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SEP 2 7 2018

Dear Mr. Kieling:

Subject:

Submittal of the First Annual Long-Term Monitoring and Maintenance Report for

the Corrective Measures Implementation at Consolidated Unit 16-021(c)-99

Enclosed please find two hard copies with electronic files of the First Annual Long-Term Monitoring and Maintenance Report for the Corrective Measures Implementation at Consolidated Unit 16-021(c)-99. This report is being submitted to fulfill Fiscal Year 2018 Milestone 14 in Appendix B of the 2016 Compliance Order on Consent.

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Sincerely,

Arturo Q. Duran

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1. First Annual Long-Term Monitoring and Maintenance Report for the Corrective Measures Implementation at Consolidated Unit 16-021(c)-99 (EM2018-0033)

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First Annual Long-Term
Monitoring and Maintenance
Report for the Corrective
Measures Implementation at
Consolidated Unit 16-021(c)-99



Newport News Nuclear BWXT - Los Alamos, LLC (N3B), under the U.S. Department of Energy Office of Environmental Management Contract No. 89303318CEM000007 (the Los Alamos Legacy Cleanup Contract), has prepared this document pursuant to the Compliance Order on Consent, signed June 24, 2016. The Compliance Order on Consent contains requirements for the investigation and cleanup, including corrective action, of contamination at Los Alamos National Laboratory. The U.S. government has rights to use, reproduce, and distribute this document. The public may copy and use this document without charge, provided that this notice and any statement of authorship are reproduced on all copies.

# First Annual Long-Term Monitoring and Maintenance Report for the Corrective Measures Implementation at Consolidated Unit 16-021(c)-99

September 2018

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### 1.0 INTRODUCTION

This first annual long-term monitoring and maintenance report for the corrective measures implementation (CMI) at Consolidated Unit 16-021(c)-99 within Technical Area 16 (TA-16) at Los Alamos National Laboratory (LANL or the Laboratory) follows the Long-Term Monitoring and Maintenance Plan requirements included as Appendix A to the "Remedy Completion Report for Corrective Measures Implementation at Consolidated Unit 16-021(c)-99,"(LANL 2017, 602597). This annual long-term monitoring and maintenance report covers the reporting period from October 2017 through July 2018.

Consolidated Unit 16-021(c)-99 consists of the high explosives— (HE-) machining building (16-260) and associated sumps, drainlines, and troughs that discharged into the 260 Outfall drainage channel. The 260 Outfall drainage channel consists of the outfall, a former settling pond, and the lower portion of the drainage channel leading to Cañon de Valle (Figure 1.0-1). Historically, HE-contaminated water from the outfall entered the former settling pond and drained into the 260 Outfall drainage channel.

The CMI was implemented to address HE associated with the 260 Outfall, including RDX (hexahydo-1,3,5-trinitro-1,3,5-triazine) and barium (a byproduct of processing HE Baratol), which are the primary contaminants addressed in the CMI remedy completion report (LANL 2017, 602597) and discussed in this report. Other compounds associated with the 260 Outfall include HMX (octahydo-1,3,5,7-tetranitro-1,3,5,7-tetrazocine), TNT (2,4,6-trinitrotoluene), volatile organic compounds (VOCs), metals, and HE byproducts and degradation products. As part of the Long-Term Monitoring and Maintenance Plan, other analytes measured include semivolatile organic compounds (SVOCs), general inorganics, <sup>15</sup>N/<sup>18</sup>O isotopes in nitrate, and radionuclides. Where appropriate, these compounds are screened in accordance with the criteria set forth by the 2016 Compliance Order on Consent, and any compounds exceeding their respective screening levels are further discussed in this report. Additionally, field parameters (i.e., dissolved oxygen, oxidation-reduction potential [ORP], pH, specific conductance, temperature, and turbidity) were collected at select locations and measurement results are provided.

This annual long-term monitoring and maintenance report discusses the monitoring and maintenance of the Outfall 260 former settling pond cap; monitoring of the surge bed water levels; monitoring of water quality at SWSC Spring, Burning Ground Spring, Martin Spring, and permeable reactive barrier (PRB) alluvial seep; and monitoring of groundwater and surface water quality at select locations within Cañon de Valle, S-Site Canyon, Pajarito Canyon, Water Canyon, and Fishladder Canyon.

# 1.1 Regulatory Context

Long-term monitoring and maintenance activities follow the approach put forth in the remedy completion report for corrective measures at Consolidated Unit 16-012(c)-99 (LANL 2017, 602597). The long-term water quality monitoring activities complement and integrate with the Interim Facility-Wide Groundwater Monitoring Plan (IFGMP) for groundwater and surface water monitoring (LANL 2017, 602597). The Laboratory has implemented the IFGMP in accordance with Section XII of the 2016 Compliance Order on Consent. The Long-Term Monitoring and Maintenance Plan was included in the CMI remedy completion report, Appendix A (LANL 2017, 602597). The New Mexico Environment Department (NMED) approved the CMI remedy completion report on November 27, 2017 (NMED 2017, 602758).

Monitoring of groundwater from springs (including SWSC, Burning Ground, and Martin), alluvial wells, and intermediate and regional wells in the vicinity and downgradient of the 260 Outfall has historically been conducted as part of the TA-16 260 monitoring group activities conducted under the IFGMP. With the completion of surface CMI activities at Consolidated Unit 16-021(c)-99 and NMED's approval of the "Remedy Completion Report for Corrective Measures Implementation at Consolidated Unit 16-021(c)-99,"

including the Long-Term Monitoring and Maintenance Plan (LANL 2017, 602597; NMED 2017, 602758), the monitoring of surface water, alluvial groundwater, and springs has been incorporated into the IFGMP.

# 1.2 Conceptual Model for Contaminant Transport of RDX and Barium

RDX and barium were the primary contaminants in alluvial groundwater during the surface CMIs from 1999 to 2010 (LANL 2007, 098192). RDX is the most significant contaminant within Cañon de Valle and Water Canyon (LANL 2017, 602597). RDX is a mobile contaminant that does not sorb strongly to environmental media and is readily transported in water. RDX dissolved in groundwater will partition between dissolved RDX and sorbed RDX. RDX sorbs minimally to tuff and sediment, with greater sorption if organic carbon is present. RDX can be degraded both biologically (i.e., microbial degradation) and chemically (hydrolysis) (LANL 2017, 602597).

A review of the concentrations of RDX detected in alluvial monitoring wells indicates long-term declines. The CMI remedy completion report (LANL 2017, 602597) reported that the majority of detections of RDX in alluvial wells in Cañon de Valle were near or below the screening level value of 7.02  $\mu$ g/L. Although RDX concentrations in discharges from SWSC, Burning Ground, and Martin Springs from 2000 to 2017 were above the 7.02  $\mu$ g/L screening level, concentrations are declining, likely because of the RDX source reduction actions that were implemented at Outfall 260 (LANL 2017, 602597).

The decrease in RDX concentrations in shallow water reflects multiple factors, including the elimination of the original outfall source of contamination with cessation of National Pollutant Discharge Elimination System (NPDES) discharges into Cañon de Valle, surface removal activities conducted in 2001 and during the surface CMI in 2009 and 2010, and long-term reduction of RDX from the system from natural degradation processes.

Concentration trends for HE compounds have been variable and range from generally declining to stable for an extended period of time. As described in the CMI remedy completion report (LANL 2017, 602597), the current concentrations of RDX detected in the springs are considered protective of nearby surface water and alluvial groundwater because the concentrations decrease dramatically as the distance increases away from the source. The objective of the long-term monitoring at each of the springs is to ensure concentrations remain low or stable with time and ensure the protection of the regional aquifer.

Barium was targeted for removal in addition to RDX during Outfall 260 source removal activities. With the cessation of discharge from Outfall 260 to Cañon de Valle, the estimated inventory of barium has been significantly reduced (LANL 2002, 073706). However, barium concentrations in Cañon de Valle alluvial groundwater and surface water persist (LANL 2017, 602597).

Barium mobility, which is controlled by sorption and by the dynamics of surface and alluvial hydrology, continues to be mobilized by fluctuating water levels in the alluvium. Barium is also irreversibly removed from groundwater when barite precipitates. However, because witherite is also present and dissolves when wet, barium concentrations in alluvial groundwater remain elevated, buffered by the geochemical processes (LANL 2017, 602597).

Barium is more persistent in shallow groundwater within Cañon de Valle and, to a lesser extent, in Martin Spring in S-Site Canyon. However, barium is not likely to migrate to perched-intermediate groundwater or the regional aquifer given its sorptive characteristics, making it considerably less mobile than RDX in oxidizing groundwater. Although it is well buffered in the near-surface system, natural sorptive processes slowly remove barium from the system.

Barium is elevated only in the surface and alluvial systems, and its mobility is limited by conditions in near-surface soils and alluvial groundwater. In addition to flushing dissolved barium from pore water and desorbing any reversibly sorbed barium, higher alluvial groundwater levels can dissolve barium minerals, primarily witherite, present in the unsaturated zone (Reid et al. 2005, 093660). Alternatively, declining alluvial groundwater levels will precipitate barium minerals. The presence of barium minerals partially buffers barium concentrations in surface waters and significantly buffers barium concentrations in alluvial waters (Reid et al. 2005, 093660).

Barium concentrations in alluvial groundwater within Cañon de Valle continue to be elevated. Concentrations in spring water are less than the 1000 µg/L screening level. Barium concentrations show a long-term decline in alluvial groundwater samples collected from location CDV-16-02656, located upgradient of the former PRB, suggesting a diminishing source. However, location CDV-16-611923, upstream of the former PRB cutoff wall, showed a significant spike in barium concentrations after the PRB was installed in 2010. After the cutoff wall was installed, water levels in the alluvium above the cutoff wall rose, saturating sediments that likely contained witherite, which is the mobile fraction of barium. As the witherite dissolved, barium concentrations in groundwater spiked. The elevated barium eventually dissipated after flooding breached the cutoff wall in 2011.

Surface water and alluvial groundwater include a mix of spring water and water from upgradient locations and sources. RDX concentrations at surface water and alluvial monitoring locations have been steadily declining and are currently low and stable with some seasonally driven variability. Barium concentrations at surface and alluvial monitoring locations are steadily declining, except at CDV-16-02659 where barium levels are below the screening value.

The CMI performance objectives were to reduce concentrations of barium and RDX in alluvial groundwater to prevent their migration to deeper groundwater. The Long-Term Monitoring and Maintenance Plan established performance monitoring points as follows: at the five existing alluvial wells in Cañon de Valle, three existing alluvial wells in S-Site Canyon, two surface water sampling points along the perennial surface water reach of Cañon de Valle, one surface water sampling point in S-Site Canyon, and at the springs.

# 1.3 Monitoring Objectives

Key objectives of the long-term monitoring program include the following:

- Monitoring effectiveness of the low-permeability cap and surge-bed grouting to ensure infiltrating water does not encounter and mobilize residual contamination in the outfall area and underlying shallow vadose zone.
- Monitoring the long-term trend in contaminant concentrations (primarily HE and barium) in springs, surface water, and alluvial groundwater to ensure historically declining and/or stable concentrations persist.

# 2.0 LONG-TERM MONITORING AND MAINTENANCE SAMPLING AND RESULTS

Section 2 presents the data collected for this first annual long-term monitoring and maintenance report. The focus of the discussion is RDX and barium, identified as the primary contaminants targeted in the corrective measures implemented at Consolidated Unit 16-021(c)-99. Other constituents are monitored as part of the long-term monitoring and maintenance, and sampling results for all constituents monitored in the monitoring year (MY) 2018 long-term monitoring and maintenance program are provided in this report. The results are screened against their respective screening values, and the constituents that exceed their screening value are discussed in more detail in this report.

# 2.1 Sampling

The purpose of the long-term monitoring activities is to assess the long-term effectiveness of the CMI for Consolidated Unit 16-021(c)-99, to monitor the long-term trends in contaminant concentrations, and to support continuous evaluation of the conceptual model for the fate and transport of residual contamination in nearby springs, surface water, and alluvial groundwater.

Sampling of groundwater, surface water, and springs for the TA-16 260 monitoring group is conducted semiannually (LANL 2017, 602406). In the CMI remedy completion report, Appendix A (LANL 2017, 602597), the analytes and sampling frequencies proposed in the MY 2018 IFGMP (LANL 2017, 602406) for alluvial groundwater, surface water, and springs for the TA-16 260 monitoring group have been adapted as the long-term monitoring requirements for Consolidated Unit 16-021(c)-99. Table 2.1-1 summarizes the monitoring locations (i.e., TA-16 260 monitoring group), parameters measured, and sampling frequencies for the springs, alluvial groundwater, and surface waters that make up the MY 2018 long-term monitoring program. The suite of compounds measured includes HEXMOD (i.e., RDX, HMX, TNT, and degradation byproducts), VOCs, metals, SVOCs, radionuclides, general inorganics, and <sup>15</sup>N/<sup>18</sup>O isotopes in nitrate. In addition, field parameters (i.e., dissolved oxygen, ORP, pH, specific conductivity, temperature, and turbidity) were also collected. Table 2.1-2 provides a list of the field parameters and measurement results. Appendix A provides the field forms associated with sample collection.

# 2.2 Results

This section presents the results for the primary contaminants associated with the Outfall 260 drainage channel (i.e., RDX and barium) and the concentrations measured in the springs, surface water, and alluvial groundwater in Cañon de Valle, S-Site Canyon, Pajarito Canyon, Water Canyon, and Fishladder Canyon. The other constituents monitored as part of the Long-Term Monitoring and Maintenance Plan are screened against their respective screening value, and any exceedances identified are further discussed in this section. All validated analytical results are provided in Appendix B.

To present and evaluate the results from the sampling events, the data are organized by canyon, beginning with the most upgradient sample location and moving downgradient within each canyon, as follows:

- Cañon de Valle segment 1
  - CDV-16-02656 (background)
  - ❖ CDV-16-02657r
  - SWSC Spring
  - Burning Ground Spring
- Cañon de Valle segment 2
  - ❖ 16-61439 (PRB alluvial seep)
  - ❖ CDV-16-611923
  - ❖ CDV-16-611937
  - Cañon de Valle below MDA P
  - ❖ CDV-16-02659

- S-Site Canyon
  - Martin Spring
  - ❖ MSC-16-06293
  - ❖ MSC-16-06294
- Pajarito Canyon
  - Bulldog Spring
  - ❖ Pajarito below S&N Ancho E Basin Confluence (Confluence)
- Water Canyon
  - ❖ Between E252 and Water at Beta
  - Water at Beta
- Fishladder Canyon
  - ❖ FLC-16-25280

The Long-Term Monitoring and Maintenance Plan prescribes the sampling of spring water, surface water, and alluvial groundwater on a semiannual frequency. The MY 2018 Long-Term Monitoring and Maintenance Plan sampling events were performed in August/September 2017 and February 2018. Table 2.2-1 presents the RDX results by canyon or canyon segment. Barium levels are monitored in filtered and unfiltered samples collected from spring water, surface water, and alluvial groundwater. Table 2.2-2 presents the barium results by canyon or canyon segment.

The Long-Term Monitoring and Maintenance Plan prescribes monitoring spring water, surface water, and alluvial groundwater for other constituents besides RDX and barium. Table 2.1-1 provides a list of compounds monitored in the MY 2018 sampling events. For the analytes that have a screening value, they were screened against that value, if the value is exceeded they are discussed in section 4.3. Table 2.2-3 presents the analytes that exceeded their respective screening values.

### 3.0 INSPECTION AND MAINTENANCE

Sections 3.1 and 3.2, respectively, discuss (1) the inspection and maintenance approach for the low-permeability cap on the former settling pond and (2) monitoring of the surge bed monitoring well installed to monitor the effectiveness of the injection grouting.

# 3.1 Low-Permeability Cap

The objective of the low-permeability cap on top of the former settling pond is to prevent surface water run-on and infiltration into residual contamination in the outfall area and underlying shallow vadose zone. The low-permeability cap is inspected semiannually for evidence of settling, cracking, erosion, water ponding, and animal intrusion. Each year, inspections are conducted in March or April to check for damage that may be associated with winter and snowmelt conditions and in September to monitor for damage from summer rainfall runoff.

