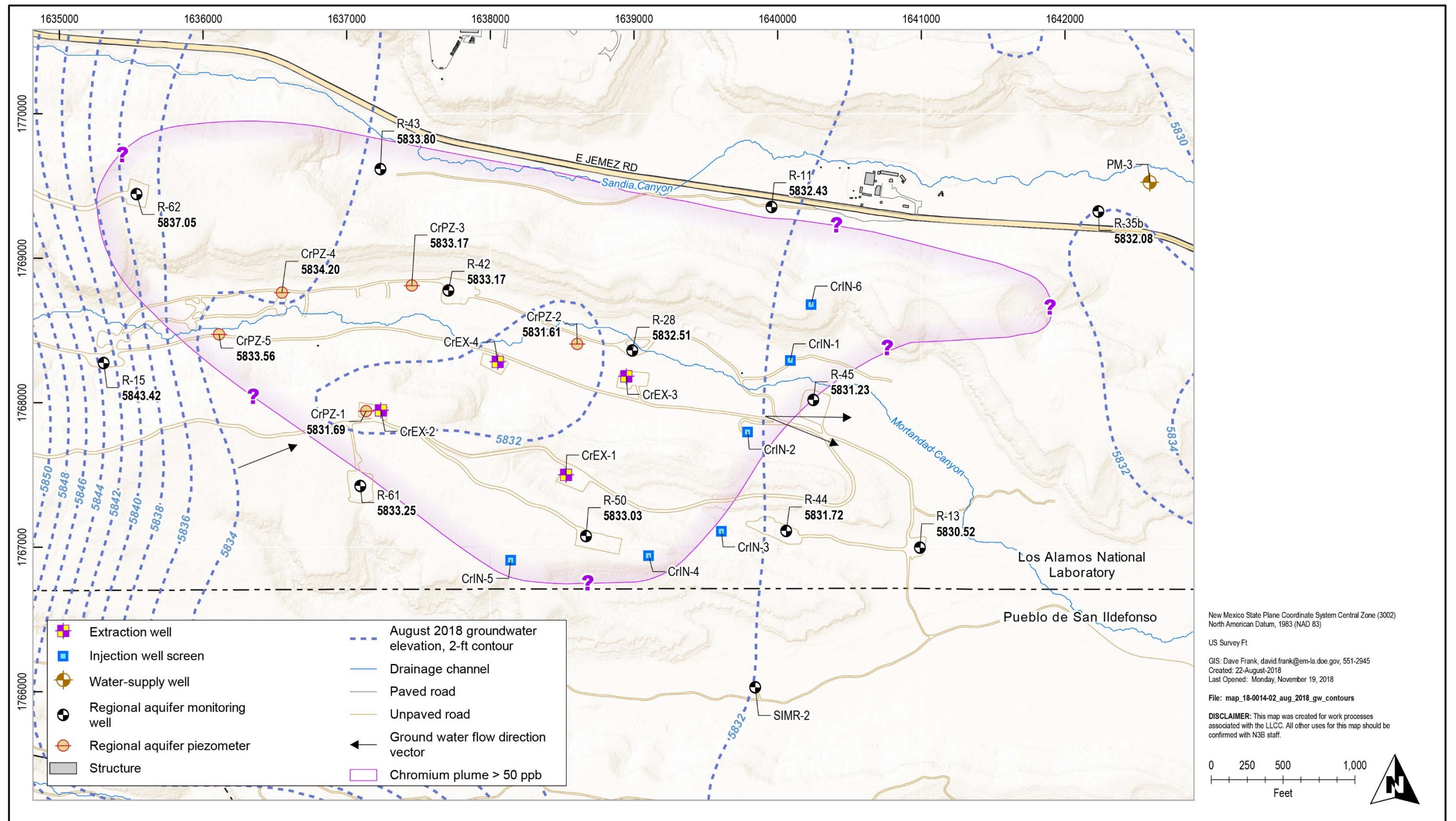


Figure E3-1 Groundwater elevation counter map – 2018 Quarter 3, DP-1835

ENCLOSURE 4

Groundwater Monitoring Wells
Analytical Results Summary Table –
2018 Quarter 3, DP-1835

Table E4-1
Groundwater Monitoring Wells Analytical Results Summary Table - 2018 Quarter 3, DP-1835

