

**MONTHLY PROGRESS REPORT #248
FOR NOVEMBER 2017**

EPA REGION I ADMINISTRATIVE ORDERS SDWA 1-97-1019 and 1-2000-0014

**JOINT BASE CAPE COD (JBCC)
TRAINING RANGE AND IMPACT AREA**

The following summary of progress is for the period from 1 November to 30 November 2017.

1. SUMMARY OF REMEDIATION ACTIONS

The following is a description of Remediation Actions (RA) underway at Camp Edwards as of November 2017.

Demolition Area 1 Comprehensive Groundwater RA

The Demolition Area 1 Comprehensive Groundwater RA consists of the removal and treatment of contaminated groundwater to control further migration of explosives compounds and perchlorate. Extraction, treatment, and recharge (ETR) systems at Frank Perkins Road, Pew Road, Base Boundary, and the Leading Edge include extraction wells, ex-situ treatment processes to remove explosives compounds and perchlorate from the groundwater, and injection wells to return treated water to the aquifer.

The Frank Perkins Road Treatment Facility has been optimized as part of the Environmental and System Performance Monitoring (ESPM) program at Demolition Area 1. The treatment facility continues to operate at a flow rate of 175 gpm, with over 2.517 billion gallons of water treated and re-injected as of 24 November 2017. No Frank Perkins Road facility shut downs occurred in November.

The Pew Road Mobile Treatment Unit (MTU) continues to operate at a flow rate of 103 gpm with over 548.2 million gallons of water treated and re-injected as of 24 November 2017. No Pew Road MTU shut downs occurred in November.

The Base Boundary MTU is operating at a flow rate of 65 gpm with over 181.8 million gallons of water treated and re-injected as of 24 November 2017. No Base Boundary MTU shut downs occurred in November.

The Leading Edge system continues to operate at a flow rate of 100 gpm with over 79.3 million gallons of water treated and re-injected as of 24 November 2017. No Leading Edge system shut downs occurred in November.

J-1 Range Groundwater RA

Southern Plant

The J-1 Range Southern Groundwater RA consists of removal and treatment of contaminated groundwater to control further migration of explosives compounds. The ETR system includes two extraction wells, ex-situ treatment process to remove explosives compounds from the groundwater, and an infiltration trench to return treated water to the aquifer.

The Southern MTU continues to operate at a flow rate of 125 gpm. As of 24 November 2017, over 447.5 million gallons of water have been treated and re-injected. The following J-1 Range Southern system shut downs occurred in November:

- Shut down at 2202 on 29 October 2017 due to a power outage; BETCO was onsite on 3 November 2017 to replace fuses on two separate poles that had been knocked out during the storm and the system was restarted at 0935 on 3 November 2017; and
- J1SEW0002 was shut down at 0810 on 6 November 2017 to run J1SEW0001 for sampling and was restarted at 0820 on 6 November 2017. J1SEW0001 was shut down at 0900 on 6 November 2017 after sample was collected and was restarted at 0905 on 6 November 2017.

Northern Plant

The J-1 Range Northern Groundwater RA consists of removal and treatment of contaminated groundwater to control further migration of explosives compounds and perchlorate. The ETR system includes two extraction wells, ex-situ treatment process to remove explosives compounds and perchlorate from the groundwater, and an infiltration trench to return treated water to the aquifer.

The Northern MTU continues to operate at a total system flow rate of 250 gpm. As of 24 November 2017, over 511.4 million gallons of water have been treated and re-injected. No J-1 Range Northern MTU shut downs occurred in November.

J-3 Range Groundwater RA

The J-3 Range Groundwater RA consists of removal and treatment of contaminated groundwater to control further migration of explosives compounds and perchlorate. The ETR system includes four extraction wells, ex-situ treatment process to remove explosives compounds and perchlorate from the groundwater and use of the existing Fuel Spill-12 (FS-12) infiltration gallery to return treated water to the aquifer.

The J-3 system is currently operating at a flow rate of 155 gpm while J3EWIP1 is offline awaiting repair. As of 24 November 2017, over 1.066 billion gallons of water have been treated and re-injected. The following J-3 Range system shut downs occurred in November:

- J3EWIP1 tripped at 0221 on 30 October 2017, during a power outage, and will not restart; alarm is "VFD Fault" "Precharge Error" and will not clear. The VFD needs a new circuit board. Well remains offline awaiting repairs;
- 90EW0001 shut down at 0803 on 14 September 2017. A new VFD was installed and the extraction well was restarted at 1105 on 09 November 2017; and
- The System was turned off at 0800 on 29 November 2017 to drain GAC Vessels #002A and #002B for the carbon exchange on 30 November 2017. The System was restarted at 0756 on 1 December 2017.

J-2 Range Groundwater RA

Northern Plant

The J-2 Range Northern Treatment facility consists of removal and treatment of contaminated groundwater to control further migration of explosives compounds and perchlorate. The Extraction, Treatment, and Re-infiltration system includes three extraction wells, ex-situ treatment process to remove explosives compounds and perchlorate from the groundwater, and an infiltration basin to return treated water to the aquifer.

The Northern Treatment Building continues to operate at a flow rate of 225 gpm. As of 24 November 2017, over 945.7 million gallons of water have been treated and re-injected. No Northern Treatment Building shut downs occurred in November.

The Northern MTUs E and F continue to operate at a flow rate of 250 gpm. As of 24 November 2017, over 1.396 billion gallons of water have been treated and re-injected. The following J-2 Range Northern MTU shut down occurred in November:

- MTUs E and F shut down at 0810 on 7 November 2017 to drain IX Vessel #3 at Unit F for resin exchange on 8 November 2017. CFS was onsite on 8 November 2017 to perform resin exchange and IX Vessel #3 was wetted from the bottom up to allow the new resin to soak overnight. MTUs E and F were restarted at 0855 on 9 November 2017; and
- MTUs E and F shut at 0416 on 13 November 2017; alarm was "Floor Sump High Level" due to a broken fitting on the LAG GAC influent line at MTU E. The hose and fitting were replaced and MTUs E and F were restarted at 0910 on 13 November 2017.

