GROUNDWATER DISCHARGE PERMIT

APPLICATION FOR THE

Chromium Plume Control Interim Measure

and Plume-Center Characterization

Submitted by

LOS ALAMOS NATIONAL SECURITY, LLC

And the

US DEPARTMENT OF ENERGY

MARCH 2015

LA-UR-15-21970

ENV-DO-15-0085

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Los Alamos National Laboratory's Hydrogeologic Studies of the Pajarito Plateau: A Synthesis of Hydrogeologic Workplan Activities (1994-2004). LA-14263-MS.

2009 Hydrogeologic Site Altas. LAUR-09-3763.

Conceptual Models of Vadose Zone Flow and Transport Beneath The Pajarito Plateau, Los Alamos, New Mexico. Vadose Zone Journal, Vol. 4, August 2005

NRCS Soil Survey of Sandoval County Area, New Mexico, Parts of Los Alamos, Sandoval, and Rio Arriba Counties.

2006 Mortandad Canyon Investigation Report. LA-UR-06-6752.

Well Logs:

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Map #2 – LANL Soils Map.

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LA-UR-15-21970
ENV-DO-15-0085

NEW MEXICO ENVIRONMENT DEPARTMENT
GROUND WATER QUALITY BUREAU

DISCHARGE PERMIT APPLICATION

Type of Application. Check appropriate box.

☒ Application for new Discharge Permit -- new facility

☐ Application for new Discharge Permit -- existing (unpermitted) facility

☐ Application for Discharge Permit Renewal

☐ Application for Discharge Permit Modification
"Modification" is defined as a change to the permit requirements that result from a change in the location of the discharge, a significant increase in the quantity of the discharge, or a significant change in the quality of the discharge.

☐ Application for Discharge Permit Renewal and Modification

For an existing Discharge Permit, please indicate: DP Number _____ Expiration date _____

Checklist of Application Components.

☒ Part A: Administrative Completeness.	*Instructions for completing the application are included on the form itself and on Supplemental Instructions for Parts A and B.* *You may fill out the application manually, or a Microsoft Word version may be downloaded from www.nmenv.state.nm.us (Ground Water Quality) and filled out electronically.*
☒ Part B: Operational, Monitoring, Contingency and Closure Plans, with required attachments. *Choose appropriate option*: ☐ Septic Tank System ☒General – Various Facility Types	
☒Part C: Site Information, with required attachments.	
☒$100 Filing Fee, payable to the New Mexico Environment Department. *Required from all applicants.* An additional fee will be assessed prior to permit issuance. Permit fees are listed in Section 20.6.2.3114 NMAC.	

Certification. Signature must be that of the person named in Item A-3 of Part A of the application.

I certify under penalty of law that I am knowledgeable about the information contained in this application. The information is, to the best of my knowledge and belief, true, accurate and complete.

Signature: _____ Date: _____

Printed Name: Alison M. Dorries

Title: Division Leader, Environmental Protection Division (ENV); Los Alamos National Security, LLC (LANS)

Signature: _____ Date: _____

Printed Name: Christine Gelles

Title: Acting Manager, Environmental Management, Los Alamos Field Office (EM-LA); U. S. Department of Energy (US DOE)

Send three complete copies of this application and the filing fee to:

Program Manager
Ground Water Pollution Prevention Section
New Mexico Environment Department
PO Box 5469
Santa Fe, NM 87502

GROUND WATER DISCHARGE PERMIT APPLICATION
PART A: ADMINISTRATIVE COMPLETENESS
All Facilities

A-1. Facility Information. See Supplemental Instructions to determine what constitutes the "facility." The physical location of the facility must be provided. If the facility does not have an address, the location can be described by road intersections, mile posts, or landmarks, as appropriate.

Facility Name	Los Alamos National Laboratory (LANL or the Laboratory)
Former Names (if any)	NA
Physical address/location (*mandatory*)	Los Alamos, New Mexico
	County Los Alamos
Mailing address	P.O. Box 1663 Mail Stop K499
	Los Alamos, NM 87545
Contact person	Alison M. Dorries
Title	Division Leader, Environmental Protection Division (ENV)
Telephone number(s)	505-665-6952
Fax number	505-665-3811 E-mail address adorries@lanl.gov

A-2. Type of Discharge and Type of Facility. See Supplemental Instructions.

Type of discharge: ☐ Domestic ☐ Agricultural ☒ Industrial ☐ Mining

Type of facility: Class V ground water remediation injection wells used to inject contaminated ground water that has been treated utilizing ion exchange to meet New Mexico Ground Water Quality Standards for chromium.

A-3. Applicant Information. The applicant is the person or entity (e.g., corporation, partnership, organization, municipality, etc.) legally responsible for the discharge and for complying with the terms of the Discharge Permit. If the applicant is an entity, then the name and title of a contact person must be provided. This application must be signed by the applicant or contact person named here.

Applicant Name	U.S. Department of Energy (DOE), Environmental Management, Los Alamos Field Office (EM-LA)[1]
	Los Alamos National Security, LLC (LANS)[2]
Mailing address	[1]3747 West Jemez Road, Los Alamos, NM 87544
	[2]P.O. Box 1663, MS K499, Los Alamos, NM 87545
Contact person	[1]Christine Gelles, EM-LA
	[2]Alison Dorries, LANS

Title	[1]Acting Manager	[2]Division Leader	
Telephone number(s)	[1](505) 665-5658	[2](505) 665-6952	
Fax number	[1](505) 606-2132 [2](505) 665-3811	E-mail address	[1]christine.gelles@em.doe.gov [2]adorries@lanl.gov

A-4. Consultant Information (if applicable). If the consultant is a company or organization, then the name and title of a contact person must be provided.

Consultant/Firm Name	N/A
Mailing address	
Contact person	
Title	
Telephone number(s)	
Fax number	E-mail address

A-5. Permit Contact Information (if applicable). If someone other the applicant listed in Item A-3 or a consultant listed in Item A-4 is a primary contact for this application and/or facility, list here.

Permit Contact Name	Robert S. Beers
Title	Environmental Professional, Environmental Compliance Programs Group, LANS
Mailing address	P.O. Box 1663, MS K490
	Los Alamos, NM 87545
Telephone number(s)	(505) 667-7969
Fax number	E-mail address bbeers@lanl.gov

A-6. Ownership.

The applicant owns (check as appropriate): ☒ the facility* ☐ some discharge sites ☐ all discharge sites

***Department of Energy (DOE) Facility**

If other parties own the facility or any of the discharge sites, attach their names and contact information.

A-7. Discharge Quantity.

Your Discharge Permit will specify a maximum discharge volume, which is typically expressed as the maximum number of gallons per day that may be treated and/or disposed of. Please indicate below the maximum discharge volume for your facility. You must show how it was determined in Part B of your application. For further explanation, see Supplemental Instructions for Part B.

Maximum discharge volume: 648,000 gallons per day (or other units: ____)

A-8. Processing, Treatment, Storage and Disposal System. Briefly describe how wastewater, sludge, etc. is processed, treated, stored, and/or disposed of at your facility. See Supplemental Instructions for examples of system components.

The system will consist of up to three ground water extraction wells (CrEX-1, CrEX-2 and CrEX-3), and up to six ground water injection wells (CrIN-1, CrIN-2, CrIN-3, CrIN-4, CrIN-5 and CrIN-6). The system will be operated continuously with water being pumped, treated and injected or land applied (under DP-1793). Extracted groundwater will be conveyed from the extraction wells to the ion exchange treatment systems through double wall piping with leak detection systems. Treated water will be pumped through single wall piping and distributed to the injection wells. Monitoring of the extraction, treatment and injection systems will be conducted to ensure proper system operation. The system will be monitored by a supervisory control and data acquisition (SCADA) system. A personal computer (PC) workstation (SCADA computer) centrally located will contain a man-machine interface graphical software package to monitor and record signals such as flowrates, pressures, liquid levels, ground water levels, pump on- off status, alarms, etc. from the system sites. See the System Operational Plan in Appendix A.

See Chromium Project Process Flow Diagrams CrEX-3 to CrIN-1, CrIN-2, CrIN-3 and CrIN-6 and CrEX-1and CrEX-2 to CrIN-4 and CrIN-5 in Appendix A.

A-9. Discharge Locations. List the locations of your facility and of all components of your processing, treatment, storage and/or disposal system. Examples of components include septic tanks, lagoons, leachfields, irrigation sites, mine stockpiles, etc. Additional examples are listed in the Supplemental Instructions. Latitude and longitude are optional unless township, range and section are not available.

