EMID-700494

DEPARTMENT OF ENERGY
Environmental Management Los Alamos Field Office (EM-LA)
Los Alamos, New Mexico 87544

JUN 2 6 2019

Mr. John E. Kieling
Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Dear Mr. Kieling:

Subject: Submittal of the Completion Report for Conversion of CrIN-6 to CrEX-5

Enclosed please find two hard copies with electronic files of the "Completion Report for Conversion of CrIN-6 to CrEX-5." The report summarizes fieldwork associated with converting chromium injection well 6 (CrIN-6) to chromium extraction well 5 (CrEX-5). The report satisfies Milestone 9 of the fiscal year 2019 version of Appendix B, Milestones and Targets, of the 2016 Compliance Order on Consent (Consent Order).

Pursuant to Section XXIII.C of the Consent Order, a pre-submission review meeting was held with the U.S. Department of Energy Environmental Management Los Alamos Field Office (EM-LA); Newport News Nuclear BWXT-Los Alamos, LLC (N3B); and the New Mexico Environment Department on April 18, 2019, to discuss project status and completion report content.

If you have any questions, please contact Steve White at (505) 309-1370 (steve.white@em-la.doe.gov) or Cheryl Rodriguez at (505) 665-5330 (cheryl.rodriguez@em.doe.gov).

Sincerely,

Arturo Q. Duran
Compliance and Permitting Manager
Environmental Management
Los Alamos Field Office

Enclosures:
1. Two hard copies with electronic files – Completion Report for Conversion of CrIN-6 to CrEX-5 (EM2019-0162)

cc (letter and enclosure[s] emailed):
L. King, EPA Region 6, Dallas, TX
R. Martinez, San Ildefonso Pueblo, NM
D. Chavarria, Santa Clara Pueblo, NM
S. Pullen, NMED
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N3B Records
Public Reading Room (EPRR)
PRS Website

EM-LA-40AD-00468

June 2019
EM2019-0162

Completion Report for Conversion of CrIN-6 to CrEX-5

N3B Los Alamos

EM2019-0162

Completion Report for Conversion of CrIN-6 to CrEX-5

June 2019

Responsible program director:

Bruce Robinson		Program Director	Water Program	6/26/2019
Printed Name	Signature	Title	Organization	Date

Responsible N3B representative:

Erich Evered		Program Manager	N3B Environmental Remediation Program	6/26/19
Printed Name	Signature	Title	Organization	Date

Responsible DOE EM-LA representative:

Arturo Q. Duran		Compliance and Permitting Manager	Office of Quality and Regulatory Compliance	6-26-2019
Printed Name	Signature	Title	Organization	Date

CONTENTS

Figures

1.0 INTRODUCTION

This completion report presents a field summary of activities associated with the conversion of chromium injection (CrIN) well CrIN-6 to chromium extraction (CrEX) well CrEX-5. The project location is shown in Figure 1.0-1. This report is prepared to fulfill reporting requirements proposed in the Compliance Order on Consent, Appendix B Milestones and Targets for fiscal year 2019 and additional reporting commitments made to the New Mexico Environment Department (NMED) in technical team meetings.

CrIN-6 was drilled and installed in 2017 as a single-screen injection well as part of the Chromium Interim Measure (IM). Measured chromium concentrations of approximately 260 ug/L in CrIN-6 obtained from initial pumping from the well led to a model-based evaluation of the optimal operational configuration to meet the IM objectives. The results presented in the "Evaluation of Chromium Plume Control Interim Measure Operational Alternatives for Injection Well CrIN-6" (LANL 2018, 603032) indicated that extraction, rather than injection, from the CrIN-6 location would provide the most optimal approach for meeting the IM objective and avoid the possibility that injection would push the chromium plume towards nearby water-supply well PM-3. Based on the evaluation, NMED approved proceeding with the recommendation to convert CrIN-6 from an injection well to an extraction well (CrEX-5) (NMED 2018, 700011).

2.0 DOWNHOLE CONVERSION

The injection hardware and plumbing at CrIN-6 consisted of a flow control valve (FCV) and a submersible Grundfos 85S300-26 pump installed in a stainless-steel pump shroud. The pump column consisted of 3-in.-inside diameter (I.D.) spline-lock stainless-steel pipe and associated cross-over joints. To measure water levels in the well, two 1-in. I.D. schedule 80 polyvinyl chloride (PVC) tubes with 5-ft screen sections of 0.020-in. slot screens and threaded end caps were banded to the pump column. One tube houses a dedicated transducer, and the other tube allows manual water level measurements.

Figure 2.0-1 presents an as-built schematic of well construction details.