Since the remedy completion report was not issued until September 2017 (LANL 2017, 602597), no September inspection was conducted during the time period covered by this report (October 2017 through July 2018). The March/April 2017 inspection of the low-permeability cap was performed and no

erosion, cracking, settlement, or ponding water was observed on the low-permeable cap. There was no evidence of burrowing animals or undesirable vegetative growth on the cap, and the slopes were observed to be adequate for water runoff. No maintenance items were identified during the inspection. The inspection form used to document the spring inspection is provided in Appendix C.

Storm water run-on and runoff controls are in place to prevent erosion of the low-permeability cap and to prevent runoff and sediment from moving farther down the 260 Outfall drainage channel. Monitoring and maintenance of the storm water control structures at Consolidated Unit 16-021(c)-99 continue under the Laboratory's Individual Permit, issued by the U.S. Environmental Protection Agency, Region 6, on September 30, 2010 (LANL 2017, 602284). Storm water controls installed at the site under the Individual Permit currently include vegetation, earthen berms, curbing, riprap, a rock check dam, and the low-permeability cap. Therefore, an additional inspection of the low-permeability cap is performed when these controls are inspected as required by the Permit. An inspection of the storm water control structures, including the low-permeability cap at Consolidated Unit 16-021(c)-99 was performed on July 25, 2018. The inspection form is provided in Appendix C.

# 3.2 Surge Bed Monitoring Well

The surge bed monitoring well was installed to evaluate the effectiveness of the grout injected into the subsurface surge bed and of the low-permeability cap by monitoring for the appearance of water in the surge bed. Observations of water levels in the surge bed monitoring well during semiannual inspections have confirmed no volume of water within the well. Additionally, throughout the MY 2018 season, water levels have been monitored by a dedicated in-well transducer; no water has been detected in the surge bed monitoring well. The raw transducer data are provided in Appendix D.

## 4.0 DISCUSSION AND CONCLUSIONS

This section discusses the RDX and barium results from the August/September 2017 and February 2018 sampling events and how they compare with the historical trends and support the conceptual model. In addition, this section describes iron, manganese, and boron detections and how these relate to the geochemical conditions in the alluvial groundwater.

# 4.1 RDX

The complete RDX data records for Cañon de Valle segments 1 and 2 are presented in Figures 4.1-1 and 4.1-2, respectively. These figures provide a comprehensive review of the RDX concentrations in waters in each segment and how the RDX sample results compare with the historical data trends. Based on a review of these data, it can be concluded that the temporal and spatial trends; and conditions in the surface water, alluvial groundwater, and springs, are consistent with conditions described in the CMI remedy report (LANL 2017, 602597) and are still considered protective of the regional groundwater.

Plate 1 shows the spatial distribution of RDX across Cañon de Valle since the completion of the CMI. This plate illustrates a continued decline in RDX concentration since the completion of the corrective measures. Plate 1 shows the RDX concentrations detected along the sampling locations. As the graphs on the plate indicate, the concentration of RDX extending downgradient from Burning Ground Spring declines with distance from the source, supporting the conclusion that RDX concentrations continue to decline across the canyon.

The S-Site Canyon RDX data record is shown in Figure 4.1-3, and the spatial distribution of RDX detected since the corrective measures is provided on Plate 1. The Martin Spring water RDX concentrations remain above the screening value, although the sample results are consistent with the conclusion that RDX levels continue to decline over time. Plate 1 shows declining levels of RDX across the canyon with no impacts to surface water downgradient of Martin Spring, suggesting the RDX concentration in Martin Spring is a localized condition. Alluvial groundwater RDX results continue to be below detection levels.

The Pajarito Canyon locations include a spring location at Bulldog Spring and a surface water location at the Confluence. Figure 4.1-4 presents the data record for both locations. Historically, Bulldog Spring water RDX concentrations are near or below the screening value, as demonstrated in the results of the sample collected in August 2017. The February 2018 RDX concentrations at Bulldog Spring water were slightly above 7.02  $\mu$ g/L but are consistent with the historic record. At the Confluence surface water location, the RDX results are consistent with past data; concentrations are below 7.02  $\mu$ g/L and support the sharply decreasing trend in RDX concentration to levels near or below detection.

The Water Canyon RDX data record is presented in Figure 4.1-5 and demonstrates that the samples are consistent with historic results, which indicate RDX is well below the screening level or not detected.

Figure 4.1-6 presents the data record for the Fishladder Canyon. Samples were not available because of insufficient water at the time of sampling; however, the historic record indicates no impacts to Fishladder alluvial groundwater above the RDX screening value except in January 2008, when the RDX concentration was slightly above the RDX screening value.

The sample results are consistent with recent RDX concentration data trends and support the conceptual model for RDX by demonstrating the following:

- Concentrations of RDX in alluvial monitoring wells continue to show long-term declines.
- Most alluvial wells in Cañon de Valle are near or below the screening level value of 7.02 μg/L.
- RDX concentrations in water from Burning Ground and Martin Springs are above the 7.02-µg/L screening value, but concentrations are declining.
- Concentration trends for RDX are variable but are generally declining or stable for an extended period of time.
- The current concentrations of RDX detected in the springs suggests the water is recovering from RDX concentrations and is not impacting nearby surface water and alluvial groundwater, as concentrations indicate a dramatic decrease away from the source.

The sample results are consistent with past RDX concentration results and do not indicate a change to the conceptual site model. In addition, the monitoring and observations support the conclusion that the low-permeability cap and the stabilized surge bed remedies continue to be effective.

### 4.2 Barium

Barium concentration data records for the Cañon de Valle segment 1 and segment 2 are presented in Figures 4.2-1 and 4.2-2, respectively. These figures provide a comprehensive review of barium impacts to each segment since the start of the IFGMP program and a comparison of the sample barium results with the existing data trends. A review of these data indicate that the temporal and spatial trends; and conditions in the surface water, alluvial groundwater, and springs, are consistent with conditions described in the CMI remedy report (LANL 2017, 602597). Therefore, these conditions are still considered protective of the regional groundwater.

Plate 2 shows the spatial distribution of barium across Cañon de Valle since the completion of the CMI. Barium concentrations at each location are detected above the screening value except for samples collected from Burning Ground Spring; however, results support the conclusion that barium levels are declining at each location along the canyon where the barium concentrations exceed the screening value.

In S-Site Canyon, Pajarito Canyon, and Water Canyon, barium is not detected above the 1000-µg/L screening value, which is consistent with the historical data record as seen in Figure 4.2-3 (S-Site Canyon), Figure 4.2-4 (Pajarito Canyon), and Figure 4.2-5 (Water Canyon). Samples were not available at Fishladder Canyon sampling locations because of insufficient water at the time of sampling; however, Figure 4.2-6 shows the historical data record.

Based on the sample results and comparison with the existing barium data records, the following observations support the conceptual model:

- Concentrations in springs are less than the 1000-μg/L screening value.
- Barium concentrations in Cañon de Valle show a long-term decline in surface water and alluvial groundwater.
- The other canyons in the Long-Term Monitoring and Maintenance Plan sampling program are not impacted with barium above the screening value.

As the sample results are consistent with past barium concentration results and the conceptual site model, no change to the conceptual model is indicated by these results. The barium results are congruent with the RDX results and support the finding of the continued effectiveness of the low-permeability cap and the stabilized surge bed.

# 4.3 Other Analytes Exceeding their Respective Screening Value

All the compounds monitored as part of the Long-Term Monitoring and Maintenance Plan sampling program were screened against their respective screening values. Based on these results, iron, manganese, and boron were identified as compounds exceeding screening values (Table 2.2-3). Table 2.1-2 presents the field parameters collected during the sampling event. Alluvial groundwater conditions at sample location CVD-16-611937 were reducing in September 2017 and February 2018. In September 2017 dissolved oxygen concentration was measured at 0.76 mg/L and ORP was measured at -8.4 mV. In February 2018 dissolved oxygen and ORP were measured at 0.66 mg/L and -6.5 mV, respectively, indicating reducing conditions. Reducing conditions at CVD-16-611937 in September 2017 and February 2018 are likely due to the lack of fresh water flushing the groundwater at this location. A review of water levels at CDV-16-611937 in September 2017 and February 2018 (N3B 2018, 700068)) indicates declining or stagnant water levels, suggesting no recharge of fresh water into this groundwater sampling location.

Samples collected from Cañon de Valle location CVD-16-611937 in September 2017 (CAWA-17-142865) and February 2018 (CAWA-18-29) exceeded the iron and manganese screening values of 1000 µg/L and 200 µg/L, respectively. One reason for these detections is the redox-sensitive nature of these compounds, as localized conditions become more reduced in the alluvial groundwater and the anaerobic bacteria convert iron and manganese into their more reduced (and more soluble) forms. Therefore, the detection of iron and manganese above their screening values in the September 2017 and February 2018 samples correlates well with the reducing conditions in the alluvial groundwater at this localized location.

An additional compound that exceeded its screening value was boron, as detected in the February 2018 sample collected at Martin Spring (984  $\mu$ g/L). Elevated concentrations of boron in Martin Spring water are well documented and relate to historical Laboratory releases at TA-16 (LANL 2018, 602963).

### 4.4 Conclusions

The CMI objectives were to reduce the concentrations of barium and RDX in alluvial groundwater to prevent the migration of these contaminants into deeper groundwater. The Long-Term Monitoring and Maintenance Plan was implemented to (1) monitor the performance of the CMI in terms of these objectives to evaluate the effectiveness of the low-permeability cap and surge-bed grouting in ensuring that infiltrating water does not encounter and mobilize residual contamination in the outfall area and underlying shallow vadose zone and (2) monitor the long-term trend in contaminant concentrations (primarily RDX and barium) in springs, surface water, and alluvial groundwater to ensure historically declining and/or stable concentrations persist. The MY 2018 sampling and inspection program has met these objectives.

### 5.0 RECOMMENDATIONS

Newport News Nuclear BWXT – Los Alamos, LLC (N3B) recommends that the Long-Term Monitoring and Maintenance Plan be continued through MY 2019 to continue to evaluate the effectiveness of the low-permeability cap and surge-bed grouting and monitor the long-term trends in contaminant concentrations. Alluvial groundwater, surface water, and spring water are anticipated to continue showing stable or declining concentrations of RDX and barium. However, if the data show a significant increase in contaminant concentrations over time, the conditions in the vicinity of Consolidated Unit 16-021(c)-99 will be reassessed to identify the cause and evaluate whether additional corrective action is necessary.

Inspections of the low-permeability cap and surge bed will continue on a semiannual basis. If maintenance items are identified, they will be directly addressed and reported in the subsequent annual report.

### 6.0 REFERENCES AND MAP DATA SOURCES

# 6.1 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), July 2002. "Interim Measure Report for Potential Release Site 16-021(c)-99," Los Alamos National Laboratory document LA-UR-02-4229, Los Alamos, New Mexico. (LANL 2002, 073706)
- LANL (Los Alamos National Laboratory), July 2007. "Corrective Measures Implementation Plan for Consolidated Unit 16-021(c)-99, Revision 1," Los Alamos National Laboratory document LA-UR-07-4715, Los Alamos, New Mexico. (LANL 2007, 098192)

- LANL (Los Alamos National Laboratory), May 2017. "Interim Facility-Wide Groundwater Monitoring Plan for the 2018 Monitoring Year, October 2017–September 2018," Los Alamos National Laboratory document LA-UR-16-24070, Los Alamos, New Mexico. (LANL 2017, 602406)
- LANL (Los Alamos National Laboratory), May 1, 2017. "2016 Update to the Site Discharge Pollution Prevention Plan, Revision 1, NPDES Permit No. NM0030759, Water/Cañon de Valle Watershed, Receiving Waters: Cañon de Valle, Potrillo Canyon, Water Canyon, and Fence Canyon, Volume 4," Los Alamos National Laboratory document LA-UR-17-23039, Los Alamos, New Mexico. (LANL 2017, 602284)
- LANL (Los Alamos National Laboratory), September 2017. "Remedy Completion Report for Corrective Measures Implementation at Consolidated Unit 16-021(c)-99," Los Alamos National Laboratory document LA-UR-17-27678, Los Alamos, New Mexico. (LANL 2017, 602597)
- LANL (Los Alamos National Laboratory), March 2018. "Compendium of Technical Reports Related to the Deep Groundwater Investigation for the RDX Project at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-18-21326, Los Alamos, New Mexico. (LANL 2018, 602963)
- N3B (Newport News Nuclear BWXT Los Alamos, LLC), August 2018. "Annual Periodic Monitoring Report for the Technical Area 16 260 Monitoring Group," Newport News Nuclear BWXT Los Alamos, LLC, document EM2018-0026, Los Alamos, New Mexico. (N3B 2018, 700068)
- NMED (New Mexico Environment Department), November 27, 2017. "Approval with Modifications, Remedy Completion Report for Corrective Measures Implementation at Consolidated Unit 16-021(c)-99," New Mexico Environment Department letter to D. Hintze (DOE-NA-LA) and B. Robinson (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2017, 602758)
- Reid, K.D., S.L. Reneau, B.D. Newman, and D.D. Hickmott, August 2005. "Barium and High Explosives in a Semiarid Alluvial System, Cañon de Valle, New Mexico," *Vadose Zone Journal*, Vol. 4, pp. 744–759. (Reid et al. 2005, 093660)

# 6.2 Map Data Sources

Hillshade; Los Alamos National Laboratory, ER-ES, As published; \slip\gis\Data\HYP\LiDAR\2014Bare Earth\BareEarth DEM Mosiac.gdb; 2014.

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

Unpaved road; Los Alamos National Laboratory, ER-ES, As published, GIS projects folder; \slip\GIS\Projects\14-Projects\14-0062\project\_data.gdb; digitized\_site\_features; digitized\_road; 2017.

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

Drainage Channel; Los Alamos National Laboratory, ER-ES, As published, GIS projects folder; \slip\GIS\Projects\11-Projects\11-0108\\gdb\gdb 11-0108 generic.mdb; drainage; 2017.

TA-16 260 Outfall, As Published, GIS project folder: Q:\14-Projects\14-0080\project\_data.gdb\ polygon\outfall\_260

M Wall-PRB, As Published, GIS project folder: Q:\14-Projects\14-0080\project\_data.gdb\line\wall\_PRB

Connector piping, As Published, GIS project folder: Q:\14-Projects\14-0080\project\_data.gdb\line\connector\_piping

Tech areas; Los Alamos National Laboratory, Database Connections\GIS.PUB.PRD1.sde\PUB.Boundaries\PUB.tecareas

Tech Areas line; Los Alamos National Laboratory, Database Connections\GIS.PUB.PRD1.sde\PUB.Boundaries\PUB.tecareas line

PUB.prs\_all\_reg\_admin; Los Alamos National Laboratory, Database Connections\GIS.PUB.PRD1.sde\PUB.Regulatory\PUB.prs\_all\_reg\_admin