Components	Township	Range	Section(s)	Latitude	Longitude
Injection Well #1	19N	06E	24		
Injection Well #2	19N	06E	24		
Injection Well #3	19N	06E	25		
Injection Well #4	19N	06E	25		
Injection Well #5	19N	06E	25		
Injection Well #6	19N	06E	24		
CrEX-1 (IX treatment co-located)	19N	06E	24		
CrEX-2 (IX treatment co-located)	19N	06E	24		
CrEX-3 (IX treatment co-located)	19N	06E	24		
Storage Tanks (co-utilized by DP-1793)	19N	06E	24		
Influent Pipelines (double-walled)	19N	06E	24/25		
Treated Water Pipelines (single-walled)	19N	06E	24/25		
Lagoons #1-6 (co-utilized by DP-1793)	19N	06E	24		

A-10. Discharge Quality.

Indicate the expected quality of the discharge -- wastewater, leachate, sludge, etc. -- generated, stored, treated, processed and/or discharged at your facility. List the contaminants of concern and the expected concentrations. *Not all facilities need to characterize influent quality.* See Supplemental Instructions for typical contaminants and additional guidance.

Expected or Known Contaminants	**Expected or Known Contaminants** Indicate units: mg/L, CFU/100 ml, etc.	
	Incoming (Influent)[1]	Final (Effluent)[2]
Chromium	100 µg/L [3]	<4.0 µg/L
Nitrate (as N)	2 mg/L	2 mg/L
Perchlorate	0.6 µg/L	0.25 µg/L
TDS	150 mg/L	150 mg/L
Fluoride	0.3 mg/L	0.3 mg/L
Chloride	9 mg/L	25 mg/L [4]

[1] In less otherwise noted, data is from R-50, Screen 1. See Excel data file on CD in Appendix B from http://www.intellusnmdata.com/.

[2] CrEX-1

[3] Data from R-50, Screen 2. See Excel data file on CD in Appendix B from http://www.intellusnmdata.com/.

[4] Chloride is the mobile ion that is replaced in the ion exchange resin, therefore chloride concentrations are higher in effluent.

For **new** septic tank systems, you may either fill out the chart above or simply check one of the following options:

☐ typical domestic wastewater

☐ low-strength domestic wastewater (large gray water component; e.g., laundromat, spa, etc.)

☐ high-strength domestic wastewater (low water use; e.g., RV park, low-flow toilets at campground, etc.)

A-11. Ground Water Conditions.

All applicants must provide the depth to and pre-discharge TDS concentration of the ground water that could be affected by the discharge. Refer to Supplemental Instructions for details on how to obtain these values.

Indicate the depth to the most shallow ground water beneath the discharge site. If there are multiple discharge sites, indicate the range of depths.	Indicate pre-discharge total dissolved solids (TDS) concentration of most shallow ground water beneath the discharge site. Attach copies of analyses.
Depth to water (feet): Alluvial: 50-75 Perched: 500-600 Regional: 900-1100	TDS (mg/L): Alluvial: 329 Intermediate: 314 Regional: 150
Reference: ☒ Measurement, nearby monitoring well ☐ Measurement, nearby supply well ☐ Well log from nearby well (attach copy) ☐ Office of the State Engineer http://www.ose.state.nm.us/ ☐ Report or study (give citation here and attach relevant portion): ☐ Other (describe):	Reference: ☒ Analysis from upgradient monitoring well ☐ Analysis from on-site supply well ☐ Analysis from shallow nearby supply well ☐ Concentration provided in previous Discharge Permit application ☐ Report or study (give citation here and attach relevant portion): ☐ Other (describe):

A-12. Public Notice. See Supplemental Instructions.

a) The public notice packet including instructions and materials should be sent to:

☐Applicant ☐ Consultant ☒ Other: Permit Contact (A-5)

b) Copies of the public notice packet (excluding sign) should be sent to:

☐Applicant ☐ Consultant ☒Other: Permit Contact (A-5)

c) The applicant is required to provide public notice of this application by placing a display ad in a newspaper of general circulation near the location of the proposed discharge. Indicate newspaper you intend to place the ad in:

Newspaper: Los Alamos Monitor

d) *For new or modification applications only:* The applicant must post a sign for 30 days in a conspicuous location at or near the facility, as approved by NMED. One sign must be posted for each 640 contiguous acres or less of the discharge site. An additional notice must be posted at an off-site location conspicuous to the public. Describe the locations below where you intend to post the notices. You may also attach sketches or photographs.

At or near facility: *2 by 3 feet in size*

The project is located in T19N, R06E, Sections 24 and 25. Accordingly a sign will be posted at each of the following locations:

1. For Section 24: Off Laredo Road adjacent to TA-72 Building 39.
2. For Section 25: Off Mesita del Buey adjacent to TA-54 Building 1009.

Off-site location: *flyer size*

LANL Public Reading Room
94 Cities of Gold Rd.
Pojoaque, NM 87506

GROUND WATER DISCHARGE PERMIT APPLICATION
PART B: OPERATIONAL, MONITORING, CONTINGENCY AND CLOSURE PLANS GENERAL FORM (VARIOUS FACILITY TYPES)

Operational Plan *[Section 20.6.2.3106.C, 3109.C NMAC]*

B-1. **Source(s) of the Discharge.** Describe what generates the wastewater, sludge or other discharges processed and/or disposed of at your facility. Identify all sources. Attach additional pages, if needed. See Supplemental Instructions.

The source of the discharge is due to ground water treatment involving extraction, treatment with ion exchange and injection of the treated ground water into the regional aquifer.

B-2. **Discharge Quantity.** Describe the methods/calculations used to determine the maximum discharge volume listed in Item A-6 in Part A of your application. Attach additional pages, if needed. See Supplemental Instructions.

The six proposed injection wells will have a maximum injection capacity of 75 gallons per minute each with a total design capacity of 450 gallons per minute or 648,000 gallons per day.

B-3. **Site Map.** Attach a site map showing the components of your proposed system and relevant surrounding features, clearly labeled, such as:

- treatment units
- lagoons
- tanks
- sumps
- manure separators
- land application fields
- domestic wastewater reuse areas
- pits
- stockpiles
- leachfields
- sludge drying beds
- roads
- buildings
- supply wells
- monitoring wells
- extraction/injection wells
- arroyos
- nearby water bodies such as ponds or canals
- property boundaries
- other permitted discharges
- required setbacks
- north arrow

If map is not to scale, mark distances on the map.

☒ Site map is attached.

See Map #1 in Appendix C.

B-4. **Flood Protection**. Describe the methods used to prevent flooding and run-off at the facility (tank protection, berms, diversion channels, etc.)

New wells and treatment infrastructure are located outside of the floodplain. Pipelines will cross into the 100-year floodplain and are protected through burial at an appropriate depth. The 100-year floodplain is shown on Map #1 in Appendix C.

B-5. Plans and Specifications. For new facilities and for new components of existing systems, attach plans and specifications certified by a New Mexico registered professional engineer. *[Section 20.6.2.1202 NMAC]*

☐ Not applicable because no new facilities are proposed.

☒ Plans and specifications are attached. **See Process sketches in Appendix A and Appendix B on the CD.**

☐ Plans and specifications were previously submitted. Submittal date(s): _____

B-6. Description of Components. Provide descriptive details of all components of your processing, treatment, storage and/or disposal system. Include all components listed under Item A-8 in Part A.

Component	Description (construction material, liner type, irrigation method, capacity, dimensions, area, etc.)
Extraction wells (CrEX-1, CrEX-2, CrEX-3)	Stainless steel casing – see CrEX-1 well completion fact sheet on the CD in Appendix B for more information. CrEX-2 and CrEX-3 as-built information will be provided following well installation.
Influent water pipelines	Double-walled pipe
Influent water storage (as necessary)	Storage Tanks
Treatment units	Ion Exchange (IX) Resin and Vessel – see information on resin provided in Appendix B on the CD.
Control units and level indicators	Flow controls, remote sensing units, pressure sensors will all be tied to the SCADA system to control the operation of the treatment unit including the extraction well pumps.
Treated water pipelines	Single-walled pipe
Injection wells #1-6	Typical injection well detail provided in Appendix B on the CD.
Lagoons #1-6	Liner information is provided in Appendix B on the CD.

B-7. Operational Plan. Attach a detailed description of how you operate your processing, treatment, storage and/or disposal system.

Animal feeding operations: include stormwater management, nutrient management plans, method for mixing irrigation and wastewater.

Domestic wastewater treatment facilities: include pre-treatment, solids management, vegetation management for land application.