Field Sample ID	Location ID	Sample Date	Parameter Name	Report Result	Report Unit	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CASA-18-159859	R-11	07/11/2018	Chloride	3.83	mg/L		Y	Y	EPA:300.0	0.200
CASA-18-159859	R-11	07/11/2018	Perchlorate	0.77	µg/L		Y	Y	SW-846:6850	0.200
CASA-18-159859	R-11	07/11/2018	Chromium	7.05	µg/L	J	Y	Y	SW-846:6020	10.0
CASA-18-159859	R-11	07/11/2018	Fluoride	0.426	mg/L		Y	Y	EPA:300.0	0.100
CASA-18-159859	R-11	07/11/2018	Nitrate-Nitrite as Nitrogen	6.33	mg/L		Y	Y	EPA:353.2	0.500
CASA-18-159859	R-11	07/11/2018	Sulfate	10.4	mg/L		Y	Y	EPA:300.0	0.400
CASA-18-159859	R-11	07/11/2018	Total Dissolved Solids	179	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-159795	R-13	07/13/2018	Chloride	2.56	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-159795	R-13	07/13/2018	Perchlorate	0.402	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-159795	R-13	07/13/2018	Chromium	3.83	µg/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-159795	R-13	07/13/2018	Fluoride	0.199	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-159795	R-13	07/13/2018	Nitrate-Nitrite as Nitrogen	0.748	mg/L		Y	Y	EPA:353.2	0.050
CAMO-18-159795	R-13	07/13/2018	Sulfate	3.54	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-159795	R-13	07/13/2018	Total Dissolved Solids	144	mg/L		Y	Y	EPA:160.1	14.3
CASA-18-159871	R-43 S1	07/17/2018	Chloride	8.64	mg/L		Y	Y	EPA:300.0	0.200
CASA-18-159871	R-43 S1	07/17/2018	Perchlorate	0.869	µg/L		Y	Y	SW-846:6850	0.200
CASA-18-159871	R-43 S1	07/17/2018	Chromium	199	µg/L		Y	Y	SW-846:6020	10.0
CASA-18-159871	R-43 S1	07/17/2018	Fluoride	0.300	mg/L		Y	Y	EPA:300.0	0.100
CASA-18-159871	R-43 S1	07/17/2018	Nitrate-Nitrite as Nitrogen	5.44	mg/L		Y	Y	EPA:353.2	0.500
CASA-18-159871	R-43 S1	07/17/2018	Sulfate	18.1	mg/L		Y	Y	EPA:300.0	0.400
CASA-18-159871	R-43 S1	07/17/2018	Total Dissolved Solids	183	mg/L		Y	Y	EPA:160.1	14.3
CASA-18-159873	R-43 S2	07/18/2018	Chloride	6.39	mg/L		Y	Y	EPA:300.0	0.200
CASA-18-159873	R-43 S2	07/18/2018	Perchlorate	0.899	µg/L		Y	Y	SW-846:6850	0.200
CASA-18-159873	R-43 S2	07/18/2018	Chromium	21.8	µg/L		Y	Y	SW-846:6020	10.0
CASA-18-159873	R-43 S2	07/18/2018	Fluoride	0.348	mg/L		Y	Y	EPA:300.0	0.100
CASA-18-159873	R-43 S2	07/18/2018	Nitrate-Nitrite as Nitrogen	3.79	mg/L		Y	Y	EPA:353.2	0.500

Table E4-1
Groundwater Monitoring Wells Analytical Results Summary Table - 2018 Quarter 3, DP-1835

Field Sample ID	Location ID	Sample Date	Parameter Name	Report Result	Report Unit	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CASA-18-159873	R-43 S2	07/18/2018	Sulfate	9.39	mg/L		Y	Y	EPA:300.0	0.400
CASA-18-159873	R-43 S2	07/18/2018	Total Dissolved Solids	160	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-159807	R-44 S1	07/16/2018	Chloride	2.62	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-159807	R-44 S1	07/16/2018	Perchlorate	0.44	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-159807	R-44 S1	07/16/2018	Chromium	13	µg/L		Y	Y	SW-846:6020	10.0
CAMO-18-159807	R-44 S1	07/16/2018	Fluoride	0.215	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-159807	R-44 S1	07/16/2018	Nitrate-Nitrite as Nitrogen	1.15	mg/L		Y	Y	EPA:353.2	0.050
CAMO-18-159807	R-44 S1	07/16/2018	Sulfate	3.55	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-159807	R-44 S1	07/16/2018	Total Dissolved Solids	131	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-160417	R-44 S1	08/08/2018	Chloride	2.87	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-160417	R-44 S1	08/08/2018	Perchlorate	0.464	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-160417	R-44 S1	08/08/2018	Chromium	12.1	µg/L		Y	Y	SW-846:6020	10.0
CAMO-18-160417	R-44 S1	08/08/2018	Fluoride	0.223	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-160417	R-44 S1	08/08/2018	Nitrate-Nitrite as Nitrogen	1.16	mg/L		Y	Y	EPA:353.2	0.050
CAMO-18-160417	R-44 S1	08/08/2018	Sulfate	3.54	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-160417	R-44 S1	08/08/2018	Total Dissolved Solids	143	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-160789	R-44 S1	09/10/2018	Chloride	4.30	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-160789	R-44 S1	09/10/2018	Perchlorate	0.456	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-160789	R-44 S1	09/10/2018	Chromium	12.4	µg/L		Y	Y	SW-846:6020	10.0
CAMO-18-160789	R-44 S1	09/10/2018	Fluoride	0.334	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-160789	R-44 S1	09/10/2018	Nitrate-Nitrite as Nitrogen	1.19	mg/L		Y	Y	EPA:353.2	0.250
CAMO-18-160789	R-44 S1	09/10/2018	Sulfate	4.74	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-160789	R-44 S1	09/10/2018	Total Dissolved Solids	139	mg/L	H	Y	Y	EPA:160.1	14.3
CAMO-18-159810	R-44 S2	07/16/2018	Chloride	2.24	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-159810	R-44 S2	07/16/2018	Perchlorate	0.316	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-159810	R-44 S2	07/16/2018	Chromium	5.93	µg/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-159810	R-44 S2	07/16/2018	Fluoride	0.265	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-159810	R-44 S2	07/16/2018	Nitrate-Nitrite as Nitrogen	0.696	mg/L		Y	Y	EPA:353.2	0.050