A summary of conversion activities conducted at the well is presented below.

2.1 Removal of CrIN-6 Injection System

The transducer was removed from CrIN-6 by Newport News Nuclear BWXT-Los Alamos, LLC (N3B) personnel before subcontractor mobilization on April 4, 2019. The vault lid was removed, a short piece of well casing was welded on to the existing well casing and extended above ground surface, and a wooden platform was constructed above the well vault. A pump hoist was used to remove the injection system on April 5, 2019. The FCV was removed from the pump column, and the pump and motor were removed from the shroud.

Figure 2.1-1 presents an as-built schematic showing injection system component details for CrIN-6 preceding removal.

2.2 Installation of CrEX-5 Extraction System

For conversion to extraction service, pipeline pressure analyses were performed. Operating pressure at the pipeline tie-in was estimated at approximately 82 psi, or 189 ft of additional head. This would diminish the existing 30-horsepower (hp) pump discharge rate to approximately 60 gallons per minute (gpm). The well will accommodate pumping at a rate of more than 90 gpm. For this reason, the pump was replaced

with a 30-stage pump and 40-hp motor. The new pump is expected to produce approximately 85 gpm when operating along with the other extraction wells.

The extraction system was reinstalled between April 9 and 12, 2019. An extension piece was added to the CrIN-6 pump shroud to accommodate the longer Grundfos 85S400-30 pump, and the pump and motor were assembled and installed into the shroud. The check valve above the pump shroud, the cross-over joint above the check valve, and all 3-in. I.D. stainless-steel pipe from the injection system were reinstalled. The PVC tubes and screens/end caps from the injection system were reinstalled by banding the tubes to the pump column every 10 ft. The pump wire (2 gauge) from the injection system was reinstalled after making a new splice between the electrical cable and new motor.

Before landing the extraction system on the well casing in the vault, the short piece of well casing that was welded to the existing well was removed, and the wooden platform above the vault was removed. After system installation, the vault lid was replaced.

The bottom of the pump shroud was set at 1040.23 ft below the top of well casing. The PVC tube screens were set from 1022.2 to 1027.2 ft below the top of well casing.

Electrical problems were encountered during the first attempt to start the pumping system on June 12, 2019. The problems were indicative of downhole issues with either the service cable or submersible motor. A pump hoist was mobilized to the site and the pumping system was removed from the well on June 21 and 22. The problem was identified as the motor having a bad shaft seal and becoming water logged. The motor was replaced and reinstalled on June 22 and 23.

Figure 2.2-1 presents an as-built schematic showing system component details following CrEX-5 installation. Figure 2.2-2 presents technical notes for CrEX-5.

3.0 PIPELINE AND INFRASTRUCTURE CONVERSION

To convert CrIN-6 to CrEX-5, the wellhead manifold required reconfiguration to allow the water extracted from the well to be conveyed to the chromium central treatment facility at R-28. A new double-wall high-density polyethylene (HDPE) pipe connecting CrEX-5 to the existing double-wall HDPE pipe in the Mortandad Canyon access road was installed. This double-wall HDPE pipeline replaced the existing single-wall HDPE pipeline originally installed for injection service. The existing single-wall pipe was retained by extending the pipe to the east of the well vault and capping with a blind flange.

Fieldwork started with potholing to locate existing utilities and excavating to expose existing infrastructure, such as treated and untreated water lines. Two new precast concrete manholes were installed in excavations and tied in to existing double-wall pipelines. Trenching for the new double-wall pipeline was completed before installing and compacting bedding sand. The new double-wall pipe and associated fittings were fused together and pressure tested before performing subgrade installation. Finally, the pipeline was covered in bedding sand and low-strength flowable fill. Figure 3.0-1 presents the pipeline plan and profile for the new double-wall pipe.

Electrical work included service throughout the pipeline, modifications at the panel rack, and installation of new instrumentation and controls for communication to the supervisory control and data acquisition (SCADA) system. Leak detection wiring and conduit were installed in the trench above the flowable fill. Two new low-point leak detection devices were installed in the new manholes. Work at the panel rack included installation of a variable frequency drive for the pump motor and removal of the pneumatic control panel for the FCV.

CrEX-5 was operated as an extraction well for the first time on June 24, 2019, to test the pump. Approximately 2000 gal. of groundwater was pumped to a tank. Water was pumped and conveyed to the central treatment facility for a continuous duration of 2.5 hr on June 25, 2019, as a post-construction testing phase. Approximately 9700 gal. of water was extracted and treated at varying flow rates during this period. Following this demonstration of integration into the IM system, CrEX-5 was shutdown. Full-time operation of CrEX-5 is expected to commence in the summer of 2019 following permitting approval.