Facilities using reclaimed domestic wastewater above ground: include proposed water quality classification(s), effluent monitoring, setbacks, irrigation schedules, etc. that will result in protection of public health and the environment. Please refer to *NMED Ground Water Quality Bureau Guidance: Above-Ground Use of Reclaimed Domestic Wastewater* for further information. A copy of the guidance document is available on the NMED website www.nmenv.state.nm.us under "Ground Water Quality".

☒ Operational plan is attached. See Appendix A and the CD in Appendix B.

☐ Operational plan was previously submitted. Submittal date(s): _____

An operational plan for the Chromium Treatment Unit 6 utilized for DP-1793 is included on the CD in Appendix B. An operational plan for the chromium treatment and use of the injection wells along with process drawings are included in Appendix A.

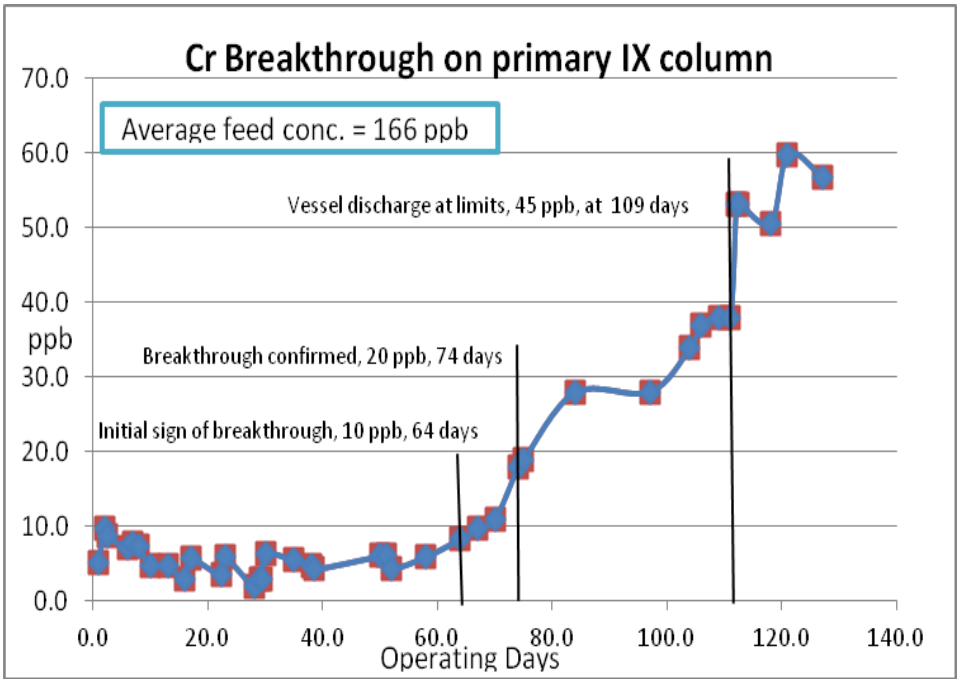
Operation of the system will be controlled using a program logic controller (PLC) and remote terminal units (RTUs). Specific monitoring of the extraction, treatment and injection systems will be completed to ensure

proper system operation. The System will be monitored by a supervisory control and data acquisition (SCADA) system. A PC workstation (SCADA computer) centrally located will contain a man-machine interface (MMI) graphical software package to monitor and record signals such as flowrates, pressures, liquid levels, ground water levels, motor on-off status, alarms, etc. from the system sites. The MMI software will also provide the Operator with the ability to change process control variables or control motors and injection well flow control valves directly from the PC Workstation. An RTU with an operator interface will be located at each remote site to perform control logic, display data and to transmit information to and from the SCADA computer via radio telemetry. Flowrate of extracted water will be controlled by the PLC through the use of motor-controlled valves or variable frequency drives (VFDs). Flowrate of injected water will be controlled by motor controlled valves and pressure at each injection well will be maintained at a specified value using a downhole pneumatic control valve. Water levels in all extraction and injection wells will be monitored by the control system, and alarms and/or system shutdown will be executed by the control system if water levels are outside of the prescribed ranges. The total extracted flows will be continuously computed and compared to the combined injection well and land application flowrate, and if a deviation of more than 10% (or other value as determined during design and startup) occurs for a period of 10 minutes the control system will alarm to notify the operator and cease operation of the extraction well pumps. System pressure will also be monitored and if a prescribed value is exceeded the control system will cease operation of the extraction well pumps and alarm the operator. Other interlocks and alarms will be programmed into the control system to minimize potential damage to the system and environment in the event of pipeline breaks or instrumentation failure.

Each injection well will also be equipped with a submersible pump to allow for periodic backflushing as dictated by increased injection well pressures. The ground water generated from injection well backflushing will be pumped into storage tanks located at the injection well surface locations. The water in storage will be tested and transported where it will be treated, if needed, and land applied (under DP-1793).

Each ion exchange treatment train used to remove chromium from ground water consists of two identical vessels operated in series. Multiple treatment trains are used to meet the required flowrate for each removal system. The first, or primary, vessel is used to remove 99% of the chromium with the second acting as a polishing unit. Routine monitoring is conducted of the treated water from each primary ion exchange vessel. With this data, a determination can be made as to when contaminant break-through is occurring.

As can be seen on the graph below based on historical data, from the time chromium first breaks through the primary ion exchange column it takes over forty days before the discharge limit is reached. During this time the polishing unit is still removing chromium to below detection limits prior to discharge. Each primary IX vessel is sampled weekly and vessels that are showing break-through are replaced. The polishing unit is then moved into the primary location and a fresh vessel installed as a polishing unit.



B-8. **System Maintenance**. Attach a description of the operations and maintenance procedures which ensure that your processing, treatment and disposal system functions properly; e.g., inspections, pumping schedules, equipment maintenance, etc.

☒ O & M procedures are attached. **See Appendix A and Appendix B on the CD.**

☐ O & M procedures were previously submitted. Submittal date(s): _____

B-9. **Backflow Prevention.** If wastewater is used for land application or irrigation, describe methods used to protect wells from contamination by wastewater backflow. For new facilities or new systems at an existing facility, only air gap or reduced pressure valve assemblies are acceptable methods.

a) Clearly describe and/or sketch the location of air gaps or devices and attach specifications.

NA

b) Describe how devices are maintained.

NA

B-10. **Water Rights.** Animal feeding operations which land apply wastewater must attach documentation of irrigation water rights for the proposed land application fields, sufficient to sustain the intended crop rotation.

☐ Water right documentation is attached.

☒ Not applicable.

B-11. Past Ground Water Monitoring Results. *This item applies only to existing facilities seeking renewal and/or modification of a Discharge Permit that required ground water monitoring.*

a) Attach a graph or a table showing all analytical results from ground water sampling at your facility. If preparing graphs, a separate graph should be developed for each constituent, except that nitrate and TKN may be shown on the same graph. Multiple wells may be shown on the same graph. See Supplemental Instructions for sample table and graph.

b) If the monitoring results indicate that ground water standards have been violated or that there is an upward trend approaching standards, attach a description of what actions you have taken or will take to address the elevated concentrations. Ground water standards are listed in Section 20.6.2.3103 NMAC. See the Supplemental Instructions for frequently referenced standards.

Historical ground water monitoring data for R-42 and R-50 are provided on a CD in Appendix B obtained from a data search at http://www.intellusnmdata.com/. The ground water from these two wells is representative of produced groundwater from CrEX-1, CrEX-2, and CrEX-3.

Monitoring Plan *[Section 20.6.2.3107.A NMAC]*

B-12. Discharge Volumes. Describe how and where the monthly discharge volume at your facility will be. For all measuring devices, provide type, location, and units of measure including multipliers (e.g., gallons, gallons x 100, acre-ft, etc.) See Supplemental Instructions. Attach additional pages, if necessary.

There will be a totalizing flow meter on the line to each injection well in gallons. The flow meters are shown on the process diagrams in Appendix A.

B-13. Discharge Quality Monitoring. Discharge Permits typically require that the discharge (treated wastewater, sludge, septage, etc.) be sampled on a regular basis. The frequency of sampling varies by type of facility, as do the contaminants of concern. Domestic and agricultural Discharge Permits typically require sampling for total Kjeldahl nitrogen (TKN), nitrate-nitrogen (NO_3-N), total dissolved solids (TDS) and chloride on a quarterly or semi-annual basis. *(continued on next page)*

If reclaimed domestic wastewater will be discharged for above ground uses, testing of the discharge for additional parameters is appropriate. Please refer to the *NMED Ground Water Quality Bureau Guidance: Above-Ground Use of Reclaimed Domestic Wastewater* for further information.