Eastern Plant

The J-2 Range Eastern Treatment facility consists of removal and treatment of groundwater to minimize downgradient migration of explosives compounds and perchlorate. The ETI system includes the following components: three extraction wells in an axial array, an ex-situ treatment process consisting of an ion exchange (IX) resin and granular activated carbon (GAC) media to treat perchlorate and explosives compounds and three infiltration trenches located along the lateral boundaries of the plume where treated water will enter the vadose zone and infiltrate into the aquifer. The J-2 Range Eastern system is running at a combined total flow rate of 495 gpm.

The MTUs H and I continue to operate at a flow rate of 250 gpm. As of 24 November 2017, over 1.013 billion gallons of water have been treated and re-injected. The following MTU H and I shut downs occurred in November:

- MTUs H and I shut down at 2226 on 29 October 2017 due to a power outage; BETCO was onsite on 3 November 2017 to replace fuses on two separate poles that had been knocked out during the storm as well as to replace two motor starters that had been damaged during the outage. The MTUs were restarted at 1025 on 3 November 2017; and
- MTUs H and I shut down at 1300 on 7 November 2017 to drain GAC Vessels #5 and #6 at Unit H for carbon exchange on 8 November 2017. CFS was onsite on 8 November 2017 to perform carbon exchange and GAC Vessels #5 and #6 were wetted from the bottom up to allow the fresh carbon to soak overnight. MTUs H and I were restarted at 0812 on 9 November 2017.

MTU J continues to operate at a flow rate of 120 gpm. As of 24 November 2017, over 469.3 million gallons of water have been treated and re-injected. The following shut downs of MTU J occurred in November:

- MTU J shut down at 2209 on 29 October 2017 due to a power outage; BETCO was onsite on 3 November 2017 to replace fuses on two separate poles that had been knocked out during the storm as well as to replace one motor starter that had been damaged during the outage. MTU J was restarted at 1004 on 3 November 2017.

MTU K continues to operate at a flow rate of 125 gpm. As of 24 November 2017, over 581.4 million gallons of water have been treated and re-injected. The following shut downs of MTU K occurred in November:

- MTU K shut down at 2359 on 29 October 2017 due to a power outage; BETCO was onsite on 3 November 2017 to replace fuses on two separate poles that had been knocked out during the storm as well as to replace two motor starters that had been damaged during the outage. MTU K was restarted at 1044 on 3 November 2017.

Central Impact Area RA

The Central Impact Area (CIA) Groundwater treatment facility consists of removal and treatment of groundwater to minimize downgradient migration of explosives compounds and perchlorate. The ETR system includes the following components: three extraction wells, an ex-situ treatment process consisting of an ion exchange (IX) resin and granular activated carbon (GAC) media to treat explosives compounds and three infiltration galleries to return treated water to the aquifer. The CIA systems 1, 2, and 3 continue to run at a combined total flow rate of 750 gpm. As of 24 November 2017, over 1.148 billion gallons of water have been treated and re-injected. The following CIA treatment facility shut downs occurred in November:

- System 2 was turned off at 1110 on 31 October 2017 to allow injection gallery to dry for injection well installation and was restarted at 1000 on 8 November 2017; and
- System 1 and System 2 shut down at 0830 on 21 November 2017 due to the power being disconnected for the work being performed at E Range. System 1 did not immediately restart due to a power supply interruption (MCP Power Fault alarm, and was restarted at 0714 on 22 November 2017. System 2 was restarted at 1122 on 21 November 2017.

SUMMARY OF ACTIONS TAKEN

Samples collected during the reporting period are summarized in Table 1.

Process water samples were collected at Frank Perkins Road, Pew Road, Base Boundary, Leading Edge, J-1 Range Southern, J-1 Range Northern, J-2 Range Northern, J-2 Range Eastern, J-3 Range, and Central Impact Area (CIA).

Environmental and system performance monitoring groundwater samples were collected at J-1 Range Northern, J-1 Range Southern, Demolition Area 2 and GA Range.

Soil samples were collected from D Range, C Range and Former B Range.

Performed MEC investigation in two Area 3 grids at J-3 Range.

Completed excavation of 7th lifts at two grids at Former B Range.

Installed the down-comber PVC within IW-660 (CIA2 injection well), constructed piping to well from CIA2 effluent, and brought well online on 16 November 2017.

Performed daily inspection of BEM cover at the CIA to ensure cover is secure and intact.

JBCC IAGWSP Tech Update Meeting Minutes 9 November 2017

Project and Fieldwork Update

The tie-in for the CIA reinjection well was completed yesterday. The down pipe still needs to be installed but the system is back up and running. Water is going to the gallery until the down pipe is installed. There was a power surge in the J-3 system and in-plume well 1 is down. The electrician and programmer are on-site today to try and fix it along with well EW0032 (which is getting a new VFD). There was a change-out of GAC at the J-2 eastern system today. Dawson has been working on firebreaks and should finish the 20 acres by next Tuesday. They cut a 40' firebreak from Wood Road on Greenway to Barlow Road on the south side of Wood Road (adjacent to the MMRP work being conducted by AFCEC at the Old K Range), L4 and L5 which are essentially laterals that go off into the area south of Wood Road, and a 20' firebreak at Barlow Road from Wood Road north past Jefferson Road. The crew is currently cutting 5 acres north of Chadwick Road downrange of the KD Range. They will also be moving the APC at the end of the KD Range. Another 2 acres of firebreaks were cut in Former E next to the Demolition Area 1 bowl connecting through to Turpentine Road. UXO surface clearance of all the firebreak areas is also being performed.

In the Small Arms Ranges, crews still have additional lifts to dig at three of the ranges; however conditions have been unfavorable and the hope to get back in early next week to finish those lifts. The BEM soils were shipped off-site to Bourne early this week. Work will begin at the grids in the J-3 Range next week after the UXO crews have finished with the fire breaks.