Table E4-1
Groundwater Monitoring Wells Analytical Results Summary Table - 2018 Quarter 3, DP-1835

Field Sample ID	Location ID	Sample Date	Parameter Name	Report Result	Report Unit	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CAMO-18-159810	R-44 S2	07/16/2018	Sulfate	2.78	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-159810	R-44 S2	07/16/2018	Total Dissolved Solids	110	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-160421	R-44 S2	08/08/2018	Chloride	2.11	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-160421	R-44 S2	08/08/2018	Perchlorate	0.334	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-160421	R-44 S2	08/08/2018	Chromium	6.2	µg/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-160421	R-44 S2	08/08/2018	Fluoride	0.276	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-160421	R-44 S2	08/08/2018	Nitrate-Nitrite as Nitrogen	0.682	mg/L		Y	Y	EPA:353.2	0.050
CAMO-18-160421	R-44 S2	08/08/2018	Sulfate	2.57	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-160421	R-44 S2	08/08/2018	Total Dissolved Solids	147	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-160792	R-44 S2	09/18/2018	Chloride	2.21	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-160792	R-44 S2	09/18/2018	Perchlorate	0.364	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-160792	R-44 S2	09/18/2018	Chromium	5.2	µg/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-160792	R-44 S2	09/18/2018	Fluoride	0.385	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-160792	R-44 S2	09/18/2018	Nitrate-Nitrite as Nitrogen	0.622	mg/L		Y	Y	EPA:353.2	0.050
CAMO-18-160792	R-44 S2	09/18/2018	Sulfate	2.62	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-160792	R-44 S2	09/18/2018	Total Dissolved Solids	114	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-159813	R-45 S1	07/17/2018	Chloride	5.73	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-159813	R-45 S1	07/17/2018	Perchlorate	0.609	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-159813	R-45 S1	07/17/2018	Chromium	42.9	µg/L		Y	Y	SW-846:6020	10.0
CAMO-18-159813	R-45 S1	07/17/2018	Fluoride	0.257	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-159813	R-45 S1	07/17/2018	Nitrate-Nitrite as Nitrogen	3.28	mg/L		Y	Y	EPA:353.2	0.500
CAMO-18-159813	R-45 S1	07/17/2018	Sulfate	8.86	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-159813	R-45 S1	07/17/2018	Total Dissolved Solids	164	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-160424	R-45 S1	08/08/2018	Chloride	5.54	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-160424	R-45 S1	08/08/2018	Perchlorate	0.628	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-160424	R-45 S1	08/08/2018	Chromium	43.2	µg/L		Y	Y	SW-846:6020	10.0
CAMO-18-160424	R-45 S1	08/08/2018	Fluoride	0.246	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-160424	R-45 S1	08/08/2018	Nitrate-Nitrite as Nitrogen	3.06	mg/L		Y	Y	EPA:353.2	0.500

Table E4-1
Groundwater Monitoring Wells Analytical Results Summary Table - 2018 Quarter 3, DP-1835