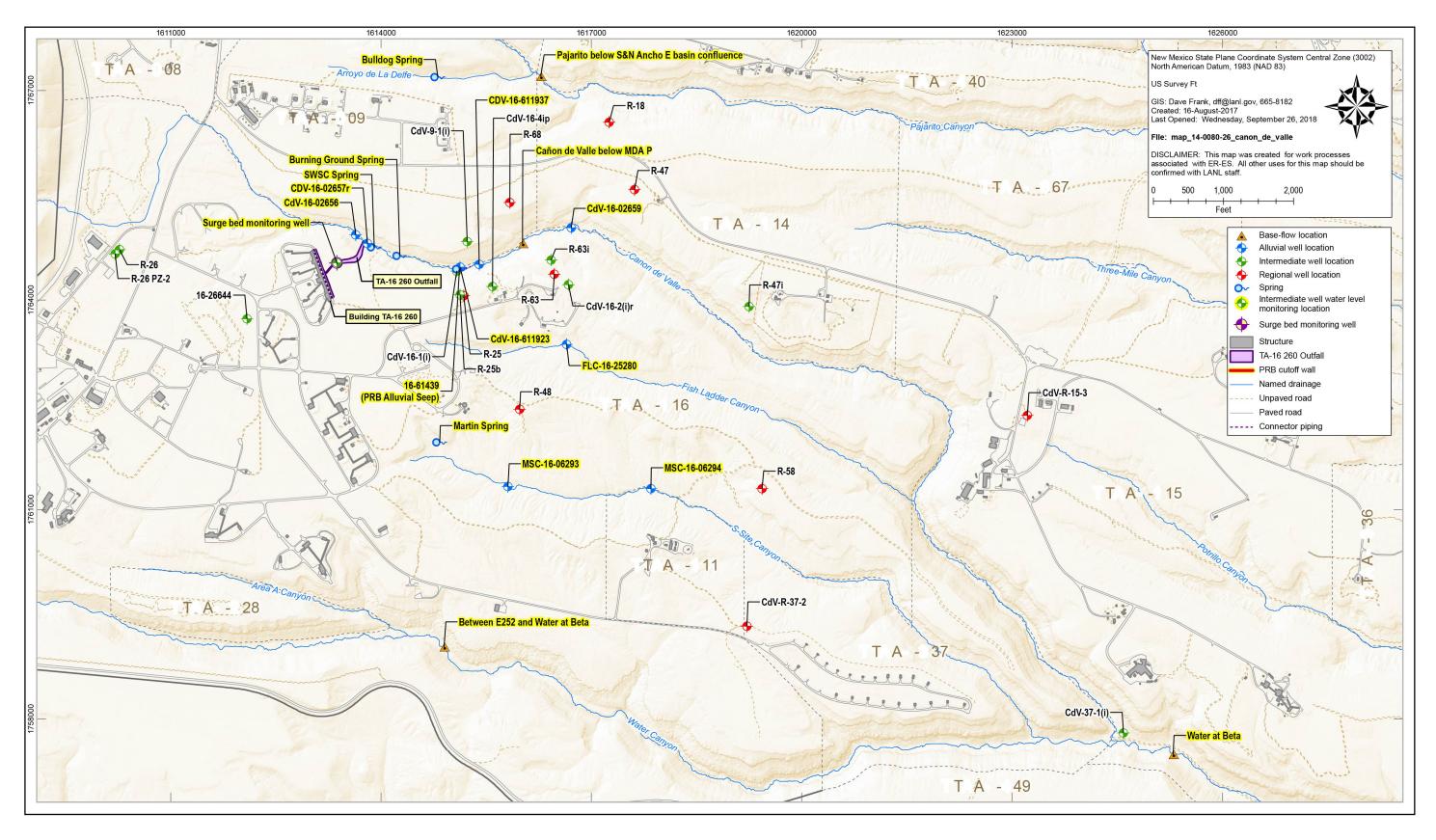


Figure 1.0-1 Consolidated Unit 16-021(c)-99 and Long-Term Monitoring and Maintenance Plan locations

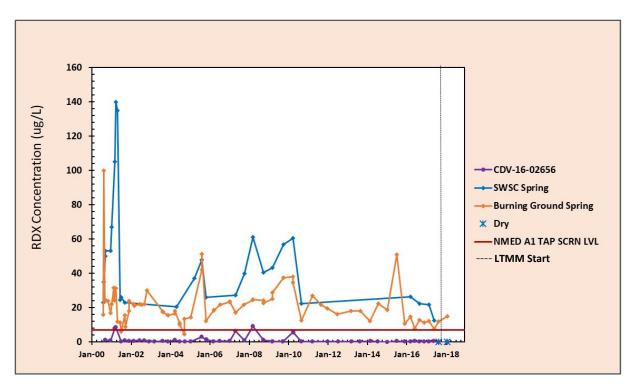


Figure 4.1-1 Cañon de Valle segment 1 RDX data record

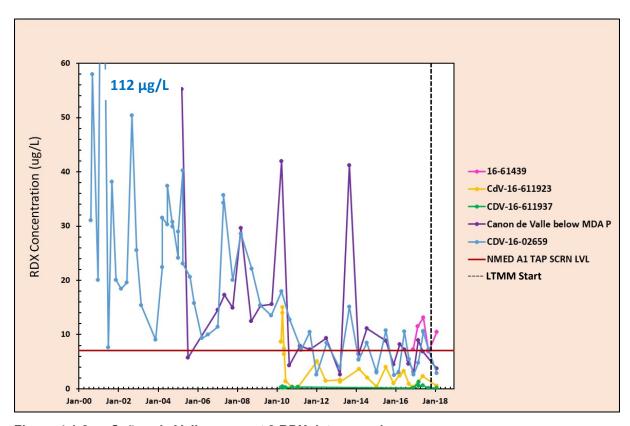


Figure 4.1-2 Cañon de Valle segment 2 RDX data record

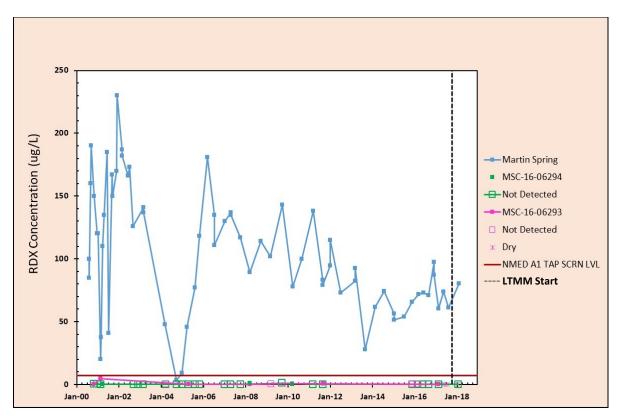


Figure 4.1-3 S-Site Canyon RDX data record

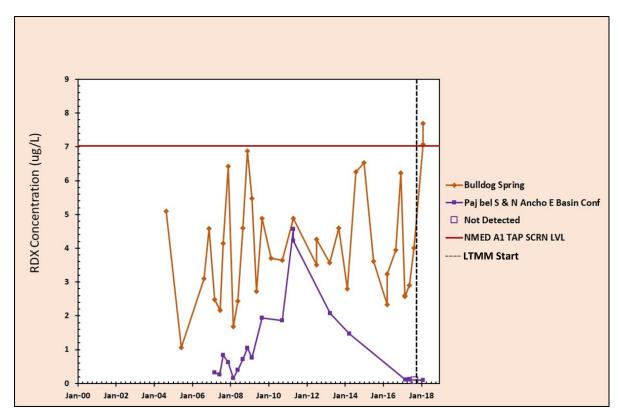


Figure 4.1-4 Pajarito Canyon RDX data record

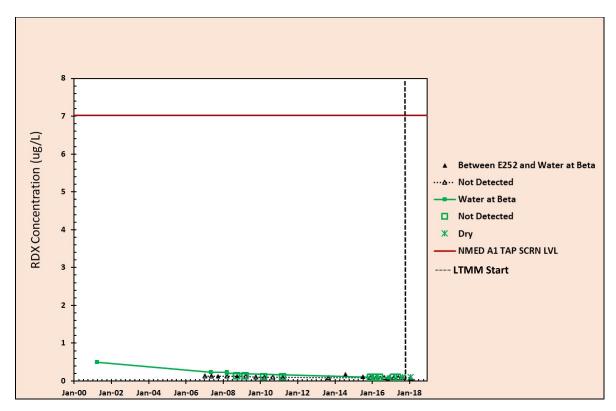


Figure 4.1-5 Water Canyon RDX data record

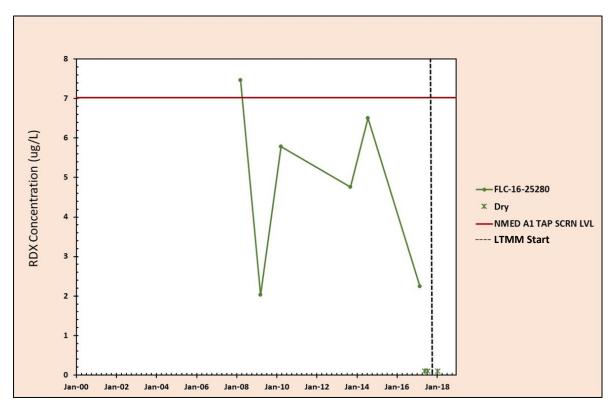


Figure 4.1-6 Fishladder Canyon RDX data record

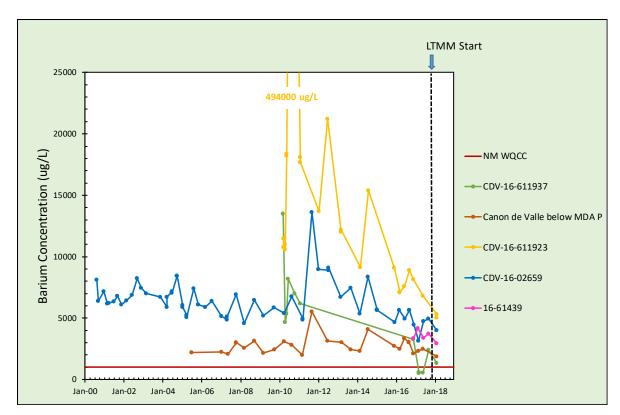


Figure 4.2-1 Cañon de Valle segment 1 barium data record

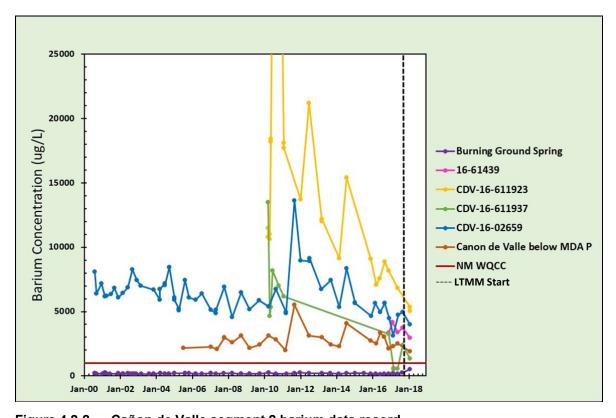


Figure 4.2-2 Cañon de Valle segment 2 barium data record

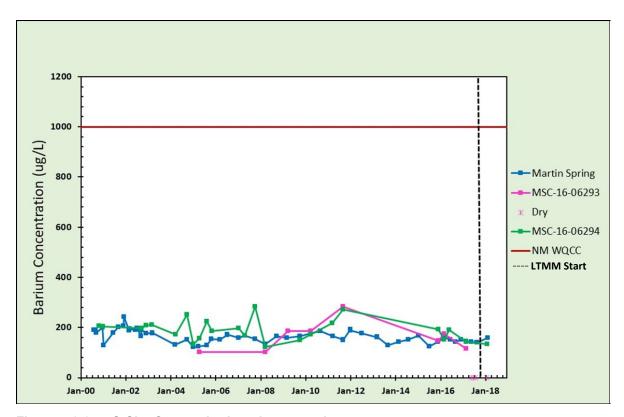


Figure 4.2-3 S-Site Canyon barium data record

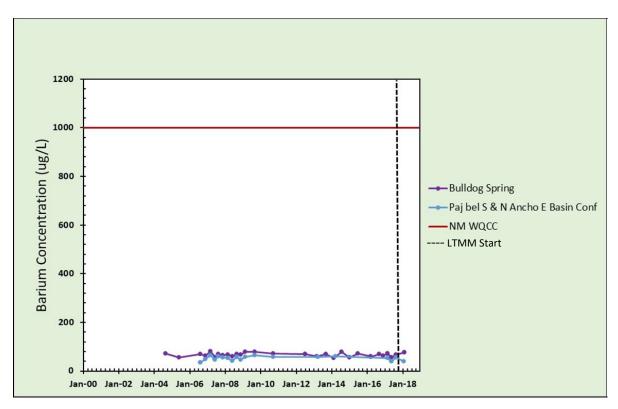


Figure 4.2-4 Pajarito Canyon barium data record

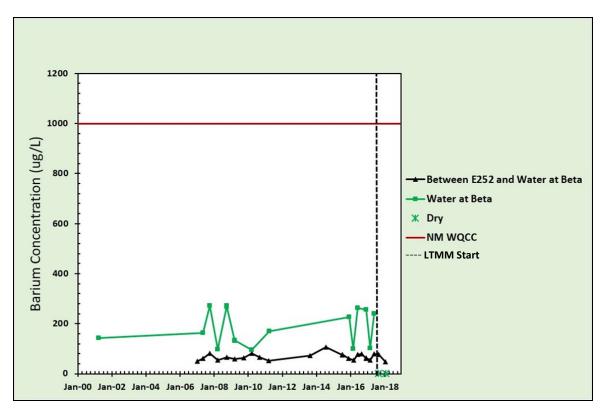


Figure 4.2-5 Water Canyon barium data record

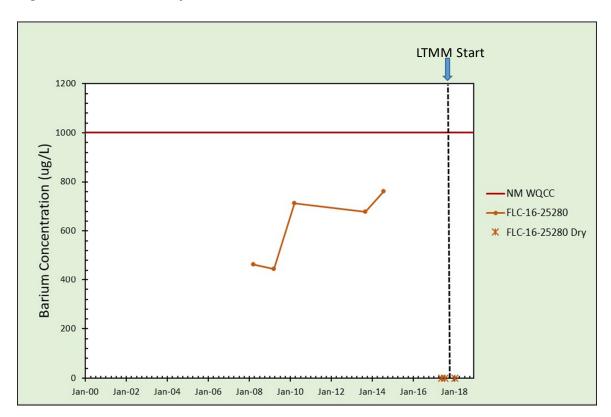


Figure 4.2-6 Fishladder Canyon barium data record

Table 2.1-1
2019 Monitoring Locations and Analytes

Canyon	Location	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	НЕХМОБ	Radionuclides	Low-Level Tritium	General Inorganics	15N/18O Isotopes in Nitrate
Cañon de Valle 1	CDV-16-02656	Alluvial	Sª	S	B <sup>b</sup>	S	В	NMc	S	NM
	CDV-16-02657r	Alluvial	S	S	В	S	В	NM	S	NM
	SWSC Spring	Spring	S	S	В	S	В	NM	S	$A^d$
	Burning Ground Spring	Spring	S	S	В	S	В	Α	S	Α
Cañon de Valle 2	16-61439 (PRB Alluvial Seep)	Alluvial	S	S	В	S	В	NM	S	NM
	CDV-16-611923	Alluvial	S	S	В	S	В	NM	S	NM
	CDV-16-611937	Alluvial	S	S	В	S	В	NM	S	NM
	Cañon de Valle below MDA P	Base Flow	S	S	В	S	В	NM	S	NM
	CDV-16-02659	Alluvial	S	S	В	S	В	NM	S	NM
S-Site Canyon	Martin Spring	Spring	S	S	В	S	В	Α	S	Α
	MSC-16-06293	Alluvial	S	S	В	S	В	NM	S	NM
	MSC-16-06294	Alluvial	S	S	В	S	В	NM	S	NM
Pajarito Canyon	Bulldog Spring	Spring	S	S	В	S	В	NM	S	Α
	Pajarito below S-N Ancho E Basin Confluence	Base Flow	S	S	В	S	В	NM	S	NM
Water Canyon	Between E252 and Water at Beta	Base Flow	S	S	В	S	В	NM	S	NM
	Water at Beta	Base Flow	S	S	В	S	В	NM	S	NM
Fishladder Canyon	FLC-16-25280	Alluvial	S	S	В	S	В	NM	S	NM
n/a <sup>e</sup>	Surge Bed Monitor Well	Surge Bed (Intermediate)	S	S	S	s	NM	NM	S	NM

<sup>&</sup>lt;sup>a</sup> S = Semiannual (two times per year).

<sup>&</sup>lt;sup>b</sup> B = Biennial (one time per 2 years).

<sup>&</sup>lt;sup>c</sup> NM = Not measured. This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

<sup>&</sup>lt;sup>d</sup> A = Annual.

<sup>&</sup>lt;sup>e</sup> n/a = Not applicable.