Action Items

The action items were discussed and updated.

J-1 Range Northern Plume Shell Update – Presentation

A presentation as provided on the J-1 northern plume shell update. The process used for the plume shell development was reviewed and discussed. It was explained that the first step is to query EDMS for perchlorate and RDX data associated with the J-1 Range northern plume area. Then the existing steady-state MODFLOW groundwater model for "average" conditions is run. It was noted that the simulation is started at the earliest date of groundwater sample collection and ends at the present time and representative groundwater extraction rates are used for the simulation period. Then particles are initiated in MODPATH at locations and times of each sample collection point and are migrated using results of the MODFLOW groundwater flow model. MODPATH simulation is run to migrate particles (x, y, and z) to the

present time. Next you import model predicted x, y, z, and c values to Excel and match the particles with their respective measured concentrations. It was noted that perchlorate concentrations are not adjusted and RDX concentrations are decayed (Max decay 55% after 5 year) according to work done by Jacobs. Finally, values are imported to ArcView and used as a guide to manually develop plume contours representing 10 foot layers.

Figures showing the ten foot layers for perchlorate and RDX were displayed and discussed. For the J-1 Range northern perchlorate plume, the start date was November 15, 2000 and end date was April 30, 2017. Concentrations ranged from non-detect to 87.5 µg/L and of the 1,646 points migrated, 1,355 were remaining and 231 points were used for the plume shell. For the RDX plume, the start date was November 23, 1999 and end date was April 30, 2017. Concentrations ranged from non-detect to 87.2 µg/L and of the 1,900 points migrated, 1,627 were remaining and 309 points were used for the plume shell. The contour values were 0.25 µg/L, 0.60 µg/L and 6 µg/L. Mass (lbs.) predicted vs. extraction treatment and reinjection system removed for both perchlorate and RDX was displayed and discussed.

Time to cleanup for the J-1 northern plume was discussed. For Perchlorate, the 2011 Decision Document predicted perchlorate would reach the cleanup level of 2 µg/L between 2035 and 2037. The 2012 and 2017 plume shell updates predicted perchlorate levels would reach 2 µg/L by 2038 and 2047 respectively. For RDX, the 2011 Decision Document predicted perchlorate would reach the cleanup level of 0.6 µg/L between 2035 and 2047. The 2012 and 2017 plume shell updates predicted perchlorate levels would reach 0.6 µg/L by 2067 and 2051 respectively.

It was explained that the new plume would be incorporated into the next annual report.

Central Impact Area Annual Environmental Monitoring Report – Presentation

A presentation was provided on the Central Impact Area Annual Environmental Monitoring Report. It was noted that the presentation would cover new work conducted, system performance, annual groundwater sampling results (July 2016 through June 2017) and trends, hydraulic monitoring and capture zone analysis, a comparison to Decision Document criteria, and recommendations.

New work conducted during the reporting period included the installation of groundwater profile borings at two locations along Pocasset/Sandwich Road in the Northeast Plume and monitoring well screens (MW-686M1/M2 and MW-687M1/M2), recalibration of the CIA groundwater flow model was completed and redevelopment of the RDX plume shell to better represent current levels of contamination at the CIA was performed. Results for the new monitoring wells were displayed and discussed.

System performance summaries with statistics for MTUs CIA 1, CIA 2 and CIA 3 were displayed and reviewed. It was noted that the influent concentration range for MTU 1 was 0.56 to 0.83 µg/L for RDX and 0.36 to 0.47 µg/L for perchlorate. For MTU 2, RDX influent concentrations ranged from 1.02 to 1.54 µg/L and perchlorate concentrations were 0.22 to 0.29 µg/L. MTU 3 ranged from 0.75 to 1.50 µg/L for RDX and 0.052 to 0.27 µg/L for perchlorate. The three systems treated 376 million gallons of water. During the reporting period, MTU 1 removed 0.84 pounds of RDX and 0.46 pounds of perchlorate. MTU 2 removed 5.60 pounds of RDX, and 0.80 pounds of perchlorate and MTU 3 removed 0.97 pounds of RDX and 0.08 pounds of perchlorate. Plots of treatment systems influent trends were displayed and discussed.

Groundwater monitoring results and trends were discussed. Overall, perchlorate ranged from non-detect to 4.7 µg/L (MW-89M2). There were three well locations with concentrations above 2 µg/L. No well locations were above 15 µg/L. RDX concentrations ranged from non-detect to 12.6 µg/L (MW-113M2).

There were 45 well locations with concentrations above 0.6 µg/L and 20 well locations that were above 2 µg/L. There were no well locations with RDX concentrations above 20 µg/L.

Two aquifer hydraulic analysis events were discussed. In October 2016, water levels ranged from 4.22' msl at MW-284M1 (north) to 54.39' msl at MW-207M2 (south). In February 2017, water levels ranged from 4.77' msl at MW-284M2 (north) to 64.22' msl at MW-184M1 (south) and the horizontal gradient in Zone 1 was approximately 0.00188 ft/ft; in Zone 2 it was 0.00388 ft/ft.

Recommendations were discussed and displayed on a figure. IAGWSP is not recommending any modifications to plant operations or sampling or any modifications to wellfield extraction rates. Recommendations for the hydraulic monitoring include removing the winter water level monitoring event such that there will only be an annual water level survey in zones 1 and 2, and removing several wells from the annual event that do not appreciably add to the hydraulic capture evaluation because of their location in relation to the predicted and formerly measured capture zones. For the groundwater perchlorate and explosives monitoring program, IAGWSP recommends adding the MW-686 and MW-687 well screens to the program for annual sample and measurement for explosives. It was noted that EPA and MassDEP comments on the annual report are pending.

JBCC Cleanup Team Meeting

The next meeting of the JBCC Cleanup Team (JBCCCT), formerly the MMR Cleanup Team (MMRCT) has not been scheduled. The Cleanup Team meeting discusses late breaking news and responses to action items, as well as updates from the IAGWSP and the Installation Restoration Program (IRP). The JBCCCT meetings provide a forum for community input regarding issues related to both the IRP and the IAGWSP.