Field Sample ID	Location ID	Sample Date	Parameter Name	Report Result	Report Unit	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CAMO-18-160424	R-45 S1	08/08/2018	Sulfate	8.39	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-160424	R-45 S1	08/08/2018	Total Dissolved Solids	173	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-160798	R-45 S1	09/10/2018	Chloride	5.71	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-160798	R-45 S1	09/10/2018	Perchlorate	0.605	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-160798	R-45 S1	09/10/2018	Chromium	39.2	µg/L		Y	Y	SW-846:6020	10.0
CAMO-18-160798	R-45 S1	09/10/2018	Fluoride	0.363	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-160798	R-45 S1	09/10/2018	Nitrate-Nitrite as Nitrogen	2.82	mg/L		Y	Y	EPA:353.2	0.250
CAMO-18-160798	R-45 S1	09/10/2018	Sulfate	8.66	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-160798	R-45 S1	09/10/2018	Total Dissolved Solids	136	mg/L	H	Y	Y	EPA:160.1	14.3
CAMO-18-159816	R-45 S2	07/17/2018	Chloride	4.66	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-159816	R-45 S2	07/17/2018	Perchlorate	0.442	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-159816	R-45 S2	07/17/2018	Chromium	28	µg/L		Y	Y	SW-846:6020	10.0
CAMO-18-159816	R-45 S2	07/17/2018	Fluoride	0.318	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-159816	R-45 S2	07/17/2018	Nitrate-Nitrite as Nitrogen	0.980	mg/L		Y	Y	EPA:353.2	0.250
CAMO-18-159816	R-45 S2	07/17/2018	Sulfate	5.68	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-159816	R-45 S2	07/17/2018	Total Dissolved Solids	163	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-160427	R-45 S2	08/08/2018	Chloride	4.46	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-160427	R-45 S2	08/08/2018	Perchlorate	0.439	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-160427	R-45 S2	08/08/2018	Chromium	27.8	µg/L		Y	Y	SW-846:6020	10.0
CAMO-18-160427	R-45 S2	08/08/2018	Fluoride	0.310	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-160427	R-45 S2	08/08/2018	Nitrate-Nitrite as Nitrogen	0.905	mg/L		Y	Y	EPA:353.2	0.250
CAMO-18-160427	R-45 S2	08/08/2018	Sulfate	5.34	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-160427	R-45 S2	08/08/2018	Total Dissolved Solids	260	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-160801	R-45 S2	09/10/2018	Chloride	4.68	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-160801	R-45 S2	09/10/2018	Perchlorate	0.444	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-160801	R-45 S2	09/10/2018	Chromium	27.5	µg/L		Y	Y	SW-846:6020	10.0
CAMO-18-160801	R-45 S2	09/10/2018	Fluoride	0.401	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-160801	R-45 S2	09/10/2018	Nitrate-Nitrite as Nitrogen	0.880	mg/L		Y	Y	EPA:353.2	0.250

Table E4-1
Groundwater Monitoring Wells Analytical Results Summary Table - 2018 Quarter 3, DP-1835

Field Sample ID	Location ID	Sample Date	Parameter Name	Report Result	Report Unit	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CAMO-18-160801	R-45 S2	09/10/2018	Sulfate	5.65	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-160801	R-45 S2	09/10/2018	Total Dissolved Solids	144	mg/L	H	Y	Y	EPA:160.1	14.3
CAMO-18-159820	R-50 S1	07/13/2018	Chloride	10.1	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-159820	R-50 S1	07/13/2018	Perchlorate	0.647	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-159820	R-50 S1	07/13/2018	Chromium	133	µg/L		Y	Y	SW-846:6020	10.0
CAMO-18-159820	R-50 S1	07/13/2018	Fluoride	0.208	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-159820	R-50 S1	07/13/2018	Nitrate-Nitrite as Nitrogen	2.35	mg/L		Y	Y	EPA:353.2	0.250
CAMO-18-159820	R-50 S1	07/13/2018	Sulfate	15.3	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-159820	R-50 S1	07/13/2018	Total Dissolved Solids	199	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-160430	R-50 S1	08/09/2018	Chloride	9.50	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-160430	R-50 S1	08/09/2018	Perchlorate	0.646	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-160430	R-50 S1	08/09/2018	Chromium	135	µg/L		Y	Y	SW-846:6020	10.0
CAMO-18-160430	R-50 S1	08/09/2018	Fluoride	0.218	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-160430	R-50 S1	08/09/2018	Nitrate-Nitrite as Nitrogen	2.20	mg/L		Y	Y	EPA:353.2	0.500
CAMO-18-160430	R-50 S1	08/09/2018	Sulfate	14.0	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-160430	R-50 S1	08/09/2018	Total Dissolved Solids	246	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-160804	R-50 S1	09/13/2018	Chloride	10.7	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-160804	R-50 S1	09/13/2018	Perchlorate	0.62	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-160804	R-50 S1	09/13/2018	Chromium	124	µg/L		Y	Y	SW-846:6020	10.0
CAMO-18-160804	R-50 S1	09/13/2018	Fluoride	0.368	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-160804	R-50 S1	09/13/2018	Nitrate-Nitrite as Nitrogen	2.10	mg/L		Y	Y	EPA:353.2	0.250
CAMO-18-160804	R-50 S1	09/13/2018	Sulfate	14.5	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-160804	R-50 S1	09/13/2018	Total Dissolved Solids	173	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-159824	R-50 S2	07/16/2018	Chloride	2.16	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-159824	R-50 S2	07/16/2018	Perchlorate	0.311	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-159824	R-50 S2	07/16/2018	Chromium	4.18	µg/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-159824	R-50 S2	07/16/2018	Fluoride	0.309	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-159824	R-50 S2	07/16/2018	Nitrate-Nitrite as Nitrogen	0.530	mg/L		Y	Y	EPA:353.2	0.050

Table E4-1
Groundwater Monitoring Wells Analytical Results Summary Table - 2018 Quarter 3, DP-1835