Table 2.1-2
Long-Term Monitoring and Maintenance Plan Sampling Program Field Parameters

Watershed	Location	Date	Screen Top Depth (ft)	Dissolved Oxygen (mg/L)	Oxidation- Reduction Potential (mV)	pH (SU <sup>a</sup> )	Specific Conductance (µS/cm)	Temperature (deg C)	Turbidity (NTU <sup>b</sup> )	Comments
Cañon de Valle 1	CDV-16-02656	09/01/2017	3	1.84	180.2	6.49	185.6	14.5	5.8	
		02/10/2018	3	6.66	189.9	6.63	169.2	5.4	8.7	
	CDV-16-02657r	09/01/2017	1.35	NS <sup>c</sup>	NS	NS	NS	NS	NS	Insufficient water for sampling
		02/10/2018	1.35	NS	NS	NS	NS	NS	NS	Location dry
	SWSC Spring	09/01/2017	n/a <sup>d</sup>	NS	NS	NS	NS	NS	NS	Insufficient water for sampling
		02/10/2018	n/a	NS	NS	NS	NS	NS	NS	Location dry
	Burning Ground	09/01/2017	n/a	8.32	NM <sup>e</sup>	7.23	193.8	13.1	1.7	
	Spring	02/10/2018	n/a	8.41	NM	7.57	203.6	10.2	2.3	
Cañon de Valle 2	Burning Ground Spring	09/01/2017	n/a	8.32	NM	7.23	193.8	13.1	1.7	
		02/10/2018	n/a	8.41	NM	7.57	203.6	10.2	2.3	
	16-61439	09/15/2017	n/a	7.43	NM	6.62	214.5	13.1	8.7	
		02/16/2018	n/a	9.27	NM	7.1	193.3	5.9	4.9	
	CDV-16-611923	08/02/2017	3.2	NS	NS	NS	NS	NS	NS	Insufficient water for sampling
		02/16/2018	3.2	2.88	55.6	6.57	203.7	5.1	9.5	
	CDV-16-611937	09/12/2017	3	0.76	-8.4	6.51	221.8	12.9	4.9	
		02/16/2018	3	0.66	-6.5	6.41	235.8	6	10.4	
	Cañon de Valle below MDA P	09/01/2017	n/a	NS	NS	NS	NS	NS	NS	Insufficient water for sampling
		02/10/2018	n/a	9.62	NM	7.62	210.4	6.1	1.1	
	CDV-16-02659	09/14/2017	1.7	6.12	259.5	6.59	302	13.2	1.6	
		02/10/2018	1.7	8.25	210.3	6.68	229.1	6.4	2.8	

Table 2.1-2 (continued)

Watershed	Location	Date	Screen Top Depth (ft)	Dissolved Oxygen (mg/L)	Oxidation- Reduction Potential (mV)	pH (SU <sup>a</sup> )	Specific Conductance (µS/cm)	Temperature (deg C)	Turbidity (NTU <sup>b</sup> )	Comments
S-Site Canyon	Martin Spring	08/29/2017	n/a	7.34	NM	7.4	329.9	18.7	6.4	
		02/23/2018	n/a	7.91	NM	6.85	350.8	7.8	3.1	
	MSC-16-06293	08/02/2017	2	NS	NS	NS	NS	NS	NS	Insufficient water for sampling
		02/02/2018	2	NS	NS	NS	NS	NS	NS	Insufficient water for sampling
	MSC-16-06294	09/11/2017	2.5	NS	NS	NS	NS	NS	NS	Insufficient water for sampling
		02/10/2018	2.5	3.47	138.4	6.14	177.4	5.4	37.8	
Pajarito Canyon	Bulldog Spring	08/29/2017	n/a	8.24	n/a	7.68	251.4	13.7	3.9	
		02/21/2018	n/a	9.24	NM	7.75	269.3	6.7	2.9	
	Pajarito below S-N Ancho E Basin Confluence	09/06/2017	n/a	6.43	NM	7.88	189.7	16.8	2.3	
		02/13/2018	n/a	10.71	NM	7.86	142.5	5.4	7.7	
Water Canyon	Between E252	09/07/2017	n/a	7.68	NM	8.22	198.2	18.7	0.9	
	and Water at Beta	02/08/2018	n/a	11.28	NM	7.75	143.4	0	8.6	
	Water at Beta	09/08/2017	n/a	NS	NS	NS	NS	NS	NS	Insufficient water for sampling
		02/09/2018	n/a	NS	NS	NS	NS	NS	NS	Location dry
Fishladder Canyon	FLC-16-25280	08/02/2017	2	NS	NS	NS	NS	NS	NS	Insufficient water for sampling
		02/02/2018	2	NS	NS	NS	NS	NS	NS	Insufficient water for sampling

<sup>&</sup>lt;sup>a</sup> SU = Standard unit.

<sup>&</sup>lt;sup>b</sup> NTU = Nephelometric turbidity unit.

<sup>&</sup>lt;sup>c</sup> NS = Not sampled.

<sup>&</sup>lt;sup>d</sup> n/a = Not applicable.

<sup>&</sup>lt;sup>e</sup> NM = Not measured. This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

Table 2.2-1 RDX Concentrations in Groundwater, Surface Water, and Springs

Canyon	Location	Sample	Depth to Top of Screen (ft)	Date	Field Prep	Field QC <sup>a</sup> Type	Result (µg/L)	NMED Screening Value	Comments
Cañon de Valle 1	CDV-16-02656	CAWA-17-142894	3	09/01/2017	UF <sup>b</sup>	REG <sup>c</sup>	ND <sup>d</sup> (0.087)	7.02	
		CAWA-18-16	3	02/10/2018	UF	REG	ND (0.087)	7.02	
	CDV-16-02657r	NS <sup>e</sup>	1.35	09/01/2017	NS	NS	NS	7.02	Insufficient water for sampling
		NS	1.35	02/10/2018	NS	NS	NS	7.02	Location dry
	SWSC Spring	NS	n/a <sup>f</sup>	09/01/2017	NS	NS	NS	7.02	Insufficient water for sampling
		NS	n/a	02/10/2018	NS	NS	NS	7.02	Location dry
	Burning Ground Spring	CAWA-17-142892	n/a	09/01/2017	UF	REG	12	7.02	
		CAWA-18-10	n/a	02/10/2018	UF	REG	15	7.02	
Cañon de Valle 2	16-61439	CAWA-17-142890	n/a	09/15/2017	UF	REG	6.89	7.02	
		CAWA-18-28	n/a	02/16/2018	UF	REG	10.5	7.02	
	CDV-16-611923	NS	n/a	08/02/2017	NS	NS	NS	7.02	Insufficient water for sampling
		CAWA-18-22	3.2	02/16/2018	UF	REG	0.49	7.02	
		CAWA-18-125	3.2	02/16/2018	UF	FD <sup>g</sup>	0.53	7.02	
	CDV-16-611937	CAWA-17-142900	3	09/12/2017	UF	REG	ND (0.089)	7.02	
		CAWA-18-30	3	02/16/2018	UF	REG	0.09 J	7.02	
	Cañon de Valle below MDA P	NS	n/a	09/01/2017	NS	NS	NS	7.02	Insufficient water for sampling
		CAWA-18-2	n/a	02/10/2018	UF	REG	3.77	7.02	
	CDV-16-02659	CAWA-17-142895	1.7	09/14/2017	UF	REG	7.21	7.02	
		CAWA-18-20	1.7	02/10/2018	UF	REG	2.9	7.02	
S-Site Canyon	Martin Spring	CAWA-17-142905	n/a	08/29/2017	UF	REG	61.1	7.02	
		CAWA-18-12	n/a	02/23/2018	UF	REG	80.4	7.02	

Table 2.2-1 (continued)

Canyon	Location	Sample	Depth to Top of Screen (ft)	Date	Field Prep	Field QC <sup>a</sup> Type	Result (µg/L)	NMED Screening Value	Comments
S-Site Canyon (cont.)	MSC-16-06293	NS	2	08/02/2017	NS	NS	NS	7.02	Insufficient water for sampling
		NS	2	02/02/2018	NS	NS	NS	7.02	Insufficient water for sampling
	MSC-16-06294	NS	2.5	09/11/2017	NS	NS	NS	7.02	Insufficient water for sampling
		CAWA-18-26	2.5	02/10/2018	UF	REG	ND (0.092)	7.02	
Pajarito Canyon	Bulldog Spring	CAPA-17-142933	n/a	08/29/2017	UF	REG	4.01	7.02	
		CAPA-18-2	n/a	02/21/2018	UF	REG	7.69	7.02	
		CAPA-18-12	n/a	02/21/2018	UF	FD	7.08	7.02	
	Pajarito below S&N	CAPA-17-142953	n/a	09/06/2017	UF	REG	ND (0.085)	7.02	
	Ancho E Basin Confluence	CAPA-18-14	n/a	02/13/2018	UF	REG	0.09 J	7.02	
Water Canyon	Between E252 and	CAWA-17-142891	n/a	09/07/2017	UF	REG	ND (0.086)	7.02	
	Water at Beta	CAWA-18-4	n/a	02/08/2018	UF	REG	ND (0.083)	7.02	
	Water at Beta	NS	n/a	09/08/2017	NS	NS	NS	7.02	Insufficient water for sampling
		NS	n/a	02/09/2018	NS	NS	NS	7.02	Location dry
Fishladder Canyon	FLC-16-25280	NS	2	08/02/2017	NS	NS	NS	7.02	Insufficient water for sampling
		NS	2	02/02/2018	NS	NS	NS	7.02	Insufficient water for sampling

Note: (0.087) = Method detection limit.

<sup>&</sup>lt;sup>a</sup> QC = Quality control.

<sup>&</sup>lt;sup>b</sup> UF = Unfiltered sample.

<sup>&</sup>lt;sup>c</sup> REG = Regular.

<sup>&</sup>lt;sup>d</sup> ND = Not detected.

<sup>&</sup>lt;sup>e</sup> NS = Not sampled.

f n/a = Not applicable.

<sup>&</sup>lt;sup>g</sup> FD= Field duplicate.

Table 2.2-2
Barium Concentrations in Groundwater, Surface Water, and Springs

Canyon	Location	Sample	Depth to Top of Screen (ft)	Date	Field Prep	Field QC Type <sup>a</sup>	Result (µg/L)	Screening Value	Comments
Cañon de Valle 1	CDV-16-02656	CAWA-17-142859	3	09/01/2017	F <sup>b</sup>	REG <sup>c</sup>	1850	1000	
		CAWA-18-15	3	02/10/2018	F	REG	1520	1000	
	CDV-16-02657r	NS <sup>d</sup>	1.35	09/01/2017	NS	NS	NS	1000	Insufficient water for sampling
		NS	1.35	2/10/2018	NS	NS	NS	1000	Location dry
	SWSC Spring	NS	n/a <sup>e</sup>	09/01/2017	NS	NS	NS	1000	Insufficient water for sampling
		NS	n/a	02/10/2018	NS	NS	NS	1000	Location dry
	Burning Ground	CAWA-17-142857	n/a	09/01/2017	F	REG	236	1000	
	Spring	CAWA-18-9	n/a	02/10/2018	F	REG	502	1000	
Cañon de Valle 2	16-61439	CAWA-17-142855	n/a	09/15/2017	F	REG	3730 J <sup>f</sup>	1000	
		CAWA-18-27	n/a	02/16/2018	F	REG	2960	1000	
	CDV-16-611923	NS	3.2	08/02/2017	NS	NS	NS	1000	Insufficient water for sampling
		CAWA-18-21	3.2	02/16/2018	F	REG	5050	1000	
		CAWA-18-122	3.2	02/16/2018	F	FD <sup>g</sup>	5340	1000	
	CDV-16-611937	CAWA-17-142865	3	09/12/2017	F	REG	2390	1000	
		CAWA-18-29	3	02/16/2018	F	REG	1340	1000	
	Cañon de Valle	NS	n/a	09/01/2017	NS	NS	NS	1000	Insufficient water for sampling
	below MDA P	CAWA-18-2	n/a	02/10/2018	UF <sup>h</sup>	REG	1910	1000	
		CAWA-18-1	n/a	02/10/2018	F	REG	1890	1000	
	CDV-16-02659	CAWA-17-142860	1.7	09/14/2017	F	REG	4940	1000	
		CAWA-18-19	1.7	02/10/2018	F	REG	4010	1000	
S-Site Canyon	Martin Spring	CAWA-17-142870	n/a	08/29/2017	F	REG	141	1000	
		CAWA-18-11	n/a	02/23/2018	F	REG	158	1000	
	MSC-16-06293	NS	2	08/02/2017	NS	NS	NS	1000	Insufficient water for sampling
		NS	2	02/02/2018	NS	NS	NS	1000	Insufficient water for sampling
	MSC-16-06294	NS	2.5	09/11/2017	NS	NS	NS	1000	Insufficient water for sampling
		CAWA-18-25	2.5	02/10/2018	F	REG	134	1000	

Table 2.2-2 (continued)

Canyon	Location	Sample	Depth to Top of Screen (ft)	Date	Field Prep	Field QC <sup>a</sup> Type	Result (µg/L)	Screening Value	Comments
Pajarito Canyon	Bulldog Spring	CAPA-17-142931	n/a	08/29/2017	F	REG	68	1000	
		CAPA-18-1	n/a	02/21/2018	F	REG	75.4	1000	
		CAPA-18-10	n/a	02/21/2018	F	FD	75.6	1000	
	Pajarito below	CAPA-17-142952	n/a	09/06/2017	F	REG	56.2	1000	
	S&N Ancho E	CAPA-17-142953	n/a	09/06/2017	UF	REG	57.5	1000	
	Basin Confluence	CAPA-18-13	n/a	02/13/2018	F	REG	38.5	1000	
		CAPA-18-14	n/a	02/13/2018	UF	REG	41	1000	
Water Canyon	Between E252	CAWA-17-142891	n/a	09/07/2017	UF	REG	76.3	1000	
	and Water at	CAWA-17-142856	n/a	09/07/2017	F	REG	78.3	1000	
	Beta	CAWA-18-4	n/a	02/08/2018	UF	REG	52.1	1000	
		CAWA-18-3	n/a	02/08/2018	F	REG	48.9	1000	
	Water at Beta	NS	n/a	09/08/2017	NS	NS	NS	1000	Insufficient water for sampling
		NS	n/a	02/09/2018	NS	NS	NS	1000	Location dry
Fishladder	FLC-16-25280	NS	2	08/02/2017	NS	NS	NS	1000	Insufficient water for sampling
Canyon		NS	2	02/02/2018	NS	NS	NS	1000	Insufficient water for sampling

<sup>&</sup>lt;sup>a</sup> QC = Quality control.

<sup>&</sup>lt;sup>b</sup> F = Filtered sample.

<sup>&</sup>lt;sup>c</sup> REG = Regular.

<sup>&</sup>lt;sup>d</sup> NS = Not sampled.

<sup>&</sup>lt;sup>e</sup> n/a = Not applicable.

 $<sup>^{\</sup>rm f}$  J = Analyte detected, concentration value is expected to be more uncertain than usual.

<sup>&</sup>lt;sup>g</sup> FD = Field duplicate.

<sup>&</sup>lt;sup>h</sup> UF = Unfiltered sample.

Canyon	Location	Sample	Depth to Top of Screen (ft)	Date	Field QC <sup>a</sup> Type	Analyte	Analyte Code	Result (µg/L)	MDL <sup>b</sup>	RDL°	Screening Value	Field Prep Code	Reporting Level Code	Result/Screening Value
Cañon de	CDV-16-611937	CAWA-18-29	3	02/16/2018	REG <sup>d</sup>	Iron	Fe	11,700	30	100	1000	F <sup>e</sup>	NMWQCC <sup>f</sup>	11.7
Valle 2	CDV-16-611937	CAWA-17-142865	3	09/12/2017	REG	Iron	Fe	4690	30	100	1000	F	NMWQCC	4.69
	CDV-16-611937	CAWA-18-29	3	02/16/2018	REG	Manganese	Mn	1880	2	10	200	F	NMWQCC	9.4
	CDV-16-611937	CAWA-17-142865	3	09/12/2017	REG	Manganese	Mn	1850	2	10	200	F	NMWQCC	9.25
S-Site Canyon	Martin Spring	CAWA-17-142870	n/a <sup>g</sup>	8/29/2017	REG	Boron	В	934	15	50	750	F	NMWQCC	1.267
	Martin Spring	CAWA-18-11	n/a	02/23/2018	REG	Boron	В	984	15	50	750	F	NMWQCC	1.312

<sup>&</sup>lt;sup>a</sup> QC = Quality control.

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<sup>&</sup>lt;sup>b</sup> MDL = Method detection limit.

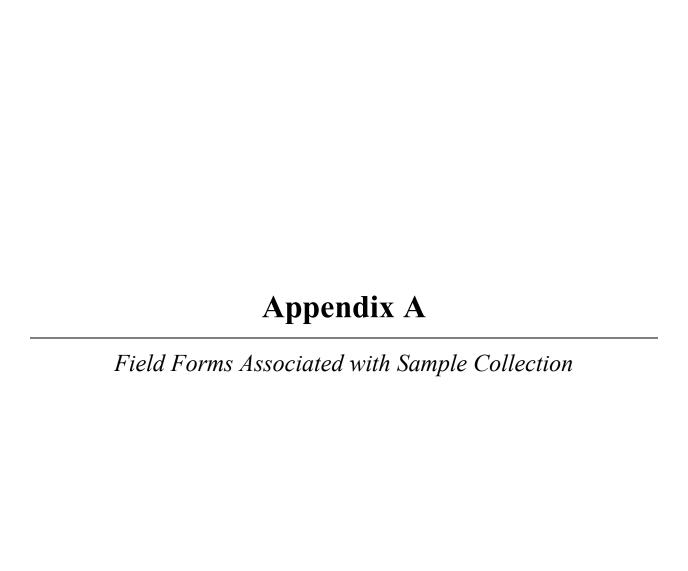
<sup>&</sup>lt;sup>c</sup> RDL = Report detection limit.