SUMMARY OF DATA RECEIVED

Table 2 summarizes the validated detections of explosives compounds and perchlorate for all groundwater results received from 1 November to 30 November 2017. These results are compared to the Maximum Contaminant Levels/Health Advisory (MCL/HA) values for respective analytes. Explosives and perchlorate are the primary contaminants of concern (COC) at Camp Edwards.

There are currently twelve operable units (OU) under investigation and cleanup at Camp Edwards. The OUs include: Central Impact Area, Demolition Area 1, Demolition Area 2, Former A Range, J-1 Range, J-2 Range, J-3 Range, L Range, Northwest Corner, Small Arms Ranges, Training Areas, and Western Boundary. Environmental monitoring reports for each OU are generated each year to evaluate the current year groundwater results. These reports are available on the site Environmental Data Management System (EDMS) and at the project document repositories (IAGWSP office and Jonathan Bourne Library).

2. DELIVERABLES SUBMITTED

Deliverables submitted during the reporting period include the following:

- Monthly Progress Report No. 247 for October 2017 11/10/2017
- Final Blow-in-Place (BIP) and Cracked Open Items Summary Report
Technical Memorandum – 2016 11/08/2017
- Final Demolition Area 2 2017 Annual Environmental Monitoring Report 11/14/2017
- Draft Demolition Area 1 2017 Annual Environmental Monitoring Report 11/14/2017
- Draft J-3 Range 2017 Annual Environmental Monitoring Report 11/29/2017
- Draft Demolition Area 1 Proposed Groundwater Profile Borings Project Note 11/29/2017

3. SCHEDULED ACTIONS

The following documents are being prepared or revised during December 2017:

- Training Areas Draft Investigation Report;
- Training Areas Remedy Selection Plan;
- 2016 CIA Source Removal Annual Report;
- Technology Evaluation and Attenuation Study Reports;
- J-3 Range Confirmatory Geophysical and Soil Investigation Technical Memorandum;
- J-1 Range Southern Drive Point and Water Table Well Locations Project Note;
- Five Year Review Report;
- Demolition Area 1 2017 Annual Environmental Monitoring Report;
- Northwest Corner 2017 Annual Environmental Monitoring Report;
- J-3 Range 2017 Annual Environmental Monitoring Report; and
- J-2 Range Eastern and J-2 Range Northern 2017 Annual Environmental Monitoring Report.