4.0 REFERENCES AND MAP DATA SOURCES

4.1 References

The following reference list includes documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ERID, ESHID, or EMID. This information is also included in text citations. ERIDs were assigned by the Laboratory's Associate Directorate for Environmental Management (IDs through 599999); ESHIDs were assigned by the Laboratory's Associate Directorate for Environment, Safety, and Health (IDs 600000 through 699999); and EMIDs are assigned by N3B (IDs 700000 and above). IDs are used to locate documents in N3B's Records Management System and in the Master Reference Set. The NMED Hazardous Waste Bureau and N3B maintain copies of the Master Reference Set. The set ensures that NMED has the references to review documents. The set is updated when new references are cited in documents.

LANL (Los Alamos National Laboratory), April 2018. "Evaluation of Chromium Plume Control Interim Measure Operational Alternatives for Injection Well CrIN-6," Los Alamos National Laboratory document LA-UR-18-23385, Los Alamos, New Mexico. (LANL 2018, 603032)

NMED (New Mexico Environment Department), June 6, 2018. "Evaluation of Chromium Plume Control Interim Measure Operational Alternatives," New Mexico Environment Department letter to D. Hintze (DOE-EM-LA) and J. Legare (N3B) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2018, 700011)

4.2 Map Data Sources

Hillshade; Los Alamos National Laboratory, ER-ES, As published; \\slip\gis\Data\HYP\LiDAR\2014\Bare_Earth\BareEarth_DEM_Mosaic.gdb; 2014.

Unpaved roads; Los Alamos National Laboratory, ER-ES, As published, GIS projects folder; \\slip\gis\GIS\Projects\14-Projects\14-0062\project_data.gdb\digitized_site_features\digitized_roads; 2017.

Drainage channel; Los Alamos National Laboratory, ER-ES, As published, GIS projects folder; \\slip\gis\GIS\Projects\15-Projects\15-0080\project_data.gdb\correct_drainage; 2017.

Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 29 November 2010.

Paved Road Arcs; Los Alamos National Laboratory, FWO Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 29 November 2010.

Chromium plume > 50 ppb; Los Alamos National Laboratory, ER-ES, As published; \\slip\gis\GIS\Projects\13-Projects\13-0065\shp\chromium_plume_2.shp; 2018.

Regional groundwater contour May 2017, 4-ft interval; Los Alamos National Laboratory, ER-ES, As published; \\slip\gis\GIS\Projects\16-Projects\16-0027\project_data.gdb\line\contour_wl2017may_2ft; 2017.

Regional groundwater contour November 2017, 2-ft interval; Los Alamos National Laboratory, ER-ES, As published; \\slip\gis\GIS\Projects\16-Projects\16-0027\project_data.gdb\line\contour_wl2017nov_2ft; 2017.

Point features; As published; EIM data pull; 2017.

Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; September 2007; as published 13 August 2010.