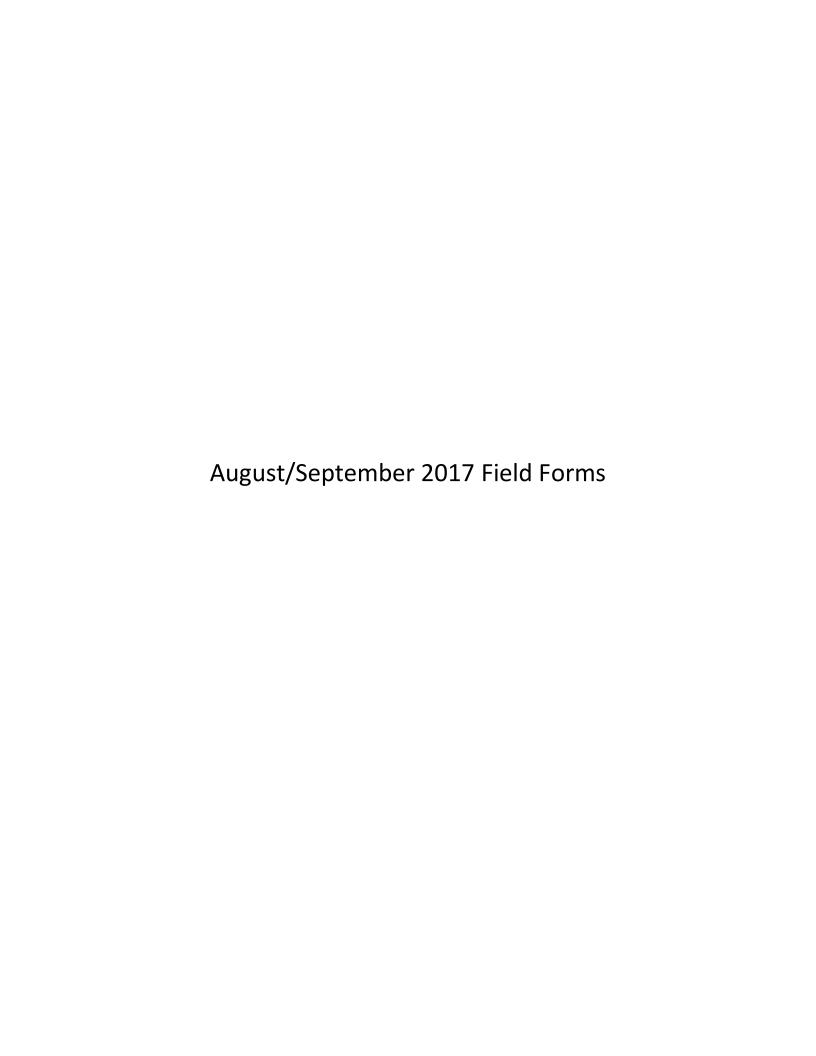
<sup>&</sup>lt;sup>d</sup> REG = Regular.

<sup>&</sup>lt;sup>e</sup> F = Filtered.

<sup>&</sup>lt;sup>f</sup> NMWQCC = New Mexico Water Quality Control Commission.

<sup>&</sup>lt;sup>g</sup> n/a = Not applicable.





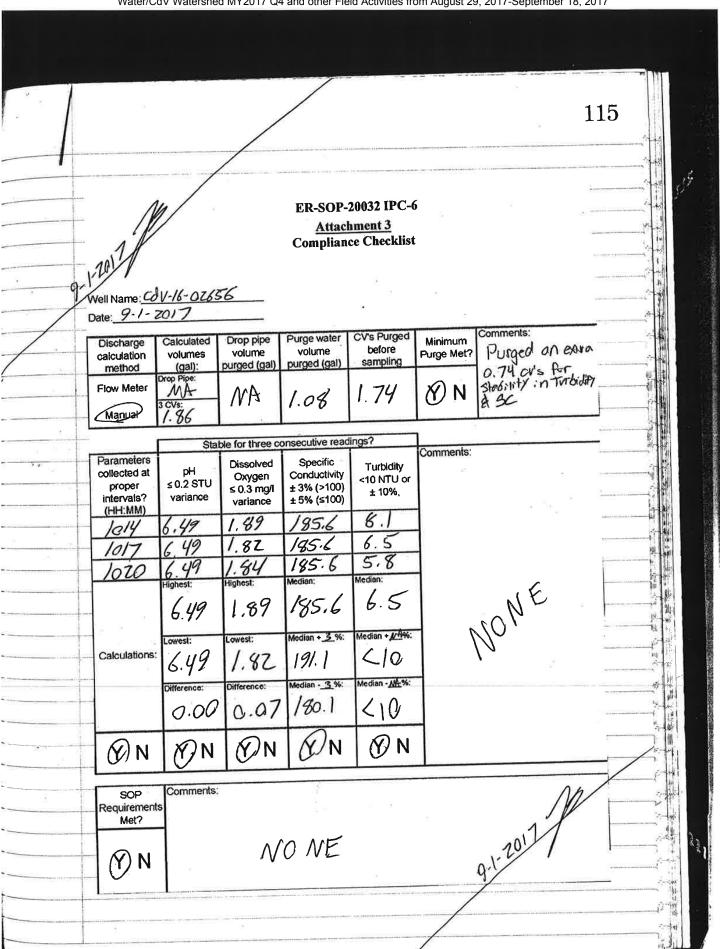
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307-5224	42					6	o o,,	
911	Spring	/Surface Water	Sampling I	Field Data Sh	eet .	· Los Alan	NOS ATORY	
Site name: B	Sotween	ECSZÁWALOBO	Date: 9-7	7-2017	Onsite time:	0920 M	ST	
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Camping Ci	ew.	Bonham, F.	TOW & N	1. Zhudo				
Meters calib	satety (	Irill: Pison Ivy (location) SA	10 vrenu	# loase h	iking su	Hous		
YSI Meter nu	rateu at	(location)	D)	(whom) _KiT	ov -	at (time)	0630	- #
Printer and the second		Date: 9-7-70.	1 di Didinie	ter serial numb	er: NA		ACM DERIVERSE	1
Sample Even	nt ID: //	3 <i>9</i> 0 Sa	ample ID Num	hers:////////////	112001 11120	0 a 142856		
		370	EIE IN D	ARAMETERS	40871/1930)	0 8 142856	ISTS SANSAIPAGE	
pH (su): 8	ZZ	P. Communication of the Commun		µS/cm): /98	7 Tu	rbidity (NTU): (		
Temperature (		8.7	DO (mg/L):	7.68	0	(apm): 42 **	3.7	
Explanation of	f Q meth	nod, including calcu	lations: 3" /	And Fred Pur	chall Flyme	(gpm): 13,40	<u> </u>	
:								
			Luttra la		THUM NO	7-/12/11		
Contactwast	e: 1	Z gall	GHT=0.10.	= 0.030cFs	×[448.83	7=13.461	An ly cfs by 448 83	
Contactwast	e: <u>/</u>	se gall	6HT=0.10	= 0.030cFs	Note: To conve	7 = 13.46 & ert cfs to gpm, multip	Pm ly cfs by 448.83	
Contact wash	e: <u>V</u>	se gall	6HT=0.10	O.O30 CF3	Note: To conve	7 = <u>1/3 , 4/6 / 6</u> ert cfs to gpm, multip	ly cfs by 448.83	
		se gall	CHT= a. la.	= 0.030cFs	Note: To conve	ert cis to gpm, multip	ly cfs by 448.83	
Media type: Sample locati	ion:	2 9a( (	CHT=0.10	= 0.030 cFS	Note: To conve	7 = <u>1/3 , 4/6 / 6</u> ert cfs to gpm, multip	ly cfs by 448.83	
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Media type: Sample locati Description of Sampling Site Substrate: Stage Condition	ion:  f e: ons:	Bank Midstream na Pool Written description Bedrock Stable: formal Dov	Spring  tural feature  Riffle  Concrete  W/ high	Wading Other (spec	Note: To conversely  Basef  Station  Sify): NA  y D	ow (persistent fi Gage: at / abo	ow) ove / below Other	
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Media type: Sample locati  Description of Sampling Site Substrate: Stage Condition Hydraulic Eve Stream Color:	ion:  f :: ons:	Midstream nate Pool Written description Stable: normal November 1980	Spring  tural feature  Riffle  MA  Concrete  W/ high  Snowmelt  Clear  Great	Wading Other (spec	Note: To converse Property Pro	ow (persistent fill Gage: at / about fiffuse  Sand  Other (specifie	ow) Ove / below Other  Mud y):	
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SOP-5224-2					<del></del>		1 0	s Use Only
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YSI Meter num	ber:	50	Turbidimete	er serial ı	number	: NA		
Sample Retriev	/al	Date: 9-1-17		Time: 0	919	Meth	od: PP	
Sample Event	D: /	1390 Sa	mple ID Numb	ers: CAL	-FI- AN	142857, -14	12892,	- 143012
				RAMETER				
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Description of Sampling Site:			Riffle		Eddy		muse	Outer
		Written description		V.		(Carry)	Can	Mud
Substrate:		Bedrock	Concrete	Copp		Gravel')	Sand	
Stage Conditio		Stable: normal / lo		Falling		Rising		(specify):
Hydraulic Ever	it:	Routine	Snowmelt	Floor		Drought		(specify):
Stream Color:		Brown	Clear) Gre		Blue	Gray		(specify):
Description of flow:	-	Turbulent	Laminar	Re	circulati	ng Sta	gnant	Other
mar new many means.		Written description	: none		ecrescottice	en (1 )		
	T		Photos	and GPS	nga sagara			
	-		Coordinates		V 9-1-	1+	-Units:	
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GPS point #2: Photo #1:	Des	cription: Downstr			NE	1	Taken Taken	by:
GPS point #2; Photo #1; Photo #2; Photo #3;	Des Des	cription: Downstr cription: Source	um .	Facing Facing	NE	Time:	Taken	by:
GPS point #2; Photo #1; Photo #2; Photo #3;	Des Des Des	cription: Downstr cription: Source cription: Upstread or test yields ne	um .	Facing Facing	SW	Time:	Taken	by:
GPS point #2: Photo #1: Photo #2: Photo #3: Other notes: 14	Des Des Des	cription: Downstruction: Source cription: Upstread test yields ne	im gative resul	Facing Facing	SW	Time:	Taken	by:

144 Martin Spring ATTACHMENT 2 Records Use Only SOP-5224-2 os Alamos Spring/Surface Water Sampling Field Data Sheet Onsite time: 1202 MST Date: 8-29-17 Site name: Martin Spring Weather: 70's sunny Objective: sample site per 50Ps and applicable docs. Sampling crew: T. Vander Vis, D. Jaramillo, W. Pryce Two-minute safety drill: Safe hiking, uneven surfaces

Meters calibrated at (location) 50 500 by (whom) k at (time) 0630 MST by (whom) K. Tow Turbidimeter serial number: NA YSI Meter number: 50 Time: 21 AST Method: P. C. Sample Retrieval Date: 8-29-17 Sample ID Numbers: (AWA- 17 -1428 70, -142905, -143013 Sample Event ID: 11390 FIELD PARAMETERS Turbidity (NTU): 6.4 Sp. Cond. (µS/cm): 329.9 pH (su): 7.40 Q (gpm): 0,71 DO (mg/L): 7.34 Temperature (°C): 18.7 Explanation of Q method, including calculations: manually measured from Flow from weirbox with (450 ml/100 ms V 6) = 0 700 ml/100 ms V 1001 ) (450 mL/10 secs ) 6)= (2700 mymin) 1991 = 0.71 gpm Note: To convert cfs to gpm, multiply cfs by 448.83 contactwaste: 1/2 gal SITE DESCRIPTION (circle all that apply) Baseflow (persistent flow) Spring Media type: Station Gage: at / above / below Wading Bank Sample location: Other (specify): Weirbox Midstream natural feature Other Diffuse Eddy Riffle Pool **Description of** Sampling Site: Written description: Weirbox Mud (Sand Cobble Gravel Concrete Bedrock Substrate: Other (specify): NA Rising Falling Stable: normal/ low / high Stage Conditions: Drought Other (specify): NA Flood Routine) Snowmelt **Hydraulic Event:** Other (specify): NA Gray Blue (Clear ) Green Brown Stream Color: Other Stagnant Laminar Recirculating Turbulent Description of flow: Written description: none Photos and GPS Units: Coordinates: TV 8-29-17 GPS point #1: Name: Units: Coordinates: GPS point #2: -Name: Taken by: Time: 1219 Facing: |= Description: Source Photo #1: Taken by: Facing: Time: Photo #2: Description: downstream Taken by: Time: Facing: F Photo #3: Description: upstream Other notes: HE test yields negative results, received FTB with broken custody seal, sample was opproved by SMO personel to use. at (time) 1330 MST Relinquish samples at SMO, care of M. Montoya Offsite time: 1300 MST Objectives met? yes

114 **Groundwater Sampling Log** Q: 4 LSD: 7443.18 ft. msl Well Diameter: Z inches Date: 9-1-2017 Watershed: Water/CdV Water Level: MA ft. msl Top of Screen: 5,30 ft. STOC Notes: Vell: CdV-16-02656 TD: = MTD - 11.0 6TOC Bottom of Screen: 11.0 16700 NONE Sampling Device: PF \*DTW: 7.18" STOC Water Column: 3.82 Measuring Point: Pt. BTOC Drop Pipe: NA 1CV: () gal. Packer Press Completion Depth: TD gal. Before: 3CV: [, 86 ft. BTOC BTIC / BGS / MSL ] 2,30 Note MP height (stickup) of TOC/TIC for Alluvials ft. DTW = (LSD - Water Level)......Water Column = (TD - DTW).....Drop Pipe = (TD/Pump intake x Drop Pipe Diameter Multiplier) 1CV = (Water Column x Well Diameter Multiplier).....3 CV = (1CV x 3) Openi nsi psi SPEC COND DΩ Turb MST DOST sυ us/cm mg/i NTU Discharge TEMP Water Level\* ORP Rate NOTES ·c (GPM) ≤ 0.2 STU ± 3% (>100) ≤ 0.3 mg/l <10 or ± Stability: variance ± 5% (≤100) variance Matu Q=0066PN P04 dork arange 4 *15*. 1002 584.1 Z00.9 3.71 66.7 7.38 0.06 Porticular multistadorus 1005 6.51 193.6 315, 0.06 cloudy wishight orange ned oderless 100% 53.0 6.50 132.1 0,06 Slightly dowly 1011 6.50 86.0 0.06 12.5 clear & odorless 1014 162.8 185.6 7.65 0.06 1017 6.5 (7).4 0.*0*S 1070 5.8 180,0 0.06 Stable Yes in HACH column = HACH Turbidimeter # MP used because MA Final Water Level Contact Waste: 1/7 gal. Drum#: MVn. L. Pal ft BTO \*Purge Water: 1.08 gal. Drum#'s: 0980 HE NH/NR Purge: Formation water purged prior to sampling (excluding drop pipe water and Total Waste Water: / 1550 gailon Tank gal sampling water)



		-				41				0.11.497.4	10 947			23	
Wat	ersnee	Afferz Noter		LSD: 7300 Water Level	0.50'm :NA	f	t. m:	SI Well Diam	neter: 4 reen: 4, 94		1.610	s Date: 7-	14-201	17	٤
Mea * Co	pling I suring mpleti	Device: F Point: Fl on Depth:	. BTOC	*TD: = mT *DTW: 9. : Drop Pipe:	39'670 MA	(	ga	Water Col	f Screen: <i>9, 9</i> ; lumn: <i>1, 46</i> 0 . 95 Z. 85			Pac Before:	ker Press	sure psi	
		.SD - Wate	r Levei)W	/ater Column : '= (Water Colu	= (TD - DTW	O Drop Pi	ne :	= (TD/Pumn	TIC for Alluvials intake x Drop F (1CV x 3)			Actuation Opening: After:		psi psi psi	
r@T	ME / DST bility:	≤ 0.2 STU	TEMP C	#\$/cm ± 3% (>100)	.mg/l ≤ 0.3 mg/l	Turb NTU <10 or ±	F A C H Yes or	ORP mV	Water Leve	ei"   i	charge Rate SPM)		NOTES	5. 	
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093	32	6.61	13.3	301.8	6.09	7.4		746.8	9.62						
09	35	6.60	13.3	301.8	6.11	1.8		753.8	9.65						
093	8	6.59	13.2	302.0	6.12	1.6		2595	9.68						
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Yes in		201							d	L			M		
Contac *Purge	t Wast Water	column = F te: '/ Z : / . Q Z Vater: / . (				unicipa	1	550 ga		7	Nater L	evel: ./3.00 nation water luding drop	flo To	ior to	