TABLE 1
Sampling Progress: 1 November to 30 November 2017

Area Of Concern	Location	Field Sample ID	Sample Type	Date Sampled	Matrix	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)
J1 Range Northern	MW-479M1	MW-479M1_F17	N	11/29/2017	Ground Water	240	250
J1 Range Northern	MW-349M2	MW-349M2_F17	N	11/29/2017	Ground Water	195	205
J1 Range Northern	MW-349M1	MW-349M1_F17	N	11/29/2017	Ground Water	229	239
J1 Range Northern	MW-245M2	MW-245M2_F17	N	11/29/2017	Ground Water	204	214
J1 Range Northern	MW-245M2	MW-245M2_F17D	FD	11/29/2017	Ground Water	204	214
J1 Range Northern	MW-245M1	MW-245M1_F17	N	11/29/2017	Ground Water	244	254
J1 Range Northern	MW-326M3	MW-326M3_F17	N	11/28/2017	Ground Water	165.2	175.3
J1 Range Northern	MW-326M2	MW-326M2_F17	N	11/28/2017	Ground Water	196.3	206.3
J1 Range Northern	MW-326M2	MW-326M2_F17D	FD	11/28/2017	Ground Water	196.3	206.3
J1 Range Northern	MW-326M1	MW-326M1_F17	N	11/28/2017	Ground Water	250	260
J1 Range Northern	MW-540M1	MW-540M1_F17	N	11/28/2017	Ground Water	258	268
J1 Range Northern	MW-541M1	MW-541M1_F17	N	11/28/2017	Ground Water	210	220
J1 Range Northern	MW-566M1	MW-566M1_F17	N	11/27/2017	Ground Water	232	242
J1 Range Northern	MW-430M2	MW-430M2_F17	N	11/27/2017	Ground Water	188.4	198.4
J1 Range Northern	MW-430M1	MW-430M1_F17	N	11/27/2017	Ground Water	245.2	255.2
J1 Range Northern	MW-370M3	MW-370M3_F17	N	11/27/2017	Ground Water	175	185
J1 Range Northern	MW-370M2	MW-370M2_F17	N	11/27/2017	Ground Water	215.5	225.5
J1 Range Northern	MW-370M1	MW-370M1_F17	N	11/27/2017	Ground Water	245	255
J1 Range Northern	MW-370M1	MW-370M1_F17D	FD	11/27/2017	Ground Water	245	255
J1 Range Northern	MW-549M2	MW-549M2_F17	N	11/21/2017	Ground Water	187.3	197.3
J1 Range Northern	MW-549M1	MW-549M1_F17	N	11/21/2017	Ground Water	227.4	237.4
J1 Range Northern	MW-547M2	MW-547M2_F17	N	11/21/2017	Ground Water	178	188
J1 Range Northern	MW-547M1	MW-547M1_F17	N	11/21/2017	Ground Water	237	247
J1 Range Northern	MW-656M2	MW-656M2_F17	N	11/21/2017	Ground Water	222.1	232.1
J1 Range Northern	MW-656M1	MW-656M1_F17	N	11/21/2017	Ground Water	244.1	254.1
J1 Range Northern	MW-564M1	MW-564M1_F17	N	11/20/2017	Ground Water	227	237
J1 Range Northern	MW-564M1	MW-564M1_F17D	FD	11/20/2017	Ground Water	227	237
J1 Range Northern	MW-563M1	MW-563M1_F17	N	11/20/2017	Ground Water	215	225
J1 Range Northern	MW-605M2	MW-605M2_F17	N	11/20/2017	Ground Water	182.2	192.2
J1 Range Northern	MW-605M1	MW-605M1_F17	N	11/20/2017	Ground Water	220.2	230.2
J1 Range Northern	MW-657M2	MW-657M2_F17	N	11/20/2017	Ground Water	208.3	218.3
J1 Range Northern	MW-657M1	MW-657M1_F17	N	11/20/2017	Ground Water	240.3	250.3
J1 Range Northern	MW-567M1	MW-567M1_F17	N	11/16/2017	Ground Water	215.5	225.5
J1 Range Northern	MW-286M2	MW-286M2_F17	N	11/16/2017	Ground Water	205	215
J1 Range Northern	MW-286M1	MW-286M1_F17	N	11/16/2017	Ground Water	259	269
J1 Range Northern	MW-265M3	MW-265M3_F17	N	11/16/2017	Ground Water	200	210
J1 Range Northern	MW-265M2	MW-265M2_F17	N	11/16/2017	Ground Water	225	235
J1 Range Northern	MW-265M2	MW-265M2_F17D	FD	11/16/2017	Ground Water	225	235
J1 Range Northern	MW-265M1	MW-265M1_F17	N	11/16/2017	Ground Water	265	275
J1 Range Northern	MW-369M1	MW-369M1_F17	N	11/15/2017	Ground Water	254.1	264.1
J1 Range Northern	MW-220M1	MW-220M1_F17	N	11/15/2017	Ground Water	248	258
J2 Range Eastern	J2E-EFF-K	J2E-EFF-K-110A	N	11/15/2017	Process Water	0	0
J2 Range Eastern	J2E-MID-2K	J2E-MID-2K-110A	N	11/15/2017	Process Water	0	0
J2 Range Eastern	J2E-MID-1K	J2E-MID-1K-110A	N	11/15/2017	Process Water	0	0
J2 Range Eastern	J2E-INF-K	J2E-INF-K-110A	N	11/15/2017	Process Water	0	0
J1 Range Northern	MW-253M1	MW-253M1_F17	N	11/15/2017	Ground Water	265.4	275.4
J2 Range Eastern	J2E-EFF-J	J2E-EFF-J-110A	N	11/15/2017	Process Water	0	0
J2 Range Eastern	J2E-MID-2J	J2E-MID-2J-110A	N	11/15/2017	Process Water	0	0
J2 Range Eastern	J2E-MID-1J	J2E-MID-1J-110A	N	11/15/2017	Process Water	0	0
J2 Range Eastern	J2E-INF-J	J2E-INF-J-110A	N	11/15/2017	Process Water	0	0
J2 Range Eastern	J2E-EFF-IH	J2E-EFF-IH-110A	N	11/15/2017	Process Water	0	0
J2 Range Eastern	J2E-MID-2H	J2E-MID-2H-110A	N	11/15/2017	Process Water	0	0
J1 Range Northern	MW-315M2	MW-315M2_F17	N	11/15/2017	Ground Water	195.7	205.7
J2 Range Eastern	J2E-MID-1H	J2E-MID-1H-110A	N	11/15/2017	Process Water	0	0
J2 Range Eastern	J2E-MID-2I	J2E-MID-2I-110A	N	11/15/2017	Process Water	0	0
J2 Range Eastern	J2E-MID-1I	J2E-MID-1I-110A	N	11/15/2017	Process Water	0	0
J2 Range Eastern	J2E-INF-I	J2E-INF-I-110A	N	11/15/2017	Process Water	0	0