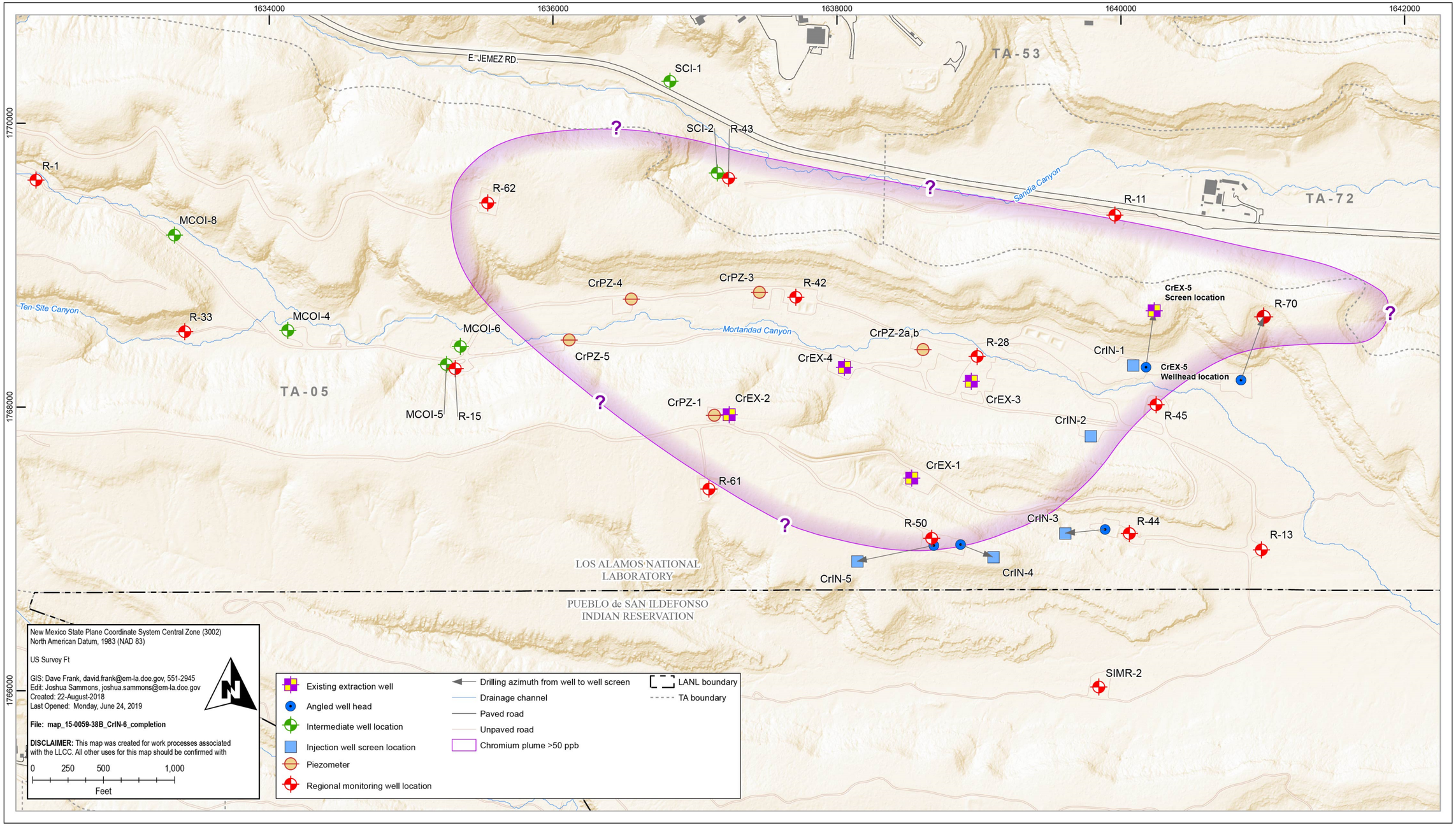


Figure 1.0-1 Project location map

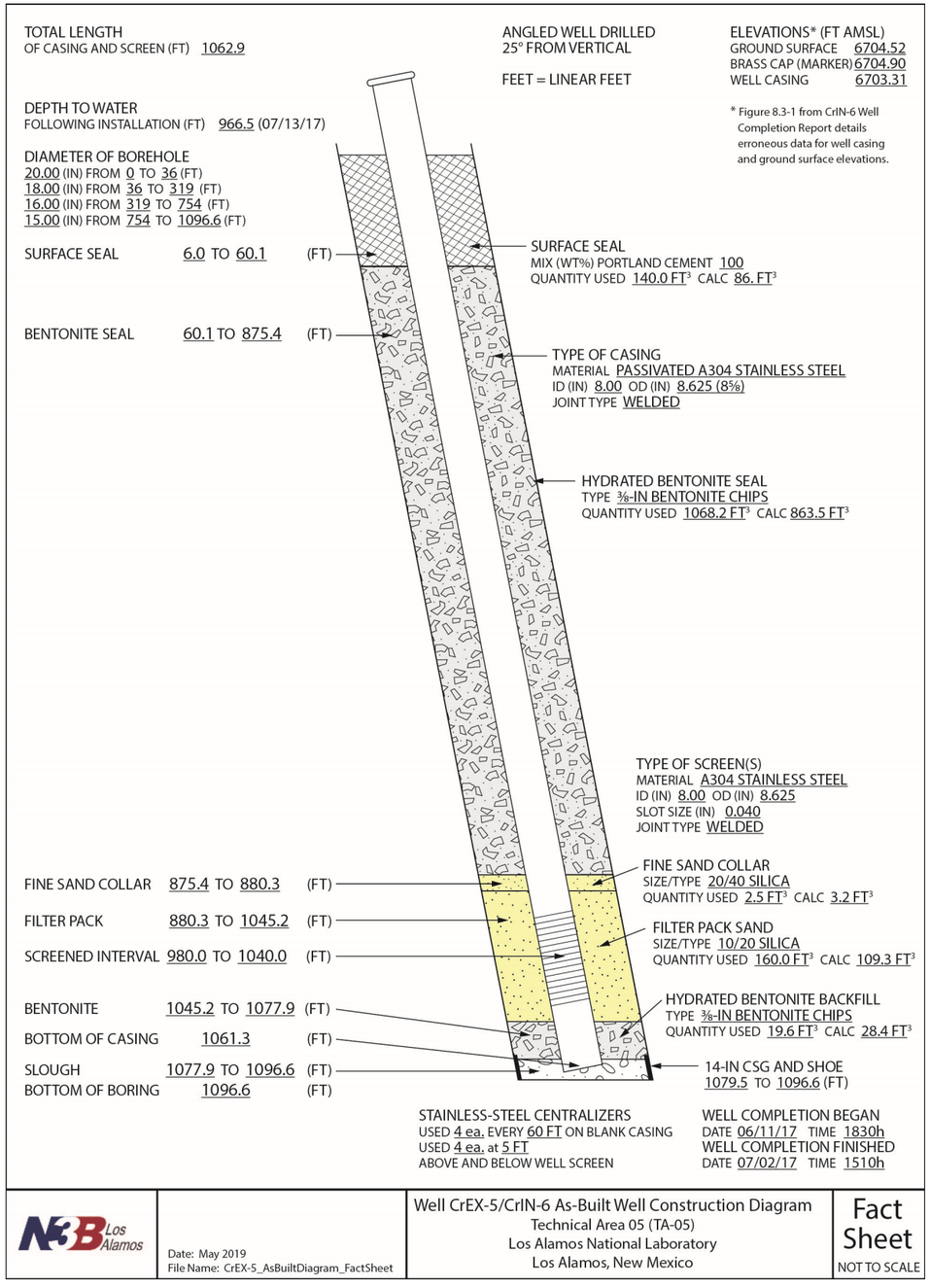