Water/CdV Watershed MY2017 Q4 and other Field Activities from August 29, 2017-September 18, 2017 24 ER-SOP-20032 IPC-6 Attachment 3 **Compliance Checklist** Well Name: Cdv-16-02659 Date: 9-14-2017 Comments: CV's Purged Purge water Discharge Calculated Drop pipe Minimum before volume volume volumes calculation Purge Met? purged (gal) sampling purged (gal) method (gal): NONE Drop Pipe: Flow Meter Y) N MA 1.07 NA 1.02 3 CVs: (Manua) 2.85 Stable for three consecutive readings? Comments: **Parameters** Specific Dissolved **Turbidity** collected at pН Conductivity Oxygen <10 NTU or ≤ 0.2 STU proper ±3% (>100) ≤ 0.3 mg/l ± 10%. intervals? variance ±5% (≤100) variance (HH:MM) 301.8 6.09 6.61 0932 301.8 6.11 0935 60 202.0 5.59 6.12 0938 10 ME Highest: 1.8 6.12 301.8 Median + 3 %: Median + ////%: owest: Calculations: 310.8 5.59 6.09 Median -MA%: Median -\_5\_%: 0.03 0.06 292,8 Ø N ⟨Y⟩ N (Y) N N Comments: SOP Requirements Met? NONE (Y) N

# Appendix E Field Documentation Water/CdV Watershed MY2017 Q4 and other Field Activities from August 29, 2017-September 18, 2017

Manual Groundwater Level Measurements

Document No. ER-SOP-20243

Revision: 1, IPC-1

Reference

Effective Date: 3/1/2017 Page: 17 of 18

### **ATTACHMENT 1**

Page 1 of 1

Groundwater Level Field Form

PART 1: Well St	te information	**************************************			
Well Name		Date:	Time onsite (MST):	Activity:	made to the street, and a street of the stre
CdV-/6- CZ6 Personnel:	(59	9-14-2017	C855	Somple	
Personnel:	um N. Steede	& D. Huales	{	Cable Langth(ft):	Cable SN:
Telemetry: Yes \ No	Pull Transducer Yes \ No	New Transducer Need New LT SN:	ed: Ves\ (6)	Memory % remaining:	Battery % remaining:
Connect Time:	Transducer SN: 38/373	New LT PSI Rating:		Log Note Memory %	Log Note Battery %
Water Level (ft)	1 2012/	P (psi):	T (C)	Stop Test: Yes \ (No)	Change Desicant:
724 33 Last Start Date:		0.56	12.42		Yes I NO I NA
Last Start Date:	MA	Data File Name:	VA	***************************************	7
PART 2: Manual N	Reasurements			and with the comment of the second	
Measuring Point	TOC (top outer cas		Stick-up Measured on Site	Previous MP	Used 🔼
Time (MST)	0906	Water Level Meter Se 34244		Notes:	
DTW (ft.bMP):	9.396700	Measur	rements in feet	MA	
Time (MST)	0909 9.39'61d/	LSD ft	7300.50'nsl		
DTW (ft bMP):	939'612	MP Height ft.	+ 3.24'	]	
Time (MST)		MP Elevation	= 7303, 74 ms1		
DPW (ft bMP):		DTW:	- 9.39 6TOC		
Time (MST).	10.85	Groundwater Elevation (GWE) Reference Level	1694,50 mg		
		Zip Tie on Kellim's Grip		1	
Transducer Perform	l nance and Programming		770	1	
NAME OF TAXABLE PARTY.	ErronDrift Acceptance	Commission of the last	Part 4: Pro	gramming & Final Readings	THE SECTION OF THE SECTION OF THE SEC
WL Reading Time (MST)		Progamming Time:	170.80%	Time (MST)	Reading
WL (transducer reading) (ft):		New Test Name:	N		
GWE from MM		Reference Level	112017		
Difference iл value;		Current Depth: 9//	gira		
Error tolerance of transducer:		Meas Interval			
Mittin Error Tolo		Start Date:			
Octobr Ency To	formers s	Start Time:			
	PSI-0.07 ft. 100 PSI-0.	23 ft 500 PSF1.16 t.	Synch Clocks: Yes \ Mo		
Deleted Tests:	NA			2	QA Date and Initial

#### Appendix E Field Documentation

Water/CdV Watershed MY2017 Q4 and other Field Activities from August 29, 2017-September 18, 2017

12 2/11/1 **Groundwater Sampling Log** mst 7288.94 4" IPWGMP MY: 2017 Q: Q4 LSD: ft. msl Well Dlameter: Inches Date: 9/11/17 Watershed: Wuter / CDV Water Level: NA ft. msl Top of Screen: 5.51 ft.BTIC Notes: Well: MSC-16-06244 TD: MTO = 11-06 Btic Bottom of Screen: 10.37 ft.BTIC none Sampling Device: PP \*DTW: 10.40 BTIC Water Column: 0.66 Measuring Point: Bていく gal. 1CV: 0.43 Drop Pipe: 11 A Packer Pressure gal. NA 1.29 gal. Before: Completion Depth: MTD 3CV: 3.07 tt \* ft. BTOC / BTIC / BGS / MSL ] Note MP height (stickup) of TOC/TIC for Alluvials psi Opening: psi DTW = (LSD - Water Level)......Water Column = (TD - DTW).....Drop Pipe = (TD/Pump intake x Drop Pipe Diameter After: Multiplier) 1CV = (Water Column x Well Diameter Multiplier). psi TIME SPEC COND рΗ DO Turb MST / DST SU NTU us/cm mg/l Water Level\* Discharge TEMP ORP Rate NOTES °C. mV (GPM) ≤0.2 STU ± 3% (>100) ≤0.3 mg/l <10 or ± Stability: variance ±5% (≤100) variance 10% to Surface -06 Water son Cloudy 10.68 234.8 -2.9 -06 7.44 odar -12.2 185.9 2.16 191.7 10.99 06 Well puged NA 0957 10.99 MA na NA NA NA 1015 10.99 M rechange 10:20 10.99 10:35 10.99 10:45 10.99 10:50 10:99 NO observable 10:57 10.99 recharge Yes in HACH column = HACH Turbidimeter # 🚺 used because Final Water Level: Contact Waste: gal. Drum#: 10179(ク) 75 cal 10.99 ft BTIC 0.36 Purge: Formation water purged prigs Purge Water: Drum#'s: 0962 sampling (excluding drop pipe water and 1550141 1.36 Total Waste Water: gal ampling water)

#### Appendix E Field Documentation Water/CdV Watershed MY2017 Q4 and other Field Activities from August 29, 2017-September 18, 2017

Manual Groundwater Level Measurements

Document No. ER-SOP-20243

Revision: 1, IPC-1

Reference

Effective Date: 3/1/2017 17 of 18 Page:

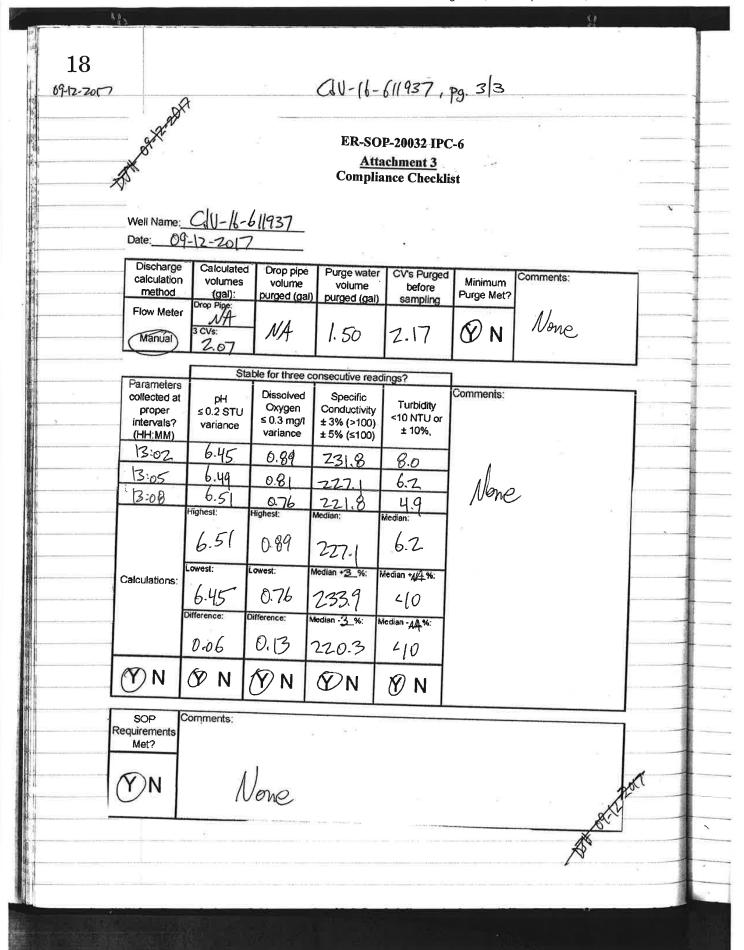
### **ATTACHMENT 1**

# Page 1 of 1 Groundwater Level Field Form

PART 1: Well St	le Information			- Marine Land Committee	
Well Name		Date:	Time onsite (MST):	[Activity	
MSC-16-1	267.94	9-11-2017	0975	SOMPLE	1 2011
MSC-16 C	, , ,		0/0-	SamPI-C Cable Lengthift):	Cable SN:
		L- TOW N T	- Time of alimens	20	236866
Telemetry	Pull Transducer	New Transchicer Needs	eromillo AC. Wilder	Memory % remaining:	Battery % remaining:
Telemetry: Yes V No	Yes (No	New LT SN:	110	NA	SG SG
Connect Time:	Transducer SN:	New LT PSI Rating:	Indexutarture Date	Log Note Memory %	Log Note Baltery %
0929 Water Level (ft)	398461	NA	NA	MA	NA
	11	P (psi):	TICI 14.32	Slop Test: Yes \ Ng	Change Desicant: Yes \ No \ NA
Last Start Date:	VA	Data File Name:	NA	<u> </u>	
PART 2: Manual M	ensurements		1, 1		The same of the sa
Measuring Point	and the same of th	ing) /TIC (Inner)	Stick-up Measured on Site	Previous MP	Used . Z
monouring r Oill		Water Level Meter Se		Notes:	. K1
Time (MST)	0929		1244		
DTW (R bMP).	10.40 GTE		rements in feet	NA	
Time (MST)	0932	LSDft	7288.44 ms1		
DTW (ft bMP)	10.40 STIC	MP Height ft.	+3.07		
DIAM (III OHOL.)	10,000	The state of the s			
Time (MST) 9	11-17/2	MP Elevation	= 7291.5/ms)		
DTW (# bMP)		DTW:	- 10.40 HIL		
Time (MST).	093Z 11.06'6TiL	Groundwater Elevation (GWE) Reference Level	7281.11/ms)		
MA	NA	Zip Tie on Kellim's Grip	· No		
Transducer Perform	nance and Programming				
Pari 3: Transducer	Errori Drift Asseptance		Part 4: Pro	gramming & Final Readings	THE RESERVE TO A STATE OF THE PARTY OF THE P
WL Reading Time (MST)		Progamming Time:		Time (MST)	Reading
VVL (transducer reading) (ft)		New Test Name:	N		7,000
GWE from MM		Reference Level	1.7017		
Olfference in value:		Current Depth:			
Error tolerance of transducer:		Meas Interval			
Marin Error Los	104 1.	Start Date:			
Paladi En a Ta	ere-s	Start Time	1		
15 PS40,03ft 30	PSI-0.07 ft. 100 PSI-0.	23 ft. 500 PSI-1.16 ft	Synch Clocks: Yes 1 146		
Deleted Tests:		VA	y .		QA Date and Initial

Water/CdV Watershed MY2017 Q4 and other Field Activities from August 29, 2017-September 18, 2017 146 x alls/17 RB Alluvial Seep ATTACHMENT 2 Records Use Only SOP-5224-2 Spring/Surface Water Sampling Field Data Sheet 16-61439) Onsite time: Site name: (RB Alluvial Seep Date: 9/15/17 MST Weather: Objective: Sample spring per SOPS + reference das 705 Sampling crew: D. Hughes, K. Tow, M. Shendo, D. Jaramillo Two-minute safety drill: uneven ground, heavy equipment Meters calibrated at (location) SMO SMO word (whom) M. Shendo at (time) 1230 PM 9/14/17 Turbidimeter serial number: YSI Meter number: Sample Retrieval Date: 9/15/17 Time: 0839 Method: PP Sample ID Numbers: (AWA-17-142890, 142855, 143621 Sample Event ID: 11390 FIELD PARAMETERS Turbidity (NTU): 2, 7 Sp. Cond. (µS/cm): 214.5 pH (su): 6.62 DO (mg/L): 7.43 Q (gpm): 0.44 Temperature (°C): 13.1 Explanation of Q method, including calculations: measured volume in measuring cup Contact waste: 1.0 gal Note: To convert cfs to gpm, multiply cfs by 448.83 SITE DESCRIPTION (circle all that apply) Baseflow (persistent flow) Spring) Media type: Station Gage: at / above / below Bank Wading Sample location: Other (specify): Midstream natural feature er 9/Eddy Other (Pool) Riffle Diffuse **Description of** Sampling Site: Written description: Cobble ) Gravel Sand ) Mud Substrate: Bedrock Concrete Other (specify): Falling Rising Stable: normal ) low / high **Stage Conditions:** Other (specify): Flood Drought Routine Snowmelt **Hydraulic Event:** Other (specify): Stream Color: Brown Clear Green Blue Gray Other Laminar Recirculating Stagnant Description of Turbulent flow: Written description: Photos and GPS Units: GPS point #1: Name: Coordinates: Units: GPS point #2: Coordinates: Name: Time: 0840 Taken by: D. Hughes Photo #1: Description: Downstream Photo #2: Facing: < W Time: 1 Taken by: Description: Upstream Taken by: Photo #3: Description: Facing: Time: negative, D. Jaramillo preserves He spot test was Other notes: all samples, M. Shendo QA's Relinquish samples at SMO, care of M. Engler+ at (time) 1230 Offsite time: 1207 Objectives met? Yes