In the space below, provide a description or sketch of the sampling point(s) to be used for sampling the discharge at your facility.

The POC sampling points and the operational sampling points for the discharges from the IX treatment units are shown on the process diagrams in Appendix A. The proposed sampling plan is shown in the table below.

Optional: In the space below (or as an attachment), you may propose revisions or additions to the standard discharge quality monitoring requirements. If you do, provide the rationale for your proposal.

Analytical Laboratory	Sampling Location	Time Period After System Startup or Modification	Frequency	Analytes	Sample Type	Sample TAT[1]
Stage 1						
Contract lab[2]	Post IX treatment[3]	weeks 1–8	weekly	NO_3-N, Cr	filtered	7-day
Stage 2						
Contract lab[2]	Post IX treatment[3]	weeks 10–12–14	biweekly	NO_3-N, Cr	filtered	7-day
Stage 3						
Contract lab[2]	Post IX treatment[3]	after 14 weeks	monthly	NO_3-N, Cr	filtered	7-day
Annual						
Contract lab[2]	Post IX treatment[3]	na	annual	Full-suite[4]	varies	30-day

Notes:
[1] TAT means the turn-around-time for sample analysis and reporting from the analytical laboratory.
[2]Contract lab means an off-site, independent analytical laboratory that is NELAP certified.
[3] Post IX treatment means after the last ion exchange (IX) treatment unit. See POC Sample Location on the Chromium Project Process Flow Diagrams, Appendix A.
[4] Full-suite means all water contaminants listed in 20.6.2.3103 NMAC and all toxic pollutants defined in 20.6.2.WW NMAC.

Narrative Description

- **Stage 1:** For the first 8 weeks of operation following start up or any modifications to the treatment system, weekly samples for NO_3-N and Cr will be collected and submitted to an off-site, independent, NELAP certified laboratory for analysis on a 7-day TAT.
- **Stage 2:** For the weeks of operation 10, 12, and 14 biweekly samples for NO_3-N and Cr will be collected and submitted to an off-site, independent, NELAP certified laboratory for analysis on a 7-day TAT.
- **Stage 3:** After 14 weeks of operation monthly samples for NO_3-N and Cr will be collected and submitted to an off-site, independent, NELAP certified laboratory for analysis on a 7-day TAT.
- **Annual:** A full-suite sample will be collected annually and submitted to an off-site, independent, NELAP certified, laboratory for analysis on a 30-day TAT. Full-suite means all water contaminants listed in 20.6.2.3103 NMAC and all toxic pollutants defined in 20.6.2.WW NMAC.

The Operational Sampling Plan (OSP) will be to Sample feed to the treatment system, the effluent from each of the IX vessels, both primary and polishing, and the total treated water for nitrates and chromium twice per week during the first three weeks of operations. Thereafter, operational sampling would be once per week at all the same locations. Additionally, if the treatment system was shut down for an extended period of three or more weeks, operational sampling would revert to twice per week until confirmation of the system performance was assured. Analytical will be performed by LANL's on-site laboratory. HACH test would be used as a back-up or if special tests were needed.

B-14. Ground Water Quality Monitoring. Discharge Permits typically require that ground water samples be collected quarterly from properly constructed monitoring wells located downgradient from discharge locations. The samples must be analyzed for contaminants of concern. For most domestic and agricultural Discharge Permits, the typical contaminants of concern are total Kjeldahl nitrogen (TKN), nitrate-nitrogen (NO_3-N), total dissolved solids (TDS) and chloride.

Optional: In the space below (or as an attachment), you may propose revisions or additions to the standard ground water monitoring requirements. If you do, provide the rationale for your proposal.

Table 3.4-1 Interim Monitoring Plan for Chromium Investigation Monitoring Group from *The Interim Facility-Wide Groundwater Monitoring Plan (IFGM) for the 2015 Monitoring Year, October 2014-September 2015*, on a CD in Appendix B covers the Chromium Investigation Monitoring Group and project area addressed by this Discharge Permit application.

For existing facilities:

Indicate number of existing monitoring wells: 17

Attach copies of monitoring well logs.

☒ Well logs attached. **See Well Construction Documents on the CD in Appendix B.**

☐ Well logs cannot be located.

☐ Well logs previously submitted. Submittal date(s): _____

Attach copy of monitoring well survey (typically not applicable if fewer than 3 monitoring wells).

☒ Survey attached. **See Figure 3.1-1, pg 35 from the IFGM on the CD in Appendix B (also shown below).**

☐ No survey has been conducted.