Field Sample ID	Location ID	Sample Date	Parameter Name	Report Result	Report Unit	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CAMO-18-159824	R-50 S2	07/16/2018	Sulfate	2.68	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-159824	R-50 S2	07/16/2018	Total Dissolved Solids	143	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-160433	R-50 S2	08/09/2018	Chloride	2.07	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-160433	R-50 S2	08/09/2018	Perchlorate	0.342	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-160433	R-50 S2	08/09/2018	Chromium	3.95	µg/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-160433	R-50 S2	08/09/2018	Fluoride	0.306	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-160433	R-50 S2	08/09/2018	Nitrate-Nitrite as Nitrogen	0.528	mg/L		Y	Y	EPA:353.2	0.050
CAMO-18-160433	R-50 S2	08/09/2018	Sulfate	2.52	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-160433	R-50 S2	08/09/2018	Total Dissolved Solids	149	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-160807	R-50 S2	09/12/2018	Chloride	2.15	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-160807	R-50 S2	09/12/2018	Perchlorate	0.335	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-160807	R-50 S2	09/12/2018	Chromium	4.14	µg/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-160807	R-50 S2	09/12/2018	Fluoride	0.430	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-160807	R-50 S2	09/12/2018	Nitrate-Nitrite as Nitrogen	0.494	mg/L		Y	Y	EPA:353.2	0.050
CAMO-18-160807	R-50 S2	09/12/2018	Sulfate	2.64	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-160807	R-50 S2	09/12/2018	Total Dissolved Solids	120	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-159805	R-62	07/20/2018	Chloride	na ^a	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-159805	R-62	07/20/2018	Perchlorate	na	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-159805	R-62	07/20/2018	Chromium	na	µg/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-159805	R-62	07/20/2018	Fluoride	na	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-159805	R-62	07/20/2018	Nitrate-Nitrite as Nitrogen	na	mg/L		Y	Y	EPA:353.2	0.500
CAMO-18-159805	R-62	07/20/2018	Sulfate	na	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-159805	R-62	07/20/2018	Total Dissolved Solids	na	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-152776	SIMR-2	04/19/2018	Chloride	2.21	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-152776	SIMR-2	04/19/2018	Perchlorate	0.39	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-152776	SIMR-2	04/19/2018	Chromium	5.31	µg/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-152776	SIMR-2	04/19/2018	Fluoride	0.204	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-152776	SIMR-2	04/19/2018	Nitrate-Nitrite as Nitrogen	0.732	mg/L		Y	Y	EPA:353.2	0.050

Table E4-1
Groundwater Monitoring Wells Analytical Results Summary Table - 2018 Quarter 3, DP-1835

Field Sample ID	Location ID	Sample Date	Parameter Name	Report Result	Report Unit	Lab Qualifier	Detect Flag	Filtered	Lab Method	Report Detection Limit
CAMO-18-152776	SIMR-2	04/19/2018	Sulfate	2.84	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-152776	SIMR-2	04/19/2018	Total Dissolved Solids	133	mg/L		Y	Y	EPA:160.1	14.3
CAMO-18-154753	SIMR-2	05/15/2018	Chloride	2.16	mg/L		Y	Y	EPA:300.0	0.200
CAMO-18-154753	SIMR-2	05/15/2018	Perchlorate	0.395	µg/L		Y	Y	SW-846:6850	0.200
CAMO-18-154753	SIMR-2	05/15/2018	Chromium	5.09	µg/L	J	Y	Y	SW-846:6020	10.0
CAMO-18-154753	SIMR-2	05/15/2018	Fluoride	0.238	mg/L		Y	Y	EPA:300.0	0.100
CAMO-18-154753	SIMR-2	05/15/2018	Nitrate-Nitrite as Nitrogen	0.772	mg/L		Y	Y	EPA:353.2	0.050
CAMO-18-154753	SIMR-2	05/15/2018	Sulfate	2.82	mg/L		Y	Y	EPA:300.0	0.400
CAMO-18-154753	SIMR-2	05/15/2018	Total Dissolved Solids	154	mg/L		Y	Y	EPA:160.1	14.3
_b	SIMR-2	06/21/2018	Chloride	NS ^b	mg/L		NS	NS	EPA:300.0	0.200
—	SIMR-2	06/21/2018	Perchlorate	NS	µg/L		NS	NS	SW-846:6850	0.200
—	SIMR-2	06/21/2018	Chromium	NS	µg/L		NS	NS	SW-846:6020	10.0
—	SIMR-2	06/21/2018	Fluoride	NS	mg/L		NS	NS	EPA:300.0	0.100
—	SIMR-2	06/21/2018	Nitrate-Nitrite as Nitrogen	NS	mg/L		NS	NS	EPA:353.2	0.050
—	SIMR-2	06/21/2018	Sulfate	NS	mg/L		NS	NS	EPA:300.0	0.400
—	SIMR-2	06/21/2018	Total Dissolved Solids	NS	mg/L		NS	NS	EPA:160.1	14.3

^a na = Not available. Samples were not analyzed because laboratory received sample package outside of specified preservation temperature range.