Figure 2.0-1 CrEX-5/CrIN-6 as-built well construction diagram

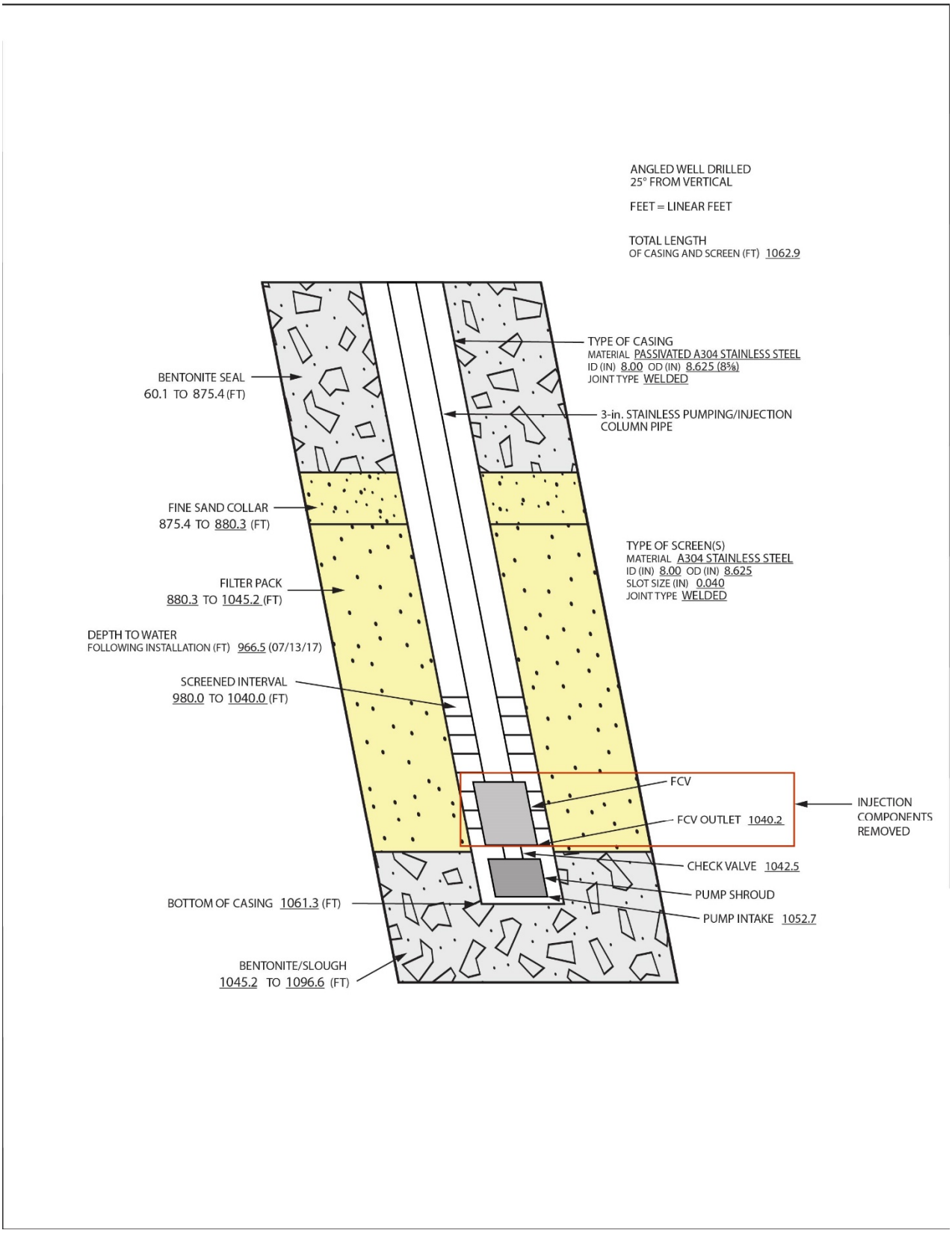


Figure 2.1-1 Former CrIN-6 pumping