☐ Survey previously submitted. Submittal date(s): _____

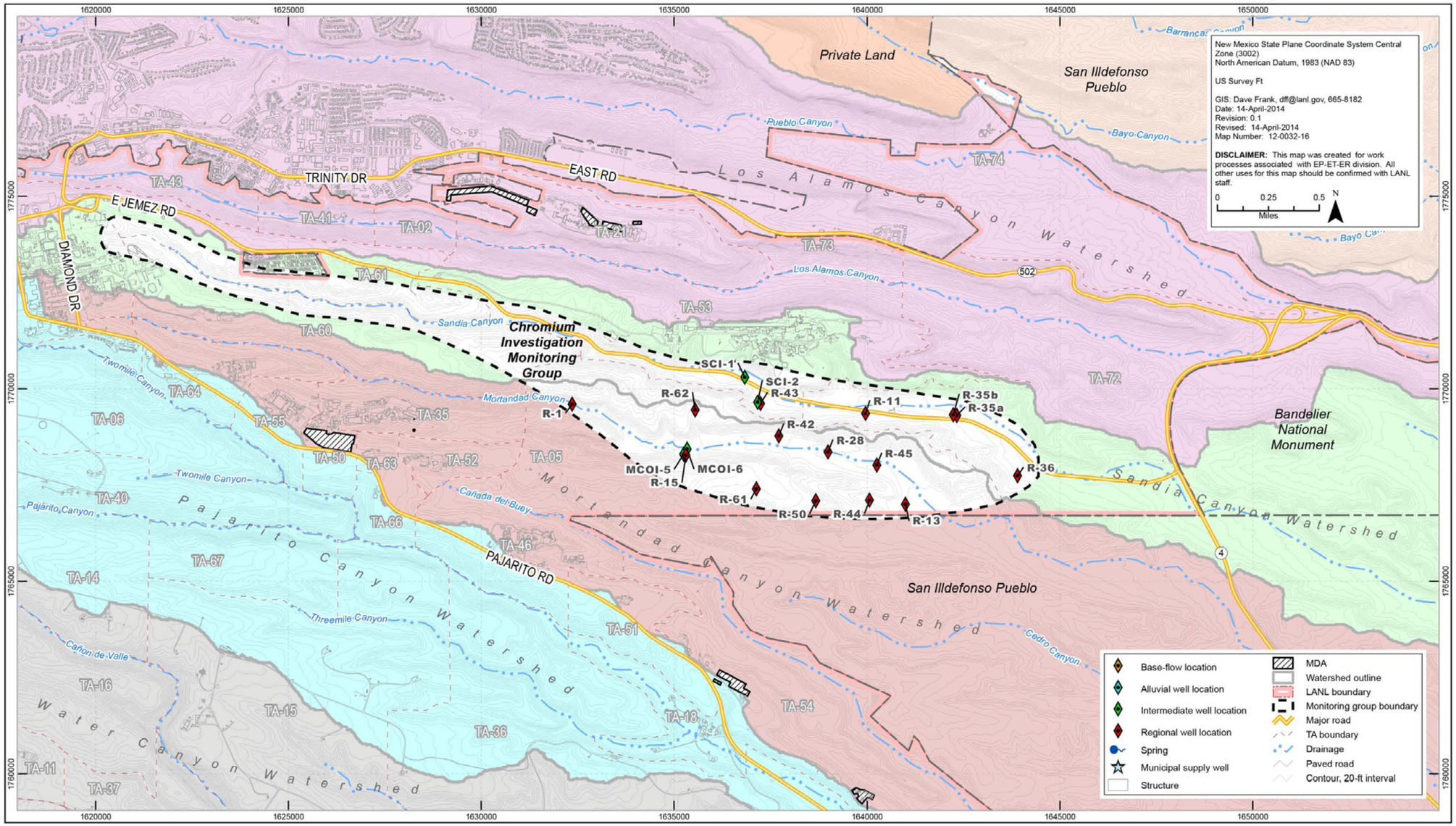


Figure 3.1-1 Chromium Investigation monitoring group

Table 3.4-1
Interim Monitoring Plan for Chromium Investigation Monitoring Group

Location	Watershed	Rationale for Selection of Location	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	PCBs	HEXP	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Chromium Isotopes	15N/18O Isotopes in Nitrate
MCOI-5	Mortandad	Monitors for potential contaminants from upper Mortandad and Ten Site Canyons or possibly Sandia Canyon.	Intermediate	S	S	S	—	—	—	A	A	—	S	A	—
MCOI-6	Mortandad	Monitors for potential contaminants from upper Mortandad and Ten Site Canyons or possibly Sandia Canyon.	Intermediate	Q	S	S	—	—	—	A	A	—	Q	Q	A
SCI-1	Sandia	Monitors the first perched-intermediate groundwater encountered along the key infiltration pathway in Sandia Canyon.	Intermediate	S	—	—	B (2015)[a]	—	—	A	A	—	S	A	A
SCI-2	Sandia	Monitors key infiltration pathway in Sandia Canyon.	Intermediate	Q	B (2016)[b]	B (2016)	B (2015)	—	—	A	A	—	Q	A	A
R-1	Mortandad	Monitors for potential contaminants from upper Mortandad Canyon or possibly Sandia Canyon. Background location in GBIR R3.	Regional	A	B (2016)	B (2016)	—	—	—	B (2015)	—	A	A	—	—
R-11	Sandia	Monitors for potential contaminants from Sandia Canyon and possibly Los Alamos Canyon.	Regional	Q	—	—	—	—	—	B (2015)	—	A	Q	S	—
R-13	Mortandad	Monitors for nature and extent of contaminants originating in Mortandad and Sandia Canyons. Key lower boundary well. Background location in GBIR R3.	Regional	S	—	—	—	—	—	B (2015)	—	A	S	—	—
R-15	Mortandad	Monitors for potential contaminants from upper Ten Site or Mortandad Canyons.	Regional	S	B (2016)	B (2016)	—	—	—	B (2016)	—	A	S	A	—
R-28	Mortandad	Monitors for potential contaminants from upper Sandia, Mortandad, or Ten Site Canyons or possibly sources in canyons to the north.	Regional	Q	—	—	—	—	—	B (2015)	A	—	Q	A	A
R-35a	Sandia	Sentinel monitoring location for chromium contamination in regional groundwater. Located within the same stratigraphic zone as the upper louvered section of water-supply well PM-3.	Regional	Q	B (2016)	B (2016)	—	—	—	B (2015)	—	A	Q	—	—
R-35b	Sandia	Sentinel monitoring location for chromium contamination in the regional groundwater. Located near the water table above the louvered section of water-supply well PM-3.	Regional	Q	B (2016)	B (2016)	—	—	—	B (2015)	—	A	Q	—	—
R-36	Sandia	Monitors for potential contaminants from the Sandia Canyon source and other potential sources from canyons to the north. Also serves as a sentinel well for water-supply well PM-1.	Regional	S	A	A	—	—	—	B (2015)	—	A	S	—	—
R-42	Mortandad	Key characterization and monitoring point located upgradient of R-28.	Regional	Q	B (2016)	B (2016)	—	—	—	B (2015)	A	—	Q	A	A
R-43 S1	Sandia	Monitors downgradient extent of contamination originating in Sandia Canyon and possibly canyons to the north.	Regional	Q	B (2016)	B (2016)	—	—	—	B (2015)	—	A	Q	Q	A
R-43 S2	Sandia	Monitors downgradient extent of contamination originating in Sandia Canyon and possibly canyons to the north.	Regional	Q	B (2016)	B (2016)	—	—	—	B (2015)	—	A	Q	Q	A
R-44 S1	Mortandad	Monitors near the water table for nature and extent of contaminants from sources in Sandia Canyon and possibly sources in canyons to the north.	Regional	Q	B (2016)	B (2016)	—	—	—	B (2015)	—	A	Q	—	—
R-44 S2	Mortandad	Monitors for nature and extent of contaminants from sources in Sandia Canyon and possibly sources in canyons to the north.	Regional	Q	B (2016)	B (2016)	—	—	—	B (2015)	—	A	Q	—	—
R-45 S1	Mortandad	Monitors near the water table for nature and extent of contaminants from sources in Sandia Canyon and possibly sources in canyons to the north.	Regional	S	B (2016)	B (2016)	—	—	—	B (2015)	—	A	S	Q	A
R-45 S2	Mortandad	Monitors for nature and extent of contaminants from sources in Sandia Canyon and possibly sources in canyons to the north.	Regional	S	B (2016)	B (2016)	—	—	—	B (2015)	—	A	S	Q	A
R-50 S1	Mortandad	Monitoring well located on the mesa south of Mortandad Canyon to define the southern extent of chromium contamination in the regional aquifer.	Regional	Q	B (2016)	B (2016)	—	—	—	B (2015)	—	S	Q	Q	—
R-50 S2	Mortandad	Monitoring well located on the mesa south of Mortandad Canyon to define the southern extent of chromium contamination in the regional aquifer.	Regional	Q	B (2015)	B (2015)	—	—	—	B (2015)	—	S	Q	Q	—
R-61 S1	Mortandad	Located on the mesa south of Mortandad Canyon to define the western extent of the flow path for chromium migration.	Regional	Q (filtered and non-filtered)	S	S	A	A	A	S	—	S	Q	Q	A
R-62	Mortandad	Located on a ridge between Sandia and Mortandad Canyon at the east end of Sigma Mesa.	Regional	S	S	S	A	A	A	S	—	S	S	S	S

Notes: Sampling suites and frequencies: C = continuous; Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr); X = sampled once in MY2016.

[a] 2015 = Samples scheduled to be collected during implementation of MY2015 Interim Plan.

[b] 2016 = Samples scheduled to be collected during implementation of MY2016 Interim Plan.

B-15. Other Monitoring. In addition to discharge volumes, discharge quality monitoring and ground water sampling, Discharge Permits typically require the following monitoring, depending on the type of facility:

- inspection and pumping of septic tanks, grease tanks, lift stations
- inspection of leachfields
- inspection of lagoons
- process testing for treatment plants
- land application data sheets (LADS)
- tracking of chemical fertilizer applications to land application areas
- soil sampling (agricultural and selected other facilities land applying wastewater)
- harvested plant material testing (agricultural facilities)

Optional: In the space below (or as an attachment), you may propose revisions or additions to the other standard monitoring requirements for your type of facility. If you do, provide the rationale for your proposal.

The current operational procedure provides direction for operation, inspection, routine maintenance, and repairs. This procedure provides details on how to perform a thorough inspection of the valve alignment and provides the operational conditions of the treatment system. The treatment system is made of the four major components: well head, Baker tanks, ion-exchange treatment units and treated water storage tanks. The inspection shall identify any abnormal or unusual conditions that shall prompt appropriate notification and authorized repair. Performance of inspections are conducted through detailed instruction in accordance with the Laboratory's Conduct of Operations Manual. Inspections shall be completed on a daily basis before new operations can take place. Operational checks and balances are also conducted throughout the operational day while treatment and system operations are being conducted.
All systems and components identified in the procedure's appendix and in Equipment ID Sheets are inspected for degradation, leaks and cracks. System integrity and system operability as assessed prior to operations, during operation and closure of systems.
This procedure will be revised as system or components are changed prior to operation.

Contingency Plan *[Section 20.6.2.3107.A.10 NMAC]*

B-16. System Failure. Describe your contingency plan in the event there is a failure of your wastewater or discharge system (e.g., wastewater back-up, pump failure, pipe breaks, tank overflow, leachfield failure, saturated fields etc.)

Operation of the System will be controlled using a program logic controller. The System will be monitored by a supervisory control and data acquisition system (SCADA) which will be used to monitor and record signals such as flowrates, pressures, liquid levels, ground water levels, motor on-off status, alarms, etc. At a minimum the following conditions will be programmed into the system controller.

1. The total extracted flows will be continuously computed and compared to the combined injection well flowrate, and if a deviation of more than 10% (or other value as determined during design and startup) occurs for a period of 10 minutes the control system will shut down the system and alarm the operator.
2. System pressure will be monitored and if system pressure(s) deviate from prescribed ranges the control system will shut down the system and alarm the operator.
3. Water levels in all extraction and injection wells will be monitored by the control system and if water

levels are outside of the prescribed ranges the control system will shut down the system and alarm the operator.

4. Other interlocks and alarms will be programmed into the control system to minimize potential damage to the system and environment in the event of pipeline breaks or instrumentation failure.