^b NS = Not sampled. SIMR-2 area was inaccessible because of Stage 3 fire restrictions.

Notes: SIMR-2 data reported here in accordance with the memorandum of agreement and protocol agreement between San Ildefonso Pueblo and the U.S. Department of Energy.

J in the Lab Qualifier column means the analyte is classified as estimated.

H in the Lab Qualifier column means that the required extraction or analysis holding time for this result was exceeded.

Y in the Detect Flag column means the analyte was detected.

N in the Detect Flag column means the analyte was not detected.

Y in the Filtered column means the sample was filtered.

N in the Filtered column means the sample was not filtered.

ENCLOSURE 5

Treated Groundwater Injection and Extraction Summary Tables –
2018 Quarter 3, DP-1835

Table E5-1
Daily Extraction Summary Table
2018 Quarter 3, DP-1835

Date	CrEX-1 (gal.)	CrEX-2 (gal.)	CrEX-3 (gal.)	CrEX-4 (gal.)	Total (gal.)
7/1/2018	88,112	89,330	82,404	0	259,846
7/2/2018	88,820	89,738	80,333	0	258,892
7/3/2018	88,414	89,587	81,384	0	259,386
7/4/2018	89,203	89,571	82,083	0	260,857
7/5/2018	90,182	90,329	78,915	0	259,426
7/6/2018	89,735	90,249	80,521	0	260,506
7/7/2018	89,292	90,365	79,798	0	259,456
7/8/2018	89,264	90,389	79,184	0	258,837
7/9/2018	104,434	38,602	82,656	0	225,693
7/10/2018	93,153	52,484	86,746	0	232,383
7/11/2018	88,414	92,050	85,506	0	265,971
7/12/2018	84,425	86,126	78,191	0	248,742
7/13/2018	87,946	89,289	86,410	0	263,645
7/14/2018	86,004	89,264	86,319	0	261,587
7/15/2018	87,003	88,088	84,986	0	260,076
7/16/2018	89,291	85,967	83,528	0	258,786
7/17/2018	83,698	79,747	77,263	0	240,708
7/18/2018	94,415	91,590	84,966	0	270,971
7/19/2018	87,126	89,275	84,956	0	261,357
7/20/2018	85,490	88,982	84,288	0	258,759
7/21/2018	89,028	86,203	82,364	0	257,595
7/22/2018	81,462	83,874	79,659	0	244,995
7/23/2018	95,115	93,450	3,574	0	192,139
7/24/2018	100,745	87,632	0	0	188,378
7/25/2018	0	0	0	0	0
7/26/2018	42,124	38,186	0	0	80,311
7/27/2018	112,325	106,488	0	0	218,813
7/28/2018	111,390	106,151	0	0	217,541
7/29/2018	108,595	105,785	0	0	214,380
7/30/2018	112,323	106,221	0	0	218,544
7/31/2018	112,324	106,226	0	0	218,550
8/1/2018	112,375	106,253	0	0	218,628
8/2/2018	112,419	106,256	0	0	218,675
8/3/2018	102,412	105,939	0	0	208,351
8/4/2018	112,747	105,922	0	0	218,669
8/5/2018	112,735	105,914	0	0	218,649
8/6/2018	112,696	105,937	0	0	218,633
8/7/2018	112,727	106,003	0	0	218,730
8/8/2018	112,671	106,068	0	0	218,739

Table E5-1
Daily Extraction Summary Table
2018 Quarter 3, DP-1835

Date	CrEX-1 (gal.)	CrEX-2 (gal.)	CrEX-3 (gal.)	CrEX-4 (gal.)	Total (gal.)
8/9/2018	112,679	106,002	0	0	218,681
8/10/2018	112,575	106,016	0	0	218,590
8/11/2018	112,659	106,025	0	0	218,684
8/12/2018	113,229	105,613	0	0	218,842
8/13/2018	113,153	105,856	0	0	219,009
8/14/2018	112,969	106,016	0	0	218,985
8/15/2018	112,737	106,030	0	0	218,767
8/16/2018	93,835	93,242	49,914	0	236,991
8/17/2018	98,868	100,625	40,792	0	240,284
8/18/2018	112,126	109,208	0	0	221,334
8/19/2018	112,279	109,223	0	0	221,502
8/20/2018	112,326	109,223	0	0	221,548
8/21/2018	112,304	109,256	0	0	221,560
8/22/2018	106,638	102,728	0	0	209,366
8/23/2018	113,768	109,442	0	0	223,209
8/24/2018	113,740	109,414	0	0	223,155
8/25/2018	114,727	106,012	0	0	220,739
8/26/2018	134,144	0	0	0	134,144
8/27/2018	126,667	0	0	0	126,667
8/28/2018	115,840	70,674	0	0	186,514
8/29/2018	112,037	109,425	0	0	221,461
8/30/2018	112,051	109,452	0	0	221,503
8/31/2018	112,021	109,439	0	0	221,460
9/1/2018	113,569	109,328	0	0	222,897
9/2/2018	113,774	109,443	0	0	223,217
9/3/2018	113,780	109,408	0	0	223,188
9/4/2018	113,734	109,449	0	0	223,183
9/5/2018	113,765	109,439	0	0	223,205
9/6/2018	113,742	109,413	0	0	223,155
9/7/2018	113,790	109,466	0	0	223,256
9/8/2018	113,748	109,411	0	0	223,160
9/9/2018	113,740	109,400	0	0	223,141
9/10/2018	113,760	109,427	0	0	223,187
9/11/2018	85,825	82,408	0	0	168,233
9/12/2018	113,728	108,990	0	0	222,718
9/13/2018	113,778	109,122	0	0	222,901
9/14/2018	113,772	109,062	0	0	222,834
9/15/2018	113,756	109,150	0	0	222,907
9/16/2018	113,742	109,077	0	0	222,819