N = Normal Sample
FD = Field Duplicate

TABLE 1
Sampling Progress: 1 November to 30 November 2017

Area Of Concern	Location	Field Sample ID	Sample Type	Date Sampled	Matrix	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)
J1 Range Northern	MW-315M1	MW-315M1_F17	N	11/15/2017	Ground Water	245.5	255.5
J2 Range Northern	J2N-EFF-G	J2N-EFF-G-134A	N	11/15/2017	Process Water	0	0
J2 Range Northern	J2N-MID-2G	J2N-MID-2G-134A	N	11/15/2017	Process Water	0	0
J2 Range Northern	J2N-MID-1G	J2N-MID-1G-134A	N	11/15/2017	Process Water	0	0
J2 Range Northern	J2N-INF-G	J2N-INF-G-134A	N	11/15/2017	Process Water	0	0
J2 Range Northern	J2N-EFF-EF	J2N-EFF-EF-134A	N	11/15/2017	Process Water	0	0
J2 Range Northern	J2N-MID-2F	J2N-MID-2F-134A	N	11/15/2017	Process Water	0	0
J2 Range Northern	J2N-MID-1F	J2N-MID-1F-134A	N	11/15/2017	Process Water	0	0
J2 Range Northern	J2N-INF-EF	J2N-INF-EF-134A	N	11/15/2017	Process Water	0	0
J2 Range Northern	J2N-MID-2E	J2N-MID-2E-134A	N	11/15/2017	Process Water	0	0
J2 Range Northern	J2N-MID-1E	J2N-MID-1E-134A	N	11/15/2017	Process Water	0	0
J1 Range Northern	MW-306M2	MW-306M2_F17	N	11/14/2017	Ground Water	164.7	174.7
J1 Range Northern	MW-306M1	MW-306M1_F17	N	11/14/2017	Ground Water	184.9	194.9
J1 Range Northern	MW-306D	MW-306D_F17	N	11/14/2017	Ground Water	291.7	301.7
Central Impact Area	CIA2-EFF	CIA2-EFF-46A	N	11/14/2017	Process Water	0	0
Central Impact Area	CIA2-MID2	CIA2-MID2-46A	N	11/14/2017	Process Water	0	0
Central Impact Area	CIA2-MID1	CIA2-MID1-46A	N	11/14/2017	Process Water	0	0
Central Impact Area	CIA2-INF	CIA2-INF-46A	N	11/14/2017	Process Water	0	0
J1 Range Northern	MW-187M1	MW-187M1_F17	N	11/14/2017	Ground Water	160	170
Central Impact Area	CIA1-EFF	CIA1-EFF-46A	N	11/14/2017	Process Water	0	0
Central Impact Area	CIA1-MID2	CIA1-MID2-46A	N	11/14/2017	Process Water	0	0
Central Impact Area	CIA1-MID1	CIA1-MID1-46A	N	11/14/2017	Process Water	0	0
Central Impact Area	CIA1-INF	CIA1-INF-46A	N	11/14/2017	Process Water	0	0
J1 Range Northern	MW-187D	MW-187D_F17	N	11/14/2017	Ground Water	306	316
Central Impact Area	CIA3-EFF	CIA3-EFF-17A	N	11/14/2017	Process Water	0	0
Central Impact Area	CIA3-MID2	CIA3-MID2-17A	N	11/14/2017	Process Water	0	0
Central Impact Area	CIA3-MID1	CIA3-MID1-17A	N	11/14/2017	Process Water	0	0
Central Impact Area	CIA3-INF	CIA3-INF-17A	N	11/14/2017	Process Water	0	0
GA Range	MW-690S	MW-690S_F17	N	11/13/2017	Ground Water	99.2	109.2
Demolition Area 2	MW-573M2	MW-573M2_F17	N	11/13/2017	Ground Water	155.4	165.4
Demolition Area 2	MW-573M2	MW-573M2_F17D	FD	11/13/2017	Ground Water	155.4	165.4
Demolition Area 2	MW-573M1	MW-573M1_F17	N	11/13/2017	Ground Water	176.4	186.4
Demolition Area 2	MW-435M2	MW-435M2_F17	N	11/13/2017	Ground Water	149.6	159.9
Demolition Area 2	MW-435M1	MW-435M1_F17	N	11/13/2017	Ground Water	169.9	180
Former B Range	SSFBR140QRA	FBR140QRA_F	N	11/12/2017	Soil	0	0.25
Former B Range	SSFBR140LA	FBR140LA_S	FR	11/12/2017	Soil	0	0.25
Former B Range	SSFBR140LA	FBR140LA_R	FR	11/12/2017	Soil	0	0.25
Former B Range	SSFBR140LA	FBR140LA_Q	N	11/12/2017	Soil	0	0.25
Demolition Area 2	MW-572M1	MW-572M1_F17	N	11/08/2017	Ground Water	164.9	174.9
Demolition Area 2	MW-161S	MW-161S_F17	N	11/08/2017	Ground Water	145.5	155.5
Demolition Area 2	MW-160S	MW-160S_F17	N	11/08/2017	Ground Water	137.5	147.5
Demolition Area 2	MW-654M1	MW-654M1_F17	N	11/08/2017	Ground Water	154	164
Demolition Area 2	MW-655M2	MW-655M2_F17	N	11/08/2017	Ground Water	156	166
Demolition Area 2	MW-655M1	MW-655M1_F17	N	11/08/2017	Ground Water	178	188
J1 Range Southern	MW-403M2	MW-403M2_F17	N	11/07/2017	Ground Water	127.36	137.4
J1 Range Southern	MW-403M1	MW-403M1_F17	N	11/07/2017	Ground Water	159.9	169.9
J1 Range Southern	MW-669M2	MW-669M2_F17	N	11/07/2017	Ground Water	201.7	211.7
J1 Range Southern	MW-669M1	MW-669M1_F17	N	11/07/2017	Ground Water	223.7	233.7
J1 Range Southern	MW-647M2	MW-647M2_F17	N	11/07/2017	Ground Water	189.3	199.3
J1 Range Southern	MW-647M1	MW-647M1_F17	N	11/07/2017	Ground Water	211.3	221.3
J1 Range Southern	MW-647M1	MW-647M1_F17D	FD	11/07/2017	Ground Water	211.3	221.3
J1 Range Southern	MW-402M2	MW-402M2_F17	N	11/06/2017	Ground Water	155.2	165.3
J3 Range	J3-EFF	J3-EFF-134A	N	11/06/2017	Process Water	0	0
J3 Range	J3-MID-2	J3-MID-2-134A	N	11/06/2017	Process Water	0	0
J3 Range	J3-MID-1	J3-MID-1-134A	N	11/06/2017	Process Water	0	0
J3 Range	J3-INF	J3-INF-134A	N	11/06/2017	Process Water	0	0
J1 Range Southern	MW-402M1	MW-402M1_F17	N	11/06/2017	Ground Water	190.1	200.1