The ion exchange resin has demonstrated that removal rates are consistent for all the Cr influent concentrations Seen; from a low of 125 ppb to a high of 850 ppb the primary columns have been effective in removing Cr down to the same treated water concentration. However, if a sudden increase in Cr was observed the first step would be to sample and analyze for major cations and anions to determine if the water chemistry had changed. In addition, the weekly operating samples would be taken immediately and a rush turn-around requested. Based on the results of these samples, an action plan would be developed which could include: increase sampling, adjustment in treatment flow rates or replacement of select IX vessels.

In the event that a NO_3-N or Cr sample collected under this sampling plan exceeds 90% of the 20.6.2.3103 NMAC ground water standards, 9 mg/L and 45 mg/L, respectively, then the following Contingency Plan shall be implemented:

1. Within 24-hrs of receipt of the original analytical result, collect a confirmation sample of the treated water and submit for off-site analysis with a 72-hr analytical turn-around-time (TAT).
2. Upon receipt of the analytical result confirming the exceedance, cease injecting immediately; divert treated water to StorageTanks for interim storage
3. Inform NMED within 24-hrs of receipt of the original analytical result showing the exceedance.
4. Replace the upstream (primary) IX vessel with the downstream (secondary) IX vessel and install a new downstream IX vessel
5. Restart treatment system with discharge to storage and collected a treated water sample for analysis on a 72-hr TAT.
6. If treated water sample collected under #5 above is below the discharge limits then the injection of treated water can resume.
7. Treated water discharged to storage under #2 above will be retreated through the IX treatment system prior to injection.
8. Following completion of step #6 above, routine sampling will reset to **Stage 1** of the sampling and analysis plan (see B-13 of this application).

B-17. Contingency Leachfield Location. *This item applies only if your disposal system includes a leachfield.* Identify a location on your site map (Item B-3) for a contingency leachfield in the event that your leachfield must be replaced. If no land is available for a contingency leachfield at an existing facility, describe how you will address a failed leachfield. New facilities must provide for a contingency leachfield location.

NA

B-18. Other Contingencies. Discharge Permits typically contain standard contingencies to address:

- exceeding wastewater quality limits
- violation of ground water or surface water standards
- spills or illegal releases of wastewater
- migration of soil nitrogen
- loading nitrogen above limit

Propose additional contingency plans, if appropriate:

Spills or Unauthorized Releases. In the event that a release not authorized in this permit occurs, DOE/LANS shall take measures to mitigate damage from the unauthorized discharge and initiate the notifications and corrective actions required in 20.6.2.1203 NMAC.

Closure Plan *[Section 20.6.2.3107(A)11 NMAC]*

B-18. Facility Closure and Post-Closure Monitoring. Discharge Permits contain standard requirements to address the closure of part or all of your discharge system, as follows:

- cap or plug lines to prevent the flow of wastewater to treatment or disposal system
- empty and remove or backfill tanks
- empty lagoons, perforate or remove liners, re-grade to surface topography
- appropriately dispose of solids
- regrade and cover stockpiles at mine facilities
- continue ground water monitoring for at least two years, longer as appropriate
- enact contingency plans if ground water standards are violated
- financial assurance may be required.

Propose additional closure plans in the space below or as an attachment, if appropriate:

Upon cessation of the activity pursuant to this Discharge Permit, the permittee shall perform the following closure measures:

a) Drain or purge all lines;

b) Cap or plug all lines to prevent the flow of water to treatment or disposal systems;

c) Empty and remove tanks;

d) Empty lagoons, remove liners backfill with clean material and re-grade to surface topography;

e) Appropriately dispose of solids;

f) Regrade and cover stockpiles;

g) Continue groundwater monitoring for at least two years, or as appropriate;

h) Enact contingency plans if groundwater standards are exceeded;

i) Remove any compounds and equipment pertaining to the remediation activities;

j) Appropriately dispose of all treatment resins and media in accordance with all applicable local, state and federal regulations; and

k) When all post-closure requirements have been met, the permittee may request to terminate the Discharge Permit.

l) Termination of this discharge permit is independent of the obligations for on-going monitoring, characterization, and cleanup required under the Consent Order.

Please Note: You must also complete Part C of the application.

GROUND WATER DISCHARGE PERMIT APPLICATION
PART C: SITE INFORMATION
All Facilities

C-1. **Area Map.** Attach a current area map showing roads and clearly mark the location of your facility.

See Map #1 in Appendix C.

C-2. **Directions to Site.** Provide driving directions to the site from the nearest town or, if located in a town, from an easily identifiable location.

From Santa Fe, NM, take US-285 north to Pojoaque, NM. Take NM-502 west towards Los Alamos, NM. Because access to the Chromium Project Site requires entry through one of the Los Alamos National Laboratory's Pajarito Corridor Vehicle Access Portals, visitors without a LANL badge must be escorted to the project site. Visits to the project site may be coordinated through the point of contact listed in A-5 of this application.

C-3. **Topographic Map.** Attach a copy of the appropriate US Geological Survey topographic map. You may provide just the relevant portion. USGS maps are available at many outdoor equipment stores or bookstores, from the USGS at www.usgs.gov or 1-888-ASKUSGS, and from commercial websites.

On the map clearly indicate the location of your facility. Also identify the approximate locations of all wells within 1,000 feet of your discharge locations. The Office of the State Engineer has a searchable database of supply wells on its website at www.ose.state.nm.us.

☒ USGS map attached with facility location and neighboring wells marked. **See Map #1 in Appendix C.**

C-4. **Flood Potential.** Attach a copy of the latest Federal Emergency Management Agency (FEMA) flood map with your facility's location clearly marked, to the best of your ability. Information about how to obtain this map, formally known as a Flood Insurance Rate Map (FIRM) is available at www.fema.gov, insurance agencies or county government offices. A site specific analysis may be substituted.

☒ FEMA map or site-specific analysis attached. **See Map #1 in Appendix C.**

☐ Previously submitted and still up-to-date. Submittal date(s): _____

C-5. **Soils.** Attach either:

a) A copy of the appropriate Natural Resource Conservation Service (NRCS) soil survey map, with your site clearly identified to the best of your ability. Include the descriptive information for soils associated with the discharge locations. To obtain the map, contact your local NRCS office – there is one in every county.

b) A site-specific assessment showing the soils classifications. This is preferred over the more generalized NRCS surveys.

☒ NRCS soil survey or site-specific assessment attached. **See Map #2 in Appendix C. See NRCS Soil Survey of Sandoval County Area, New Mexico, Parts of Los Alamos, Sandoval, and Rio Arriba Counties on the CD in Appendix B.**

☐ Previously submitted. Submittal date(s): _____

C-6. **Geology.** Provide information on the geology beneath the site by attaching relevant portions of geologic reports, well logs for on-site or nearby wells, or site specific assessments. A variety of geology publications and resources are available from the New Mexico Bureau of Geology and Mineral Resources at http://geoinfo.nmt.edu or 505-835-5420 (Socorro). Well logs are available from the New Mexico State Engineer's Office at http://www.ose.state.nm.us/.

☐ Geologic report attached. ☒ Well log(s) attached. **See CD in Appendix B.**

☐ Geologic information previously submitted. Submittal date(s): _____

Well fact sheets will be submitted to NMED following well completion for CrEx-2, CrEx-3, CrIn-1, CrIn-2, CrIn-3, CrIn-4, CrIn-5, and CrIn-6.

C-7. **Ground Water Hydrology.** Ground water hydrology refers to the occurrence, distribution, movement and chemistry of ground water. The ground water hydrology at your site will determine in large part whether your discharge will adversely affect ground water quality. You may need to present detailed information in order to "demonstrate that the Discharge Permit will not result in concentrations in excess of the standards of Section 20.6.2.3103 NMAC or the presence of any toxic pollutant." (20.2.3106.C.7 NMAC)

At a minimum, provide information below on the direction of ground water flow. Ground water may not flow in the same direction as water on the surface of the ground. A monitoring well survey is one of the best methods to determine the direction of ground water flow at a particular site. Such surveys are routinely required for many Discharge Permit locations.

If a survey is not available, check with well drillers, the city water department, staff at the Office of the State Engineer, environmental consultants or other knowledgeable persons in your area. In addition, relevant reports have been published for some areas. See the OSE website at www.ose.state.nm.us or the NMBGMR website at http://geoinfo.nmt.edu.

Direction of ground water flow: South to Southeast

If ground water flow shifts seasonally, describe here: _____

Reference:

☒ On-site well survey attached. ☐ Previously submitted. Submittal date(s): _____
See Map #3 in Appendix C.