Table E5-1
Daily Extraction Summary Table
2018 Quarter 3, DP-1835

Date	CrEX-1 (gal.)	CrEX-2 (gal.)	CrEX-3 (gal.)	CrEX-4 (gal.)	Total (gal.)
9/17/2018	113,790	109,162	0	0	222,952
9/18/2018	113,720	109,205	0	0	222,926
9/19/2018	103,905	102,724	29,598	0	236,226
9/20/2018	87,827	92,159	78,626	0	258,613
9/21/2018	87,830	92,150	79,154	0	259,134
9/22/2018	87,852	92,172	78,504	0	258,528
9/23/2018	87,823	92,144	77,752	0	257,718
9/24/2018	87,537	92,006	77,760	0	257,303
9/25/2018	81,780	83,080	71,913	0	236,773
9/26/2018	95,078	93,589	82,076	0	270,744
9/27/2018	94,976	93,411	82,073	0	270,460
9/28/2018	91,471	92,186	80,839	0	264,495
9/29/2018	82,990	89,689	77,785	0	250,464
9/30/2018	85,716	90,765	20,899	0	197,380
Subtotal					20,776,913

Table E5-2
Daily Injection Summary Table 2018 Quarter 3, DP1835

Date	CrIN-1* (gal.)	CrIN-2* (gal.)	CrIN-3 (gal.)	CrIN-4 (gal.)	CrIN-5 (gal.)	CrIN-6* (gal.)	Total (gal.)
7/1/2018	0	0	86,345	93,634	80,635	0	260,614
7/2/2018	0	0	86,194	93,701	80,646	0	260,541
7/3/2018	0	0	86,420	93,824	80,664	0	260,909
7/4/2018	0	0	86,391	93,579	80,641	0	260,611
7/5/2018	0	0	86,302	93,690	80,610	0	260,602
7/6/2018	0	0	85,742	93,643	80,645	0	260,030
7/7/2018	0	0	86,003	93,568	80,646	0	260,217
7/8/2018	0	0	85,323	93,628	80,627	0	259,578
7/9/2018	0	0	62,507	93,988	81,440	0	237,936
7/10/2018	0	0	52,044	95,858	86,750	0	234,653
7/11/2018	0	0	87,628	95,595	90,119	0	273,342
7/12/2018	0	0	44,330	95,090	89,601	0	229,021
7/13/2018	0	0	78,543	95,439	90,183	0	264,165
7/14/2018	0	0	77,781	95,308	89,920	0	263,009
7/15/2018	0	0	77,756	95,603	89,735	0	263,094
7/16/2018	0	0	77,719	95,308	89,549	0	262,576
7/17/2018	0	0	50,734	95,140	89,978	0	235,852
7/18/2018	0	0	79,165	94,735	88,037	0	261,938