N = Normal Sample
FD = Field Duplicate

TABLE 1
Sampling Progress: 1 November to 30 November 2017

Area Of Concern	Location	Field Sample ID	Sample Type	Date Sampled	Matrix	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)
J1 Range Southern	MW-525M2	MW-525M2_F17	N	11/06/2017	Ground Water	148	158
J1 Range Northern	J1N-EFF	J1N-EFF-49A	N	11/06/2017	Process Water	0	0
J1 Range Northern	J1N-MID2	J1N-MID2-49A	N	11/06/2017	Process Water	0	0
J1 Range Northern	J1N-MID1	J1N-MID1-49A	N	11/06/2017	Process Water	0	0
J1 Range Northern	J1N-INF2	J1N-INF2-49A	N	11/06/2017	Process Water	0	0
J1 Range Southern	MW-525M1	MW-525M1_F17	N	11/06/2017	Ground Water	172	182
J1 Range Southern	J1S-EW1-INF	J1S-EW1-INF_F17	N	11/06/2017	Process Water	0	0
J1 Range Southern	J1S-EFF	J1S-EFF-120A	N	11/06/2017	Process Water	0	0
J1 Range Southern	J1S-EW2-INF	J1S-EW2-INF_F17	N	11/06/2017	Process Water	0	0
J1 Range Southern	J1S-MID-2	J1S-MID-2-120A	N	11/06/2017	Process Water	0	0
J1 Range Southern	J1S-INF-2	J1S-INF-2-120A	N	11/06/2017	Process Water	0	0
J1 Range Southern	MW-645M2	MW-645M2_F17	N	11/02/2017	Ground Water	143.5	153.5
J1 Range Southern	MW-645M1	MW-645M1_F17	N	11/02/2017	Ground Water	183.5	193.5
J1 Range Southern	MW-645M1	MW-645M1_F17D	FD	11/02/2017	Ground Water	183.5	193.5
J1 Range Southern	MW-482M3	MW-482M3_F17	N	11/02/2017	Ground Water	98.2	108.2
Demolition Area 1	D1-EFF	D1-EFF-88A	N	11/02/2017	Process Water	0	0
Demolition Area 1	D1-MID-2	D1-MID-2-88A	N	11/02/2017	Process Water	0	0
Demolition Area 1	D1-MID-1	D1-MID-1-88A	N	11/02/2017	Process Water	0	0
Demolition Area 1	D1-INF	D1-INF-88A	N	11/02/2017	Process Water	0	0
J1 Range Southern	MW-482M2	MW-482M2_F17	N	11/02/2017	Ground Water	172.6	182.6
J1 Range Southern	MW-482M2	MW-482M2_F17D	FD	11/02/2017	Ground Water	172.6	182.6
Demolition Area 1	D1LE-EFF	D1LE-EFF-16A	N	11/02/2017	Process Water	0	0
Demolition Area 1	D1LE-MID2	D1LE-MID2-16A	N	11/02/2017	Process Water	0	0
Demolition Area 1	D1LE-MID1	D1LE-MID1-16A	N	11/02/2017	Process Water	0	0
Demolition Area 1	D1LE-INF	D1LE-INF-16A	N	11/02/2017	Process Water	0	0
Demolition Area 1	PR-EFF	PR-EFF-140A	N	11/02/2017	Process Water	0	0
Demolition Area 1	PR-MID-2	PR-MID-2-140A	N	11/02/2017	Process Water	0	0
Demolition Area 1	PR-MID-1	PR-MID-1-140A	N	11/02/2017	Process Water	0	0
Demolition Area 1	PR-INF	PR-INF-140A	N	11/02/2017	Process Water	0	0
J1 Range Southern	MW-481M2	MW-481M2_F17	N	11/02/2017	Ground Water	146.3	156.3
Demolition Area 1	FPR-2-EFF-A	FPR-2-EFF-A-140A	N	11/02/2017	Process Water	0	0
Demolition Area 1	FPR-2-GAC-MID1A	FPR-2-GAC-MID1A-140A	N	11/02/2017	Process Water	0	0
J1 Range Southern	MW-481M1	MW-481M1_F17	N	11/02/2017	Ground Water	189.7	199.7
Demolition Area 1	FPR2-POST-IX-A	FPR2-POST-IX-A-140A	N	11/02/2017	Process Water	0	0
C Range	SSCRNGS02	CRNGS02_J	FR	11/02/2017	Soil	0	0.25
Demolition Area 1	FPR-2-INF	FPR-2-INF-140A	N	11/02/2017	Process Water	0	0
C Range	SSCRNGS02	CRNGS02_I	N	11/02/2017	Soil	0	0.25
J1 Range Southern	MW-592M2	MW-592M2_F17	N	11/01/2017	Ground Water	158	168
J1 Range Southern	MW-592M1	MW-592M1_F17	N	11/01/2017	Ground Water	201	211
J1 Range Southern	MW-646M2	MW-646M2_F17	N	11/01/2017	Ground Water	168	178
C Range	SSDR158	DR158_I	FR	11/01/2017	Soil	0	0.25
J1 Range Southern	MW-646M1	MW-646M1_F17	N	11/01/2017	Ground Water	198	208
C Range	SSDR158	DR158_H	FR	11/01/2017	Soil	0	0.25
C Range	SSDR158	DR158_G	N	11/01/2017	Soil	0	0.25
J1 Range Southern	MW-591M2	MW-591M2_F17	N	11/01/2017	Ground Water	165	175
J1 Range Southern	MW-591M1	MW-591M1_F17	N	11/01/2017	Ground Water	200	210