☐ Nearby well survey attached. ☐ Previously submitted. Submittal date(s): _____

☒ Other. Specify: See Appendix B containing the following LANL reports:

- 2009 Hydrogeologic Site Atlas. LAUR-09-3763.
- Los Alamos National Laboratory's Hydrogeologic Studies of the Pajarito Plateau: A Synthesis of Hydrogeologic Workplan Activities (1994-2004). LA-14263-MS.
- Conceptual Models of Vadose Zone Flow and Transport Beneath the Pajarito Plateau, Los Alamos, New Mexico. Vadose Zone Journal, Vol. 4, August 2005.
- 2006 Mortandad Canyon Investigation Report. LA-UR-06-6752.
- The Interim Facility-Wide Groundwater Monitoring Plan (IFGM) for the 2015 Monitoring Year October 2014-September 2015. LA-UR-14-23327.

☐ Relevant portion attached.

☐ Previously submitted. Submittal date(s): _____

Attach any additional information available about ground water hydrology at the site.

C-8. Other Permitted Discharge Locations. If applicable, list other locations of wastewater or stormwater discharges on your site that are not described in this application and indicate what permits apply to them. Examples include discharges from small septic systems (covered by Liquid Waste Permits, discharges to surface waters under a NPDES permit, a discharge covered by a separate Discharge Permit, etc. Be sure these other discharge locations are identified on the site map required in Item B-3.

Discharge Type	Permit Identification
Land Application	DP-1793
Outfall (NPDES)	NPDES outfall 051 (RLWTF)
RLWTF	DP-1132 (RLWTF)

C-9. Other Information. Describe below or attach any additional information to demonstrate that your proposed discharge plan will be protective of ground water quality, public health and property.

Appendix A – Process Diagrams

Chromium Operational Description

Chromium Project CrEX-3 to CrIN-1, CrIN-2, CrIN-3 and CrIN-6 Process Flow Diagram

Chromium Project CrEX-1 and CrEX-2 to CrIN-4 and CrIN-5 Process Flow Diagram

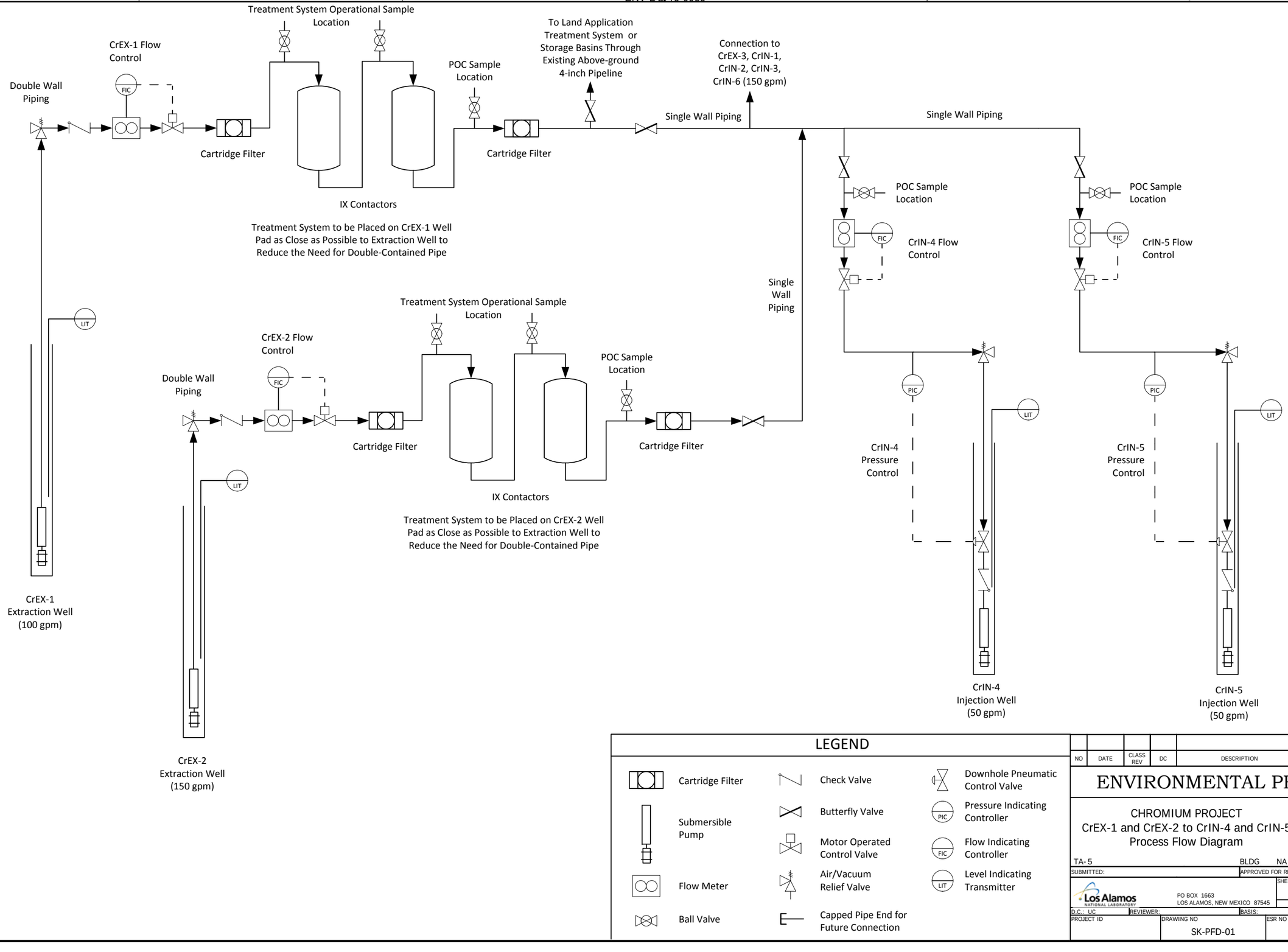
The following is a proposed description of Chromium Groundwater System operation. Process flow diagrams, SK-PFD-01 and SK-PFD-02 are included as attachments.

The Chromium System will consist of up to three groundwater extraction wells (CrEX-1, CrEX-2 and CrEX-3), and up to six groundwater injection wells (CrIN-1, CrIN-2, CrIN-3, CrIN-4, CrIN-5 and CrIN-6). The system will be operated continuously with water being pumped, treated and injected or land applied. Treatment of extracted groundwater will be executed at each extraction well pad location and all piping delivering water to injection wells and land application basins will be single wall HDPE piping. Piping from the extraction wells to the treatment systems will consist of double wall piping with leak detection systems.

Operation of the system will be controlled using a program logic controller (PLC) and remote terminal units (RTUs). Specific monitoring of the extraction, treatment and injection systems will be completed to ensure proper system operation. The System will be monitored by a supervisory control and data acquisition (SCADA) system. A PC workstation (SCADA computer) centrally located will contain a man-machine interface (MMI) graphical software package to monitor and record signals such as flowrates, pressures, liquid levels, groundwater levels, motor on-off status, alarms, etc. from the system sites. The MMI software will also provide the Operator with the ability to change process control variables or control motors and injection well flow control valves directly from the PC Workstation. An RTU with an operator interface will be located at each remote site to perform control logic, display data and to transmit information to and from the SCADA computer via radio telemetry.

Flowrate of extracted water will be controlled by the PLC through the use of motor-controlled valves or variable frequency drives (VFDs). Flowrate of injected water will be controlled by motor controlled valves, and pressure at each injection well will be maintained at a specified value using a downhole pneumatic control valve. Water levels in all extraction and injection wells will be monitored by the control system, and alarms and/or system shutdown will be executed by the control system if water levels are outside of the prescribed ranges. The total extracted flows will be continuously computed and compared to the combined injection well and land applied flowrate, and if a deviation of more than 10% (or other value as determined during design and startup) occurs for a period of 10 minutes the control system will alarm the operator and cease operation of the extraction well pumps. System pressure will also be monitored and if a prescribed value is exceeded the control system will cease operation of the extraction well pumps and alarm the operator. Other interlocks and alarms will be programmed into the control system to minimize potential damage to the system and environment in the event of pipeline breaks or instrumentation failure.

Each injection well will also be equipped with a submersible pump to allow each injection well to be periodically backflushed as dictated by increased injection well pressures. The groundwater generated from injection well backflushing will be pumped into storage tanks located at the injection well surface locations. This water in these storage tanks will be tested and transported to the land application system where it will be treated, if needed, and land applied.