and injection system

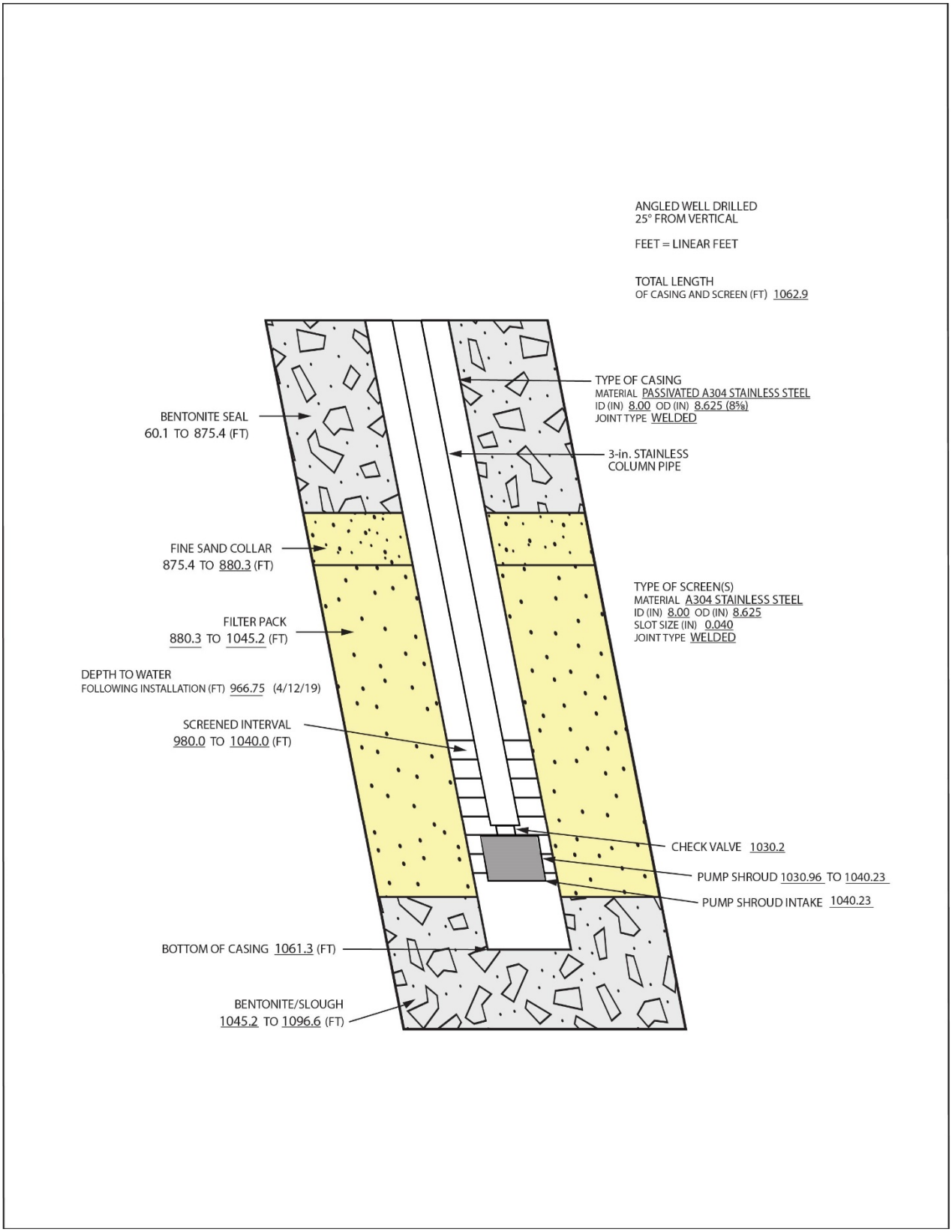


Figure 2.2-1 Current CrEX-5 pumping system

CrEX-5 TECHNICAL NOTES:

SURVEY INFORMATION *
Brass Marker
Northing: 1768288.13
Easting: 1640178.89
Elevation: 6704.90

Well Casing (top of stainless steel)
Northing: 1768286.75
Easting: 1640175.57
Elevation: 6703.31

BOREHOLE GEOPHYSICAL LOGS
Logger: Jet West Geophysical Services
Logs: Natural Gamma Ray, Neutron Density
Date: 06/10/2017

DRILLING INFORMATION
Drilling Company
Holt Services, Inc.

Drill Rig
Foremost DR-24HD

Drilling Methods
Dual rotary fluid-assisted air rotary

Drilling Fluids
Air, potable water, AQF foam, EZ Mud

MILESTONE DATES
Drilling
Start: 05/16/2017
Finished: 06/09/2017

Well Completion
Start: 06/11/2017
Finished: 07/02/2017

Well Development
Start: 07/08/2017
Finished: 07/15/2017

CrIN to CrEX Well Conversion
Start: 04/09/2019
Finished: 06/28/2019

WELL DEVELOPMENT
Development Methods
Swabbing, bailing, and pumping

Parameter Measurements (Final)
pH: 7.96
Temperature: 21.4˚C
Turbidity: 0.5 NTU

AQUIFER TESTING
Step Tests
Pumping Rates: 50, 70, 90 gpm
Performed on: 07/16/2017
24-h Constant-Rate Pumping Test
Water Produced: 129,600 gal.
Pumping Rate: 90 gpm
Performed on: 07/16/2017–07/17/2017

DEDICATED PUMPING SYSTEM
Pump
Make: Grundfos
Type: 85S400-30

Motor
Make: Franklin Electric
Model: 2366178125

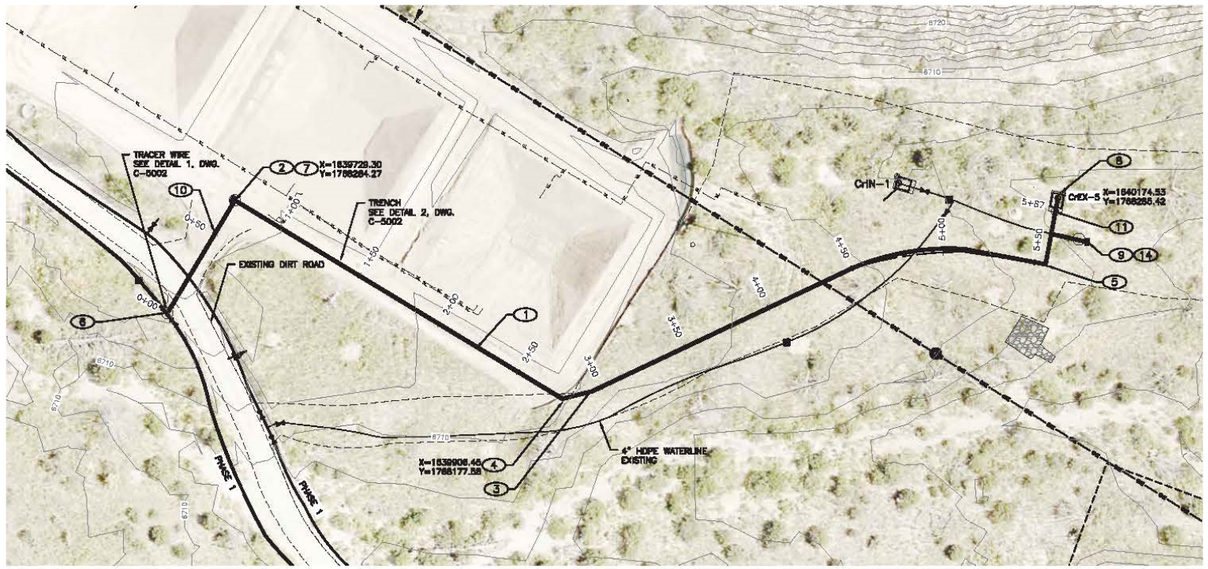
Pump Column
3-inch, sch. 80, 304 stainless steel, spline lock couplings

Gauge Tubes
2x 1.0-in. flush threaded sch. 80 PVC with 5 ft 0.010-slot screens

Transducer
Make: In-Situ Level TROLL
Model: LT 500
Range: 100 psig/231 ft

NOTE:
* Coordinates based on New Mexico State Plane Grid Coordinates, Central Zone (NAD83); Elevation expressed in feet amsl using the National Geodetic Vertical Datum of 1929.