TABLE 2
VALIDATED EXPLOSIVE AND PERCHLORATE RESULTS
Data Received November 2017

Area of Concern	Location ID	Field Sample ID	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Date Sampled	Test Method	Analyte	Result Value	Qualifier	Units	MCL/HA	> MCL/HA	MDL	RL
J1 Range Southern	MW-360M2	MW-360M2_F17	102	112	10/31/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.5		ug/L	0.6		0.036	0.2
J1 Range Southern	MW-360M2	MW-360M2_F17	102	112	10/31/2017	SW8330	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.81		ug/L	400		0.025	0.2
J1 Range Southern	MW-360M2	MW-360M2_F17D	102	112	10/31/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.52		ug/L	0.6		0.036	0.2
J1 Range Southern	MW-360M2	MW-360M2_F17D	102	112	10/31/2017	SW8330	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.84		ug/L	400		0.025	0.2
Demolition Area 1	MW-662D	MW-662D_R3	202.3	212.3	10/30/2017	SW6850	Perchlorate	0.31		ug/L	2		0.012	0.2
Demolition Area 1	MW-663D	MW-663D_R3	240.6	250.6	10/30/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	1		ug/L	0.6	X	0.036	0.2
Demolition Area 1	MW-663D	MW-663D_R3	240.6	250.6	10/30/2017	SW6850	Perchlorate	19.3		ug/L	2	X	0.024	0.4
Demolition Area 1	MW-664M2	MW-664M2_R3	218.5	228.5	10/30/2017	SW6850	Perchlorate	0.024	J	ug/L	2		0.012	0.2
J1 Range Southern	MW-524M1	MW-524M1_F17	148	158	10/19/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	1.2		ug/L	0.6	X	0.036	0.2
J1 Range Southern	MW-524M1	MW-524M1_F17D	148	158	10/19/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	1.2		ug/L	0.6	X	0.036	0.2
Central Impact Area	MW-686M2	MW-686M2_F17	194.3	204.3	10/16/2017	SW6850	Perchlorate	0.11	J	ug/L	2		0.019	0.2
Central Impact Area	MW-686M2	MW-686M2_F17	194.3	204.3	10/16/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	1.1		ug/L	0.6	X	0.036	0.2
Central Impact Area	MW-687M2	MW-687M2_F17	188	198	10/16/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.23		ug/L	0.6		0.036	0.2
J2 Range Eastern	MW-122S	MW-122S_F17	88	98	10/12/2017	SW6850	Perchlorate	0.068	J	ug/L	2		0.019	0.2
Central Impact Area	MW-616M1	MW-616M1_F17	217.1	227.1	10/12/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	1.9		ug/L	0.6	X	0.036	0.2
Central Impact Area	MW-617M1	MW-617M1_F17	175.8	185.8	10/12/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.58		ug/L	0.6		0.036	0.2
Central Impact Area	MW-623M3	MW-623M3_F17	275	285	10/11/2017	SW8330	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.4		ug/L	400		0.025	0.2
Central Impact Area	MW-623M3	MW-623M3_F17	275	285	10/11/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	1.3		ug/L	0.6	X	0.036	0.2
Central Impact Area	MW-623M3	MW-623M3_F17D	275	285	10/11/2017	SW8330	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.41		ug/L	400		0.025	0.2
Central Impact Area	MW-623M3	MW-623M3_F17D	275	285	10/11/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	1.3		ug/L	0.6	X	0.036	0.2
Central Impact Area	MW-623M2	MW-623M2_F17	291.8	301.8	10/11/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.29		ug/L	0.6		0.036	0.2
Central Impact Area	MW-623M1	MW-623M1_F17	340	350	10/11/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.31		ug/L	0.6		0.036	0.2
Northwest Corner	MW-441M2	MW-441M2_F17	109.5	119.5	10/10/2017	SW8330	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.35		ug/L	400		0.019	0.2
Northwest Corner	MW-441M2	MW-441M2_F17	109.5	119.5	10/10/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.49		ug/L	0.6		0.025	0.2
Central Impact Area	MW-625M1	MW-625M1_F17	260	270	10/10/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.57		ug/L	0.6		0.025	0.2
J2 Range Eastern	MW-339M2	MW-339M2_F17	213	223	10/10/2017	SW6850	Perchlorate	0.069	J	ug/L	2		0.019	0.2
J2 Range Eastern	MW-339M1	MW-339M1_F17	233	243	10/10/2017	SW6850	Perchlorate	0.56		ug/L	2		0.019	0.2
J2 Range Eastern	MW-170M2	MW-170M2_F17	198	208	10/09/2017	SW6850	Perchlorate	0.076	J	ug/L	2		0.019	0.2
J2 Range Eastern	MW-170M1	MW-170M1_F17	265	275	10/09/2017	SW6850	Perchlorate	0.27		ug/L	2		0.019	0.2
J2 Range Eastern	MW-335M2	MW-335M2_F17	215.3	225.3	10/09/2017	SW6850	Perchlorate	0.026	J	ug/L	2		0.019	0.2
J2 Range Eastern	MW-335M1	MW-335M1_F17	255.2	265.2	10/09/2017	SW6850	Perchlorate	0.047	J	ug/L	2		0.019	0.2
J2 Range Eastern	MW-324M2	MW-324M2_F17	203.7	214.7	10/09/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.26		ug/L	0.6		0.025	0.2
J2 Range Eastern	MW-324M2	MW-324M2_F17	203.7	214.7	10/09/2017	SW8330	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.4		ug/L	400		0.019	0.2
J2 Range Eastern	MW-324M2	MW-324M2_F17	203.7	214.7	10/09/2017	SW6850	Perchlorate	3.3		ug/L	2	X	0.019	0.2
J2 Range Eastern	MW-324M2	MW-324M2_F17D	203.7	214.7	10/09/2017	SW6850	Perchlorate	3.6		ug/L	2	X	0.019	0.2
J2 Range Eastern	MW-324M1	MW-324M1_F17	234.9	244.9	10/09/2017	SW8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.33		ug/L	0.6		0.025	0.2
J2 Range Eastern	MW-324M1	MW-324M1_F17	234.9	244.9	10/09/2017	SW8330	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.2		ug/L	400		0.019	0.2
J2 Range Eastern	MW-324M1	MW-324M1_F17	234.9	244.9	10/09/2017	SW6850	Perchlorate	3.3		ug/L	2	X	0.019	0.2
J2 Range Eastern	MW-393M2	MW-393M2_F17	218.2	228.2	10/04/2017	SW6850	Perchlorate	0.048	J	ug/L	2		0.019	0.2

J = Estimated Result
MDL = Method Detection Limit
RL = Reporting Limit

TABLE 2
VALIDATED EXPLOSIVE AND PERCHLORATE RESULTS
Data Received November 2017

Area of Concern	Location ID	Field Sample ID	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Date Sampled	Test Method	Analyte	Result Value	Qualifier	Units	MCL/HA	> MCL/HA	MDL	RL
J2 Range Eastern	MW-393M1	MW-393M1_F17	268	278	10/04/2017	SW6850	Perchlorate	0.027	J	ug/L	2		0.019	0.2
J2 Range Eastern	MW-351M1	MW-351M1_F17	278.6	288.6	10/04/2017	SW6850	Perchlorate	0.051	J	ug/L	2		0.019	0.2
J2 Range Eastern	MW-321M2	MW-321M2_F17	155.7	165.7	10/04/2017	SW8330	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.34		ug/L	400		0.019	0.2
J2 Range Eastern	MW-321M2	MW-321M2_F17	155.7	165.7	10/04/2017	SW6850	Perchlorate	1.1		ug/L	2		0.019	0.2
J2 Range Eastern	MW-321M1	MW-321M1_F17	174.6	184.6	10/04/2017	SW6850	Perchlorate	0.092	J	ug/L	2		0.019	0.2

J = Estimated Result
MDL = Method Detection Limit
RL = Reporting Limit