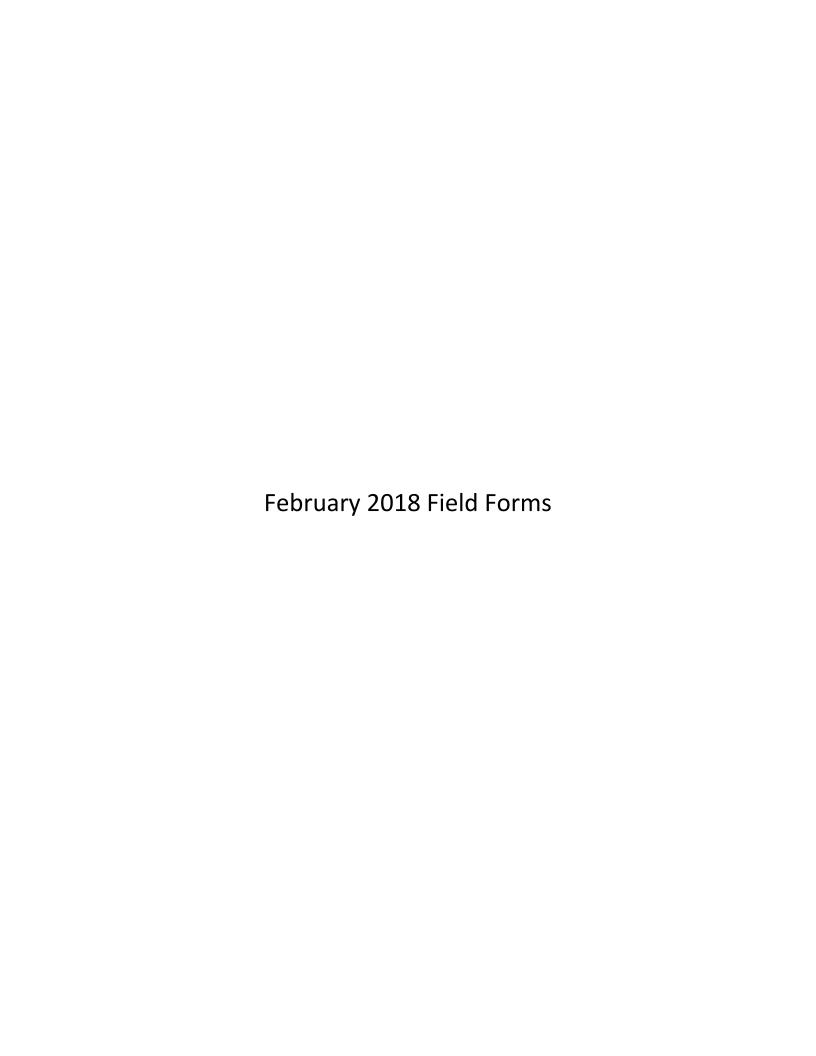
17 CAV-16-611937, pg. 1/3 0912-2017 **Groundwater Sampling Log** 7359.59 inches Date: 09-12 - 2017 LSD: ft. msl Well Diameter: 6.0 ft. Bric Water Level: ft. msl Top of Screen: 11.55'BTIC Bottom of Screen: TD: = MTD= DTW:734' 7 Water Column: 4.21 Sampling Device: Packer Pressure 1CV: Drop Pipe: gal Measuring Point: **Completion Depth:** 3CV: gal. Actuation ft. BTOC / BTIC / BGS / MSL ] Note MP height (stickup) of TOC/TIC for Alluvials psi  $DTW = (LSD - Water \ Level).....Water \ Column = (TD - DTW).....Drop \ Pipe = (TD/Pump \ intake \ x \ Drop \ Pipe \ Diameter \ Drop \ Pipe \ Diameter \ Drop \ Pipe \ Pipe \ Drop \ Pipe \ P$ ... 3 CV = (1CV x 3) Multiplier) 1CV = (Water Column x Well Diameter Multiplier). TIME SPEC COND Turb ACH MST DST µs/cm mg/l Discharge TEMP ORP Water Level\* Rate NOTES Yes or No ft. RTIC mV (GPM) ≤ 0.2 STU ± 3% (>100) ≤ 0.3 mg/l <10 or ± Stability: ± 5% (≤100) 10% variance variance Vellwish murk, **7**., slight odor 0.06 55.0 cleaning, 8.45 lesseninofor 1.07 35.5 0.06 work. odorless 8.82 13.3 deartha 72.0 0.06 12.2 8.93 6.37 **B.3** 16.0 9.15 3. 1.00 0.06 10.6 odonlass, chaw 0.89 8.0 9.24 3.0 3:02 231.8 9.33 0.06 6.2 0.81 13:05 4.9 -8.4 9.40 13:09 13:09 3:10 Yes in HACH column = HACH Turbidimeter # M used because Final Water Level: ft BTIC myn, Zipa gal. Drum#: ` Contact Waste: gal. Drum#st 1600 H 650 y consolidation poly tank Purge: Formation water purged prior to p sampling (excluding drop pipe water and .50 \*Purge Water: FOR HENHUR & Sixma sampling water) Total Waste Water: gal.



Appendix E
Field Documentation
Water/CdV Watershed MY2017 Q4 and other Field Activities from August 29, 2017-September 18, 2017

158	n					100
9-6-2017	Pai	Bol	SAN A	nobo E	Racia	n conf.
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Lin Controllysissin	nesses-capacites		* +	no i del mara mangeriament	AND SOME OF THE PARTY OF THE	XXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXX
— <u>"13651")</u>	NI		ATTAC	HMENT 2		20 (19 (19 (19 (19 (19 (19 (19 (19 (19 (19
SOP-5224/2		H.				Records Use Only
11		_			6 9	· Los Alamos
9.6-201 5	pring/Su	rface Water	r Sampling F	ield Data SI	heet	HATIONAL LABORATORY
	Hel SKN	Anr Fhasin a	Date: 9-6-	7.017	Onsite time:	0952 MST
Objective: So	mple for 1	vernce does.	sn Pa.3			nny ATempin 70's
Sampling cre	W: T. Bonh	om. D. Jorom	:10, M. Shed	o & A. Stan	Rield	Tang Cit 205
I WO-IIIIIIULE S	arety drill	Hitsina Cr	1 unever	surfaces &	Steep Surt	oces
meters calibra	ated at (loc	cation) <u>~5</u> M	<u>о</u> bу	(whom) T. V	landes Vis	at (time) <u>0630</u>
YSI Meter nur				er serial numl		
Sample Retrie	val Da	te:9- <i>6-70/</i>	7	Time: (1957)	Mei	lhod: PP
Sample Event	ID: //39	o s	ample ID Numb	ers: CAWA-	17-143005,1	142952, 142953 \$ 142958
			FIELD PA	RAMETERS		
pH (su): 7.8			Sp. Cond. (µ	ıS/cm): /89.	7 To	urbidity (NTU): Z. 3
Temperature (°			DO (mg/L):	6.43	Q	(gpm): 17.95
Explanation of	Q method,	including calc	ulations: 3" m	GOVERED Pars	holl Elving	
	1/-	- GH	N=0.12'=0	040CFS X[4		
Contactwaste	72	NAMED AND ASSOCIATION OF THE PERSONS ASSOCIATION		ulturi oʻrbi mingana un mahan	Account to the second section of	vert cfs to gpm, multiply cfs by 448.83
	200		SITE DESCRIPTION	I (circle all that a	THE NAME OF STREET OF STREET	
Media type:			Spring			flow (persistent flow)
Sample location	on:	Bank	>	Wading		n Gage: at / above / below
Description of		Midstream na			ecify): NA	
Sampling Site:	. i	Pool	n: NA	Ed	dy l	Diffuse , Öther
Substrate:		tten description Bedrock		Cabble	Preval	
Stage Condition		ble: normal / lo	Concrete	Cobble Falling	Gravel	Sand Mud
Hydraulic Ever		Routine	Snowmelt	Flood	Rising	Other (specify):
Stream Color:		Brown	Clear Gre		Drought Gray	Other (specify): Other (specify):
Description of		Turbulent	Laminar			agnant Other
flow:	-	tten description		TCOITOUR	ading Od	Julie Julie
	Mercus	EVanata 3	1140	and GPS		
GPS point #1:	Name:	NA	Coordinates:	M	Market Anna A	Units: MA
GPS point #2:	Name:	<u>// \</u>	Coordinates:	///		Units:
Photo #1:	Descripti	on: USPSHræv		Facing: V	Time: /0/5	
Photo #2:		on: Source		Facing: W	Time:	Taken by:
Photo #3:		on: down s	tream	Facing: E	Time:	Taken by:
Other notes: D A. Stanfield f	Screm:1/0	conducts H	E SPOT testi	Results neg	alive	1017
Offsite time: /o			samples at SM0	D, care of M	Englert	at (tinge)////O
Objectives met	? Yes				7	
						<i>f</i>
					/	

		Bu	ulldog	Sprin	9			143	-0
	10.5	3	ATTAC	HMENT 2				E Mills	
SOP-5224-2							Records Use Only		
					4		· Los Alamos		
Sp	ring	/Surface Water	Sampling Fi	eid Data Sn	eet				
Site name: Bu	1100	g Spring	Date: 8-29	-17			927 MST		
		site per SOPs	and applicab	le doc.	Weather:	70	s Sunny		78
Sampling crew	/: 'T	Vander Vis, D.	Jaramillo, U	). Pryce					
		drill: Safe hiking,			100				
		(location)SM		(whom) K. To			at (time) <u>U63d Mit</u>	r	
'SI Meter num		50		er serial numb	AND A CONTRACTOR OF THE PARTY O	rin b	ST COMPLETE OF THE STATE OF THE		***
AND THE PERSON NAMED IN COLUMN	OCH PROPERTY	Date: 8-21-13							
ample Event	ID:		ample ID Numb			14213	3, -14,006		
			FIELD PA	Clam): A C.	1	Turb	oidity (NTU): えり	E0839	
H (su): 7.6	> 8		Sp. Cond. (p	13/011). 251.	7	Tuit	idity (1410). 5, 7		- 4
	137. 1	7 7	DO (ma/l ).	8 24		O (a	nm). O O Carm	11	1944
emperature (	C): (	3.7	DO (mg/L):	8.24 Shall flome Ch	annelized	Q (g	of flow, fined flow		*
Explanation of C	C): ( Q met	3.7 hod, including calc	DO (mg/L):	8.24 shall flome cr	annelized aduated o	Q (g 90% UP	pm): 2.03gpm.		
Explanation of (	C): ( Q met	hod, including calco	DO (mg/L): ulations: 3" pars $\frac{1}{3785mL}$	8.24 shall flume cr = 2.03gpm	annelized aduated o Note: To	Q (g	pm): 2.03gpm of flow, fined flow cfs to gpm, multiply cfs by 448	B.83	
emperature (C explanation of C 1280inc/105 ontact waste	C): ( Q met (c) x	3.7 hod, including calcoming $60 = \frac{7680}{2}$	DO (mg/L):  ulations: 3" pars  nt/min\(\chi\) \frac{11 \chi}{3785mL}\(\chi\)	8.24  Shall flume Cr Sho g  = 2.03 gpm	annelized aduated co Note: To	Q (g	pm): 2.039 pm of flow, fined flow cfs to gpm, multiply cfs by 448	3.83	
	C): ( Q met	3.7 hod, including calcoming $\frac{6}{2}$ $\frac{6}{2}$ $\frac{7680r}{2}$		8.24  Shall flome Cr  The gr  2.03 gpm  (Circle all that		F. 102 FC 142 ID	pm): 2.039 pm of flow, fined flow cfs to gpm, multiply cfs by 448 www (persistent flow)	3.83	
ledia type:		3.7 hod, including calco	Spring	8.24  Shall flume Cr = 2.03 gpm  (circle all that:	В	aseflo	responded to the contract of the contract of the con-		*
Explanation of (  1280 In L/105  Out act waste  Media type:  Sample location		Bank	Spring	Wading	B St	aseflo ation (	w (persistent flow)	ow	
fledia type:	n:	Bank	Spring	Wading Other (spe	B St	aseflo ation (	ow (persistent flow) Gage: at / above / belo	ow	
Media type: cample location	n:	Bank Midstream na	Spring atural feature Riffle	Wading Other (spe	B Strecify):Smal	aseflo ation (	ow (persistent flow)  Gage: at / above / belowing pool below 500  Ifuse Other	ow	
Media type: Sample location Description of Sampling Site:	n:	Bank Midstream na	Spring atural feature Riffle	Wading Other (special pool by Cobble	Becify):Small	aseflo ation ( ), flou Dif	Gage: at / above / belowing pool below Some other	ow	
Media type: cample location description of campling Site: cubstrate:	on:	Bank Midstream no Pool Written descriptio Bedrock Stable: normal/ k	Spring  atural feature  Riffle  Riffle  Concrete  ow / high	Wading Other (specific pool be Cobble Falling	B Steelify):Small Idy Sow Sow Grave Rising	aseflo ation ( ), flou Dif rce	ow (persistent flow)  Gage: at / above / below som  fluse Other  Sand Mud  Other (specify):	ow	
ledia type: ample location description of ampling Site: substrate: tage Condition	on: ons:	Bank Midstream no Pool Written descriptio Bedrock	Spring  atural feature  Riffle  In: Small, Flow  Concrete  ow / high  Snowmelt	Wading Other (specific pool by Cobble Falling Flood	B Stecify):Small Idy Elow Sow Frave Rising	aseflo ation ( ), flow Dif srce	ow (persistent flow)  Gage: at / above / below sow  If the Sand Other  Other (specify):  Other (specify):	ow	
ledia type: ample location escription of ampling Site: ubstrate: tage Condition	on: ons:	Bank Midstream no Pool Written descriptio Bedrock Stable: normal)/ k	Spring  atural feature  Riffle  Riffle  Concrete  ow / high  Snowmelt  Clear Gr	Wading Other (special pool by Cobble Falling Flood een Blue	B St. Striction Strave Rising Droug Grave	aseflo ation ( ), flov Dif rce Dif rce	ow (persistent flow)  Gage: at / above / below some fituse Other  Sand Mud  Other (specify):  Other (specify):	ow	
ledia type: ample location description of ampling Site: substrate: stage Condition lydraulic Ever tream Color: description of	on: ons: ons:	Bank Midstream no Pool Written description Bedrock Stable: rormal/ k Routine Brown Turbulent	Spring  atural feature  Riffle  Small, Flow  Concrete  ow / high  Snowmelt  Clear Green  Laminar	Wading Other (specific pool by Cobble Falling Flood	B St. Striction Strave Rising Droug Grave	aseflo ation ( ), flov Dif rce Dif rce	ow (persistent flow)  Gage: at / above / below sow  If the Sand Other  Other (specify):  Other (specify):	ow	
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ledia type: ample location rescription of ampling Site: ubstrate: tage Condition lydraulic Ever tream Color: rescription of ow:	on: ons: Nar	Bank Midstream no Pool Written description Bedrock Stable: rormal/ ke Routine Brown Turbulent Written description	Spring  atural feature  Riffle  Riffle  Small, Flow  Concrete  ow / high  Snowmelt  Clear Gr  Laminar  In: NA  Photo:	Wading Other (specific pool by Cobble Falling Flood een Blue Recircu	B Stecify):Small Idy Flow Sow Rising Droug Graating	aseflo ation ( ), flov Dif rce Dif rce	w (persistent flow) Gage: at / above / below Souring pool below Souriffuse Other  Sand Mud Other (specify): Other (specify): Other (specify): Inant Other	ow	
ledia type: ample location rescription of ampling Site: ubstrate: tage Condition ydraulic Ever tream Color: rescription of ow:  PS point #1:	nn:  Nar  Nar	Bank Midstream no (Pool) Written description Bedrock Stable: normal/ k (Routine) Brown Turbulent Written description me:	Spring  atural feature Riffle In: Small, Flow Concrete ow / high Snowmelt Clear Gr Laminar In: NA Photo- Coordinates Coordinates	Wading Other (specific pool by Cobble Falling Flood een Blue Recircu s and GPS	B Stecify):Small Idy Lear Sow Rising Droug Grating	aseflo ation ( a, flou Dif rce b) g ht ay Stag	w (persistent flow)  Gage: at / above / below sow  If the Sand Other  Other (specify):  Other (specify):  Other (specify):  Inant Other  Units:  Units:	ow	
ledia type: ample location rescription of ampling Site: ubstrate: tage Condition ydraulic Ever tream Color: rescription of ow: PS point #1: PS point #2: hoto #1:	nn:  Nar Nar Des	Bank Midstream note Pool Written description Bedrock Stable: normal/ le Routine Brown Turbulent Written description me: me: coription: pownstre	Spring  atural feature Riffle  Riffle  Concrete  ow / high Snowmelt Clear Gra  Laminar  On: NA Photos  Coordinates  Coordinates	Wading Other (specific pool by Cobble Falling Flood een Blue Recircus and GPS  Facing: WE	B St. St. Scify):Small Idy Crave Rising Droug Gratating Time:	aseflo ation ( a, flow Dif rce bht ay Stag	Sange: at / above / below Souring pool below Souring Other (specify):  Other (specify): Other (specify): Inant Other Units: Units: Taken by: TV	ow	
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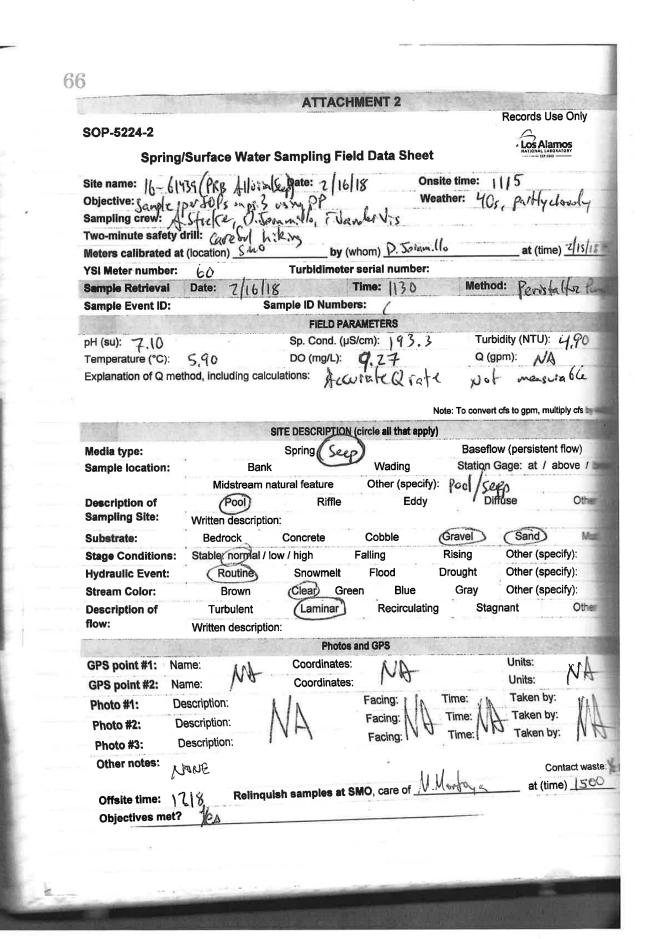