Figure 2.2-2 CrEX-5 technical notes



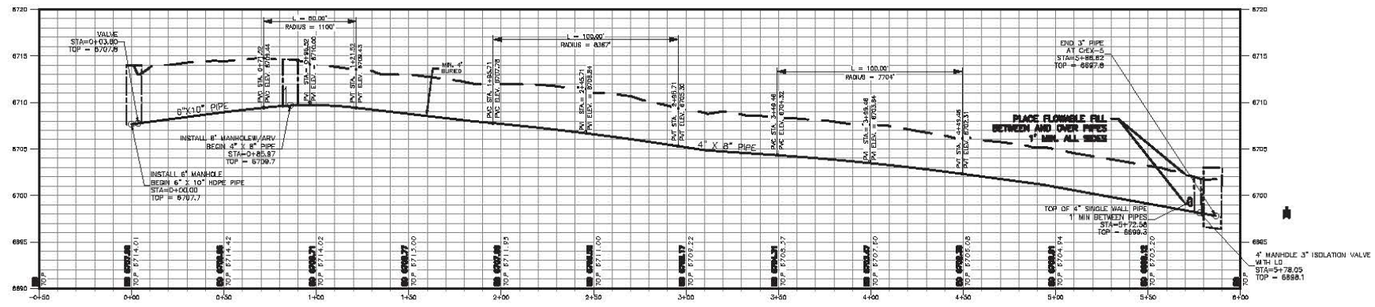
PIPE PLAN
0 30' 60'
1"=30'-0"

GENERAL NOTES

1. INSTALL PIPE PER TRENCH DETAIL, DRAWING C-5002.
2. PROVIDE TRAFFIC CONTROL BARRICADES AS NEEDED TO MAINTAIN ROADWAY ACCESS.
3. FLOWABLE FILL PER SPECIFICATION BETWEEN CULVERTS AND WATERLINES AT CROSSINGS, 5' EACH SIDE OF CROSSING.
4. WHERE DOUBLE WALL PIPE CROSSES SINGLE WALL, DOUBLE WALL SHALL BE 1' MIN UNDER SINGLE WALL (TOP TO BOTTOM)
5. MINIMUM RADIUS OF CURVATURE: 6" SINGLE WALL IS 14 FEET, 4" X 8" DOUBLE WALL PIPE IS 36.0 FEET.

KEYED NOTES

1. 4"X8" DUAL WALL HDPE WATERLINE
2. BLIND FLANGE
3. DOUBLE WALL 11.25 DEG BEND
4. DOUBLE WALL 45 DEG BEND
5. DOUBLE WALL 90 DEG BEND
6. CONNECT TO EXISTING IN 6' MANHOLE SEE DETAIL 1, DWG C-5003
7. 6" DOUBLE WALL VALVE IN 6' CONCRETE MANHOLE, SEE DETAIL 2, DWG. C-5003
8. RECONSTRUCT WELLHEAD PIPING WITHIN VAULT, SEE DETAILS 1 AND 2, DWG C-5001
9. CAP EXISTING 4" HDPE 20' EAST OF CrEX-5 VAULT.
10. 6"X10" DUAL WALL HDPE WATERLINE
11. VALVE IN MH, SEE DETAIL 1 AND 2, DWG. C-5001
14. EXTEND 4" HDPE SINGLE WALL PIPE 20' PAST 4" X 8" DOUBLE WALL PIPE, INSTALL VALVE IN VALVE BOX AT END OF PIPE BEFORE CAP



DOUBLE WALL PIPE PROFILE
0 50' 100
1"=30'-0" HORIZ.
1"=6'-0" VERT.

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DSGN	CHKD	SUB	APP

Daniel B. Stephens & Associates, Inc.

CHROMIUM PIPING & INFRASTRUCTURE
CrIN-6 TO CrIN-5 CONVERSION
WATERLINE PLAN AND PROFILE

DRAWN	J. ARELLANO
DESIGN	J. HILL
CHECKED	G. PETERSON
DATE	02/15/19

BLDG N/A TA- 05

SUBMITTED
PROJECT ENGINEER JENNIFER HILL

APPROVED FOR RELEASE

Los Alamos NATIONAL LABORATORY
PO Box 1663
Los Alamos, New Mexico 87545

SHEET C-1001
4 OF 21

CLASSIFICATION UNC
REVIEWER
DATE

PROJECT ID 18-N3B-P0009
DRAWING NO N0002-DWG-05-INFR- C-1001
REV 0

Figure 3.0-1 Double-wall pipe plan and profile