LEGEND

- Cartridge Filter
- Submersible Pump
- Flow Meter
- Ball Valve
- Check Valve
- Butterfly Valve
- Motor Operated Control Valve
- Air/Vacuum Relief Valve
- Capped Pipe End for Future Connection
- Downhole Pneumatic Control Valve
- Pressure Indicating Controller (PIC)
- Flow Indicating Controller (FIC)
- Level Indicating Transmitter (LIT)

NO	DATE	CLASS REV	DC	DESCRIPTION	DWN	DSGN	CHKD	SUB	APP

ENVIRONMENTAL PROGRAMS

CHROMIUM PROJECT
CrEX-1 and CrEX-2 to CrIN-4 and CrIN-5
Process Flow Diagram

DRAWN	G. FORDHAM
DESIGN	G. FORDHAM
CHECKED	A.MACGREGOR
DATE	3-6-2015

TA- 5 BLDG NA

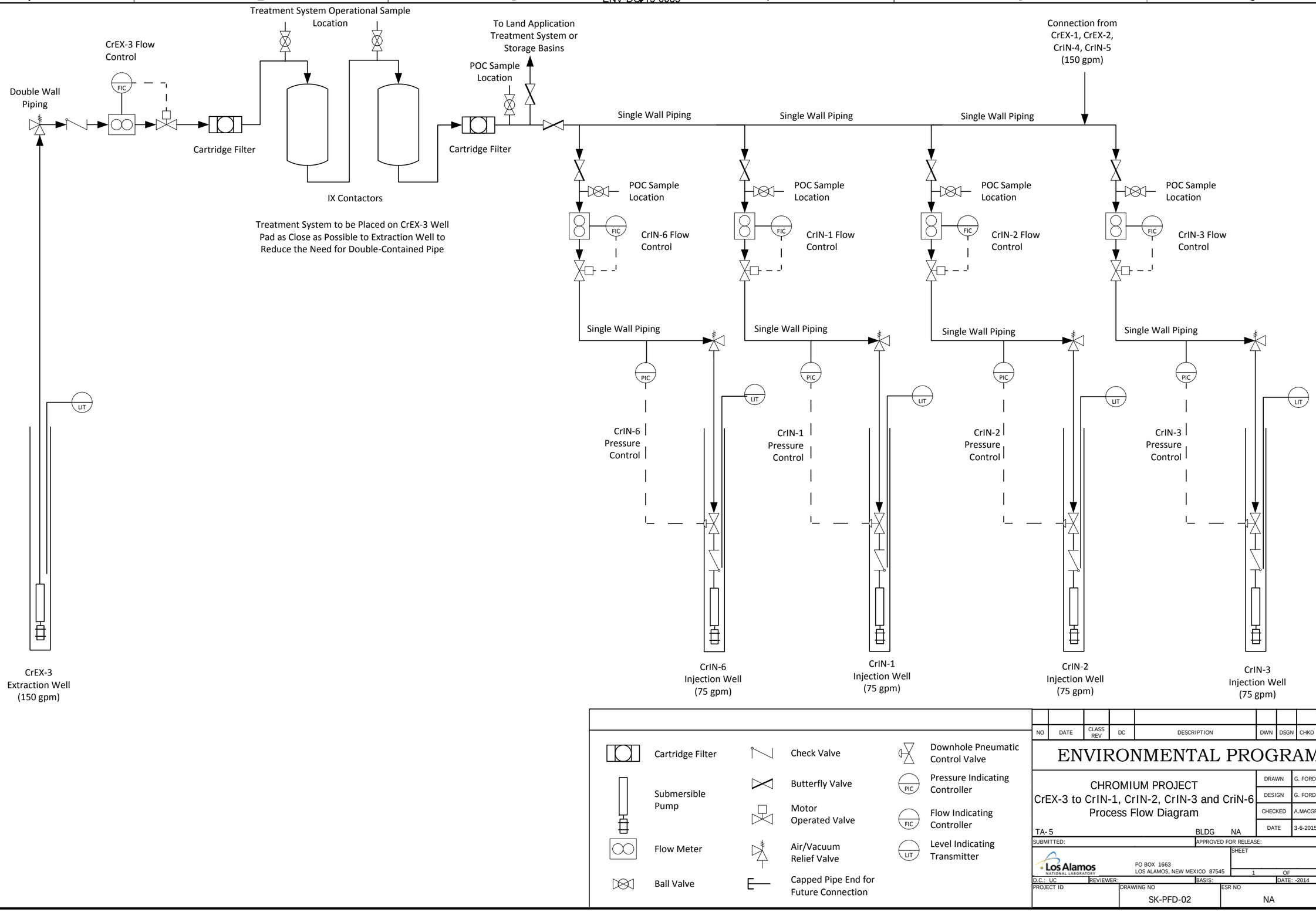
SUBMITTED: APPROVED FOR RELEASE:

Los Alamos NATIONAL LABORATORY
PO BOX 1663
LOS ALAMOS, NEW MEXICO 87545

SHEET 1 OF 1

D.C.: UC REVIEWER: BASIS: DATE: -2014

PROJECT ID	DRAWING NO	ESR NO	REV
	SK-PFD-01	NA	0



Cartridge Filter	Check Valve	Downhole Pneumatic Control Valve
Submersible Pump	Butterfly Valve	Pressure Indicating Controller (PIC)
Flow Meter	Motor Operated Valve	Flow Indicating Controller (FIC)
Ball Valve	Air/Vacuum Relief Valve	Level Indicating Transmitter (LIT)
	Capped Pipe End for Future Connection	

NO	DATE	CLASS REV	DC	DESCRIPTION	DWN	DSGN	CHKD	SUB	APP

ENVIRONMENTAL PROGRAMS

CHROMIUM PROJECT
CrEX-3 to CrIN-1, CrIN-2, CrIN-3 and CriN-6
Process Flow Diagram

DRAWN	G. FORDHAM
DESIGN	G. FORDHAM
CHECKED	A.MACGREGOR
DATE	3-6-2015

TA- 5 BLDG NA

SUBMITTED: APPROVED FOR RELEASE:

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PO BOX 1663
LOS ALAMOS, NEW MEXICO 87545

SHEET 1 OF 1

D.C.: UC REVIEWER: BASIS: DATE: -2014

PROJECT ID	DRAWING NO	ESR NO	REV
	SK-PFD-02	NA	0

Appendix B – Reference Documents

Compact Disc (CD) Containing the Following Documents

Operations and Maintenance Plan:

EP-DIV-SOP-20207, R0 CAP-FS-CTU-6 Operation of Chromium Treatment Unit CTU-6

Plans and Specifications;

ENV-DO-14-0245 - Final Construction Plans Discharge Treated Groundwater Aquifer Pilot Pumping Well CrEX-1 DP-1793

ENV-DO-14-0310 DP-1793 Record Drawings and Photographs

Typical Injection Well As Built Diagram

Reference Documents:

Chromium Plume Control Interim Measures and Corrective Measures Study Project Scope (LANL, EP2015-0011)

Historical Groundwater Monitoring Data R-42 and R-50

The Interim Facility-Wide Groundwater Monitoring Plan (IFGM) for the 2015 Monitoring Year, October 2014-September 2015 (LANL, ERID-256728). LA-UR-14-23327.

Los Alamos National Laboratory's Hydrogeologic Studies of the Pajarito Plateau: A Synthesis of Hydrogeologic Workplan Activities (1994-2004). LA-14263-MS.

2009 Hydrogeologic Site Altas. LAUR-09-3763.

Conceptual Models of Vadose Zone Flow and Transport Beneath The Pajarito Plateau, Los Alamos, New Mexico. Vadose Zone Journal, Vol. 4, August 2005

NRCS Soil Survey of Sandoval County Area, New Mexico, Parts of Los Alamos, Sandoval, and Rio Arriba Counties.

2006 Mortandad Canyon Investigation Report. LA-UR-06-6752.

Well Logs:

Chromium MWs (regional) – List of Wells

R-1 Well Construction

R-13 Well Construction

R-15 Well Construction

R-28 Well Construction

R-42 Well Construction

R-44 Well Construction

R-45 Well Construction

R-50 Well Construction

R-61 Well Construction

R-62 Well Construction

R-11 Well Construction

R-35a Well Construction

R-35b Well Construction

R-36 Well Construction

R-43 S1 Well Construction

R-43 S2 Well Construction

CrEX-1 Well Construction

Appendix C - Maps

Map #1 – Location Map with Treatment Units, Lagoons, Tanks, Roads, Buildings, Supply Wells, Monitoring Wells, Canyons, Water Bodies, Property Boundaries, Other Permitted Discharges, contours, 100-Year Flood Plain, and North Arrow

Map #2 – LANL Soils Map.

Map #3 - Well Survey