Table E5-2
Daily Injection Summary Table 2018 Quarter 3, DP1835

Date	CrIN-1* (gal.)	CrIN-2* (gal.)	CrIN-3 (gal.)	CrIN-4 (gal.)	CrIN-5 (gal.)	CrIN-6* (gal.)	Total (gal.)
7/19/2018	0	0	79,226	94,398	87,505	0	261,130
7/20/2018	0	0	79,184	94,565	87,512	0	261,262
7/21/2018	0	0	79,191	94,902	87,774	0	261,867
7/22/2018	0	0	79,230	94,909	87,841	0	261,981
7/23/2018	0	0	3,732	95,106	88,421	0	187,259
7/24/2018	0	0	2,643	83,799	79,586	0	166,028
7/25/2018	0	0	0	0	0	0	0
7/26/2018	0	0	22,530	37,767	32,865	0	93,162
7/27/2018	0	0	56,165	95,861	84,965	0	236,990
7/28/2018	0	0	45,063	95,276	83,729	0	224,069
7/29/2018	0	0	9,467	95,239	84,941	0	189,647
7/30/2018	0	0	42,383	95,353	84,739	0	222,474
7/31/2018	0	0	37,323	95,084	84,800	0	217,207
8/1/2018	0	0	56,148	93,853	84,711	0	234,713
8/2/2018	0	0	56,166	93,647	84,051	0	233,864
8/3/2018	0	0	21,893	83,048	72,311	0	177,252
8/4/2018	0	0	51,936	95,341	80,956	0	228,233
8/5/2018	0	0	51,884	95,971	81,443	0	229,298
8/6/2018	0	0	51,807	95,656	81,164	0	228,627
8/7/2018	0	0	15,327	95,978	81,497	0	192,801
8/8/2018	0	0	39,964	86,520	81,927	0	208,411
8/9/2018	0	0	59,739	80,683	81,652	0	222,074
8/10/2018	0	0	60,023	80,626	81,530	0	222,179
8/11/2018	0	0	61,655	80,606	81,132	0	223,393
8/12/2018	0	0	63,315	79,889	80,664	0	223,867
8/13/2018	0	0	63,324	79,813	81,049	0	224,186
8/14/2018	0	0	63,361	80,021	81,426	0	224,809
8/15/2018	0	0	63,448	80,576	82,047	0	226,072
8/16/2018	0	0	63,277	80,572	82,010	0	225,859
8/17/2018	0	0	63,333	79,926	81,399	0	224,658
8/18/2018	0	0	63,310	79,828	81,308	0	224,445
8/19/2018	0	0	62,917	79,451	81,099	0	223,468
8/20/2018	0	0	62,059	79,256	80,744	0	222,058
8/21/2018	0	0	61,933	79,167	80,638	0	221,738
8/22/2018	0	0	62,340	79,632	81,139	0	223,111
8/23/2018	0	0	62,668	79,930	81,535	0	224,133
8/24/2018	0	0	62,692	80,010	81,596	0	224,298
8/25/2018	0	0	62,708	80,093	81,650	0	224,451
8/26/2018	0	0	20,069	63,747	57,466	0	141,282

Table E5-2
Daily Injection Summary Table 2018 Quarter 3, DP1835

Date	CrIN-1* (gal.)	CrIN-2* (gal.)	CrIN-3 (gal.)	CrIN-4 (gal.)	CrIN-5 (gal.)	CrIN-6* (gal.)	Total (gal.)
8/27/2018	0	0	0	55,401	48,702	0	104,102
8/28/2018	0	0	38,949	70,245	71,186	0	180,380
8/29/2018	0	0	54,093	82,108	85,609	0	221,810
8/30/2018	0	0	53,272	82,723	84,661	0	220,656
8/31/2018	0	0	55,359	83,170	84,106	0	222,636
9/1/2018	0	0	57,647	81,632	83,814	0	223,093
9/2/2018	0	0	57,527	80,596	84,335	0	222,458
9/3/2018	0	0	57,608	80,652	84,508	0	222,769
9/4/2018	0	0	57,605	80,626	84,559	0	222,790
9/5/2018	0	0	57,585	81,435	84,584	0	223,604
9/6/2018	0	0	57,609	83,422	84,316	0	225,347
9/7/2018	0	0	57,615	83,506	84,320	0	225,442
9/8/2018	0	0	57,565	84,009	84,085	0	225,660
9/9/2018	0	0	57,042	85,322	83,543	0	225,907
9/10/2018	0	0	56,978	85,625	83,522	0	226,126
9/11/2018	0	0	19,502	86,406	84,452	0	190,360
9/12/2018	0	0	26,436	86,171	86,869	0	199,476
9/13/2018	0	0	83,327	63,446	91,688	0	238,461
9/14/2018	0	0	56,868	87,049	66,430	0	210,347
9/15/2018	0	0	53,279	80,666	87,684	0	221,629
9/16/2018	0	0	53,309	80,600	87,826	0	221,735
9/17/2018	0	0	73,584	67,711	89,447	0	230,741
9/18/2018	0	0	69,319	90,965	63,080	0	223,364
9/19/2018	0	0	63,401	89,673	84,119	0	237,193
9/20/2018	0	0	83,794	88,825	83,619	0	256,238
9/21/2018	0	0	83,993	87,865	83,655	0	255,513
9/22/2018	0	0	81,833	88,020	83,948	0	253,801
9/23/2018	0	0	80,519	89,084	84,496	0	254,098
9/24/2018	0	0	85,846	89,460	83,973	0	259,279
9/25/2018	0	0	88,278	89,200	83,703	0	261,181
9/26/2018	0	0	88,198	89,280	83,734	0	261,212
9/27/2018	0	0	89,601	89,271	83,358	0	262,230
9/28/2018	0	0	87,748	89,304	83,545	0	260,597
9/29/2018	0	0	86,693	89,270	83,508	0	259,472
9/30/2018	0	0	24,995	90,211	84,528	0	199,734
Subtotal							20,820,483

* UIC well construction and injection of treated groundwater did not occur during this quarter in accordance with the New Mexico Environment Department's correspondence on September 25, 2017.

ENCLOSURE 6

Facility Layout Map –
2018 Quarter 3, DP-1835