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		ATTACH	MENT 2			
		Airon			Records Use Only	1/2/4
OP-5224-2 Sprin	g/Surface Water	Sampling Fie	ld Data Sheet		Los Alamos	
		T Datas a 10	On On	site time: 120	10	100
ite name: (AV be	laration per appli	capie docume	ntation   We	eather: parti	y cloudy, 40s	1-00
ampling crew: M	. Shendo, T. Vander	Vis, A. Vig. I, K. T	ow, W. sanch	e.Z		
wo-minute safety	y drill: ice, safe h	King			at (time) 0730	
leters calibrated	at (location)	Dy (	whom) <u>D.Ja</u>	AIA		7.13
(SI Meter numbe	70	Intoldimere	r serial number: Time: 1328	Metho	1: PP	
Sample Retrieval	Date: 1328		ers: CAWA-18-			-204/3
Sample Event ID:	11669 8	ample in warns	RAMETERS			740.7
			S/cm): 210.4	Turb	pm): 0.2145000 2.529pm	1 4 8
oH (su): 구. 년 Temperature (°C):		DO (mg/L):		Q (g	pm): 0,210pm	
Gseconds		Spring	N (circle all that app	Basefic	ow (persistent flow)	
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Sample location		and the same of th	Other (speci		Other	
Description of	Midstream	natural feature	Eddy	, Di	ffuse Other	
Description of Sampling Site:	Midstream Pool Written descript	natural feature  Riffle	Eddy	, Di	ffuse Other	
Description of	Midstream Pool Written descript Bedrock	natural feature Riffle ion: April 200 V 2-10-18	Eddy in middle of Cobble	How Gravel	mass.	
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Description of Sampling Site: Substrate: Stage Condition Hydraulic Even	Midstream Pool Written descript Bedrock stable: normal t: Routine	Riffle ion: Anne Poo Concrete / low / high Snowmelt	Eddy of Cobble Falling Flood	How Gravel	Sand Mud Other (specify): NA Other (specify): Other (specify):	
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#### 85 Between EZSZ & Woter @ Beta ATTACHMENT 2 Records Use Only SOP-5224-2 oś Alamos Spring/Surface Water Sampling Field Data Sheet Site name: Between E752 A how Date: Z-8-Z018 Onsite time: 10/5 M5T Objective: Symple per Sops on page 3 Sampling crew: T. Bonham, M. Shendo, A. Stanfield AT. Vander Vis Weather: Suny & Geor W temps in 46 56's Two-minute safety drill: Histing on more surfaces Meters calibrated at (location) SMO by (wh \_ by (whom) T. Vender V.3 YSI Meter number: 70 Turbidimeter serial number: MA Sample Retrieval Date: Z-8-2018 Method: PP(Filed), Datestine Time: /025 Sample Event ID: //669 Sample ID Numbers: CAWA-18-4, 18-3 \$ 18-91 FIELD PARAMETERS pH (su): 7.75 Sp. Cond. (µS/cm): /43, 4 Turbidity (NTU): 8.6 Temperature (°C): Q. C DO (mg/L): //, 28 Q (gpm): 40.39 Explanation of Q method, including calculations: 3" Maithed Pashan Florie GHT= 0.20'=0.090 CFS X 448.83 = 40.39 GPM Note: To convert cfs to gpm, multiply cfs by 448.83 SITE DESCRIPTION (circle all that apply) Media type: Spring (Baseflow (persistent flow) Sample location: Bank Wading Station Gage: at / above / below Midstream natural feature Other (specify): Had to Break top layer of Ice **Description of** Pool (Riffle) Eddy Diffuse Other Sampling Site: Written description: MA Substrate: <Bedrock> Cobble Concrete Gravel Sand Mud Stage Conditions: Stable normal / low / high Falling Rising Other (specify): **Hydraulic Event:** (Routine Snowmelt Flood Drought Other (specify): Stream Color: Brown Clear Green Blue Gray Other (specify): **Description of** Turbulent (Lamina) Recirculating Stagnant Other flow: Written description: NA **Photos and GPS** GPS point #1: Name: NA Coordinates: Units: GPS point #2: Name: NA Units: // Photo #1: Description: Upgarean Time: 1030 Taken by: Facing: 5W Description: Down Stream Photo #2: Facing: < E Time: Taken by: Photo #3: Description: Symple location Facing: SF Time: V Other notes: Note! MSKINDO conducts HE Spot test; Results - negative Taken by: T. Vandervis Preserves Samples IT. Borham QA's me: 1055 Relinquish samples at SMO, care of M. Englert Offsite time: 1055 Objectives met? Yes

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	6	urning/	Grovi	nd .	DPM.	19			
		7			, ,	J			
		Na/							
			4774	NIII AMARINA					
		#	ATTAC	HMENT 2		Records Use Only			
-	SOP-5224-2	ZV				And have present the series			
	Sr	oring/Surface Wate	er Sampling F	ield Data Sh	eet	Los Alamos			
	01/					and appropriate			
	Site name: B	mple per all o NIT. Borban, A. St afety drill: Hiking	Date: Z-/2	1018	Onsite time:	0925 MST			
	Compliant area	mple per all o	applicable ro	fruccidous.	Weather: Sur	my A Clarw/tomps in to			
	Two-minute es	afoty drill: //:	ocher at D.	1000110	N 2				
16/	Meters calibra	ited at (location)	SMO by	(whom) _ (C.)	PPE	at (time) 26/5			
	YSI Meter num			er serial numb		at (unite) 2023			
	Sample Retrie			Time: 093		od: PP			
	and the second second	Sample Retrieval         Date: Z-/o - 20/8         Time: G935         Method: P/P           Sample Event ID: 1/669         Sample ID Numbers: CAWA-18-10, 18-19 & 18-93							
		FIELD PARAMETERS							
	pH (su): 7.5			Sp. Cond. (μS/cm): 203,6 Turbidity (NTU): 2,3					
		7	Sp. Cond. (	μS/cm): ΖΩΞ	える Tui	bidity (NTU): Z 3			
			Sp. Cond. ( DO (mg/L):	µS/cm): 203 8,41	<i>3,6</i> Tui Q(	bidity (NTU): Z, 3 gpm): 4, 2%			
	Temperature (° Explanation of	C): /の こ Q method, including ca	DO (mg/L): culations:	8,41	2, 6 Tui				
	Temperature (° Explanation of	C): /の こ Q method, including ca	DO (mg/L): culations:	8,41	2,6 Tui				
	Temperature (° Explanation of	C): 10. Z	DO (mg/L): culations:	8,41	Q (				
	Temperature (° Explanation of	C): /の こ Q method, including ca	DO (mg/L): culations:	28gal	Q (	gpm): 4,2%			
	Temperature (° Explanation of	C): $IC$ . $Z$ Q method, including ca $6 = \frac{16.ZL}{im.n} \times \frac{1}{3}$	DO (mg/L):  culations:	28gal	Q (  Note: To conve	gpm): 4,2%			
	Temperature (° Explanation of © 2.8 L //0 sec	C): $IQ$ . $Z$ Q method, including ca $6 = \frac{16. ZL}{Imin} \times \frac{1}{3}$	DO (mg/L):  culations:	28gal	Q (  Note: To conve  apply)  Basefi	gpm): 4, Z & rt ofs to gpm, multiply ofs by 448.83			
	Temperature (° Explanation of 0  2.8 \( \text{L} \)  /0 sec \( \text{Media type:} \)	C): $IQ$ . $Z$ Q method, including ca $6 = \frac{I6.ZL}{Imin} \times \frac{I}{Imin}$ on:  Bar  Midstream	DO (mg/L):  culations:	8,41 Z8gal) N (circle all that a	Q (  Note: To conve  apply)  Basefi	gpm): 4, Z &  It ofs to gpm, multiply ofs by 448.83  ow (persistent flow)			
	Temperature (° Explanation of 0  2.8 L  /0 sec ×  Media type: Sample location  Description of	Q method, including ca $6 = \frac{16.7 L}{imin} \times \frac{1}{imin}$ on: Bar Midstream	DO (mg/L):  culations:   SITE DESCRIPTION   Spring   Particular     Riffle   Riffle   Particular     R	8, 41  Z8gal  N (circle all that a  Wading Other (spe	Note: To conve	gpm): 4, Z &  It ofs to gpm, multiply ofs by 448.83  ow (persistent flow)			
	Temperature (° Explanation of © 2.8 \( \text{L} \)  Media type:  Sample location  Description of Sampling Site:	C): $O$ : $O$	DO (mg/L):  culations:	N (circle all that a Wading Other (speed Soul Sou	Note: To conve	gpm): 4, 2 %  It ofs to gpm, multiply ofs by 448.83  low (persistent flow)  Gage: at / above / below  iffuse Other			
	Temperature (° Explanation of 0 2.8 L //0 sec  Media type: Sample location Description of Sampling Site: Substrate:	C): $O$ : $C$	DO (mg/L):  culations:	N (circle all that a Wading Other (spee	Note: To conve	gpm): 4, Z &  Int ofs to gpm, multiply ofs by 448.83  low (persistent flow)  Gage: at / above / below  iffuse Other  Sand Mud			
	Temperature (° Explanation of 0  2.8 L  /0 sec ×  Media type: Sample location  Description of Sampling Site: Substrate: Stage Condition	Q method, including ca $6 = \frac{16.7L}{lmin} \times \frac{1}{lmin}$ on: Bar Midstream Pool Written descript Bedrock ons: Stable: pormal	DO (mg/L):  culations:  SITE DESCRIPTION   Spring     Riffle     Riffle     Concrete     low / high	Wading Other (spe Ed Cool @ Sov Cobble Falling	Note: To conve	gpm): 4, Z &  Int ofs to gpm, multiply ofs by 448.83  low (persistent flow)  Gage: at / above / below  iffuse Other  Sand Mud  Other (specify):			
	Temperature (° Explanation of ©  2.8 L  / 0 see ×  Media type: Sample location  Description of Sampling Site: Substrate: Stage Condition Hydraulic Ever	Q method, including ca $6 = \frac{16.71}{imin} \times \frac{1}{imin} \times$	DO (mg/L):  culations:  SITE DESCRIPTION  Spring   Riffle    Concrete    Low / high    Snowmelt	Wading Other (spe Ed Cobble Falling Flood	Note: To conve	gpm): 4, Z &  Int ofs to gpm, multiply ofs by 448.83  Int of specify into the specific speci			
	Temperature (° Explanation of 0  2.8 L  /0 sec  Media type: Sample location  Description of Sampling Site: Substrate: Stage Condition  Hydraulic Events  Stream Color:	Q method, including ca $6 = \frac{/6.7L}{im.n} \times \frac{1}{100}$ on: Bar Midstream Pool Written descript Bedrock ons: Stable: porma nt: Routine Brown	DO (mg/L): culations: SITE DESCRIPTIO Spring natural feature Riffle ion: Smill J Concrete low / high Snowmelt Clear Gr	N (circle all that a  Wading Other (spe Ed Cool Sov Cobble Falling Flood een Blue	Note: To conve	gpm): 4, Z &  Int ofs to gpm, multiply ofs by 448.83  Int ofs to gpm, multiply ofs by			
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	Temperature (° Explanation of 0  2.8 \( \)  Media type:  Sample location  Description of Sampling Site:  Substrate:  Stage Condition  Hydraulic Events  Stream Color:  Description of flow:  GPS point #1:  GPS point #2:	Q method, including ca $6 = \frac{6 \cdot 7 \cdot 7}{im \cdot n} \times \frac{6 \cdot 7}{im \cdot$	DO (mg/L):  culations:  STE DESCRIPTION  Spring   Mail   Spring   Concrete   Riffle    Indicate   Showmelt    Clear   Graminal    Clear   Graminal    Coordinates	N (circle all that a  Wading Other (spe Ed Cool & Sov Cobble Falling Flood een Blue Recircul	Note: To conve	gpm): 4, Z &  Int ofs to gpm, multiply ofs by 448.83  Int ofs to gpm, multiply ofs to gpm, multiply ofs by 448.83  Int ofs to gpm, multiply ofs to gpm, multiply ofs b			
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	Temperature (° Explanation of © 2.8 L // Sec  Media type: Sample location  Description of Sampling Site: Stage Condition Hydraulic Even Stream Color: Description of flow:  GPS point #1: GPS point #2: Photo #1: Photo #2:	C): / C Z  Q method, including ca  6 = \frac{16.7 L}{im.n} \times  6 = \frac{16.7 L}{im.n} \times  Midstream  Pool  Written descript  Bedrock  Ons: Stable: pormal  nt: Routine  Brown  Turbulent  Written descript  Name: \frac{1}{1000}  Description: Alove  Description: Source	DO (mg/L):  culations:  STE DESCRIPTION  Spring    Concrete     Riffle     Concrete     Iow / high     Snowmelt     Clear   Graminar     Coordinates     Coord	N (circle all that a Wading Other (speed Sour Cobble Falling Flood Recircular Recircular Facing: SW Facing: SW Facing: SW	Note: To conve	gpm): 4, 2 %  Int ofs to gpm, multiply ofs by 448.83  Int ofs to gpm, multiply ofs to gpm,			
	Temperature (° Explanation of © 2.8 \( \)  Media type:  Sample location  Description of Sampling Site:  Stage Condition  Hydraulic Event Stream Color:  Description of flow:  GPS point #1:  GPS point #2:  Photo #1:  Photo #2:  Photo #3:	C): / C Z  Q method, including ca  6 = 16.7 L  im.n  Midstream  Pool  Written descript  Bedrock  Ons: Stable: gormal  Turbulent  Written descript  Written descript  Name: MA  Name: Description: Source  Description: Source  Description: Source	DO (mg/L):  culations:  STE DESCRIPTION  Spring    Spring    Spring    Riffle     Riffle     Concrete     Snowmelt     Clear   Graminal     Coordinates     Coordinates     Source     Source	N (circle all that a Wading Other (specific production) SOV Cobble Falling Flood Recircular Recircular Facing: SW Facing: SW Facing: SW Facing: ME	Note: To conve	gpm): 4, 2 %  Int ofs to gpm, multiply ofs by 448.83  ow (persistent flow) Gage: at / above / below  iffuse Other  Sand Mud Other (specify): Other (specify): Other (specify): gnant Other  Units: MA Units: Taken by: Taken by: Taken by: Taken by:			
	Temperature (° Explanation of 2.8 L //0 sec  Media type: Sample location Description of Sampling Site: Stage Condition Hydraulic Evel Stream Color: Description of flow:  GPS point #1: GPS point #2: Photo #2: Photo #3: Other notes:	C): / C Z  Q method, including ca  6 = \frac{16.7 L}{im.n} \times  6 = \frac{16.7 L}{im.n} \times  Midstream  Pool  Written descript  Bedrock  Ons: Stable: pormal  nt: Routine  Brown  Turbulent  Written descript  Name: \frac{1}{1000}  Description: Alove  Description: Source	DO (mg/L):  culations:  STE DESCRIPTION  Spring    Concrete    Con	N (circle all that a Wading Other (specification) Sov Cobble Falling Flood een Blue Recircular and GPS  Facing: 3W Facing: 5W Facing: NE D. Saranian,	Note: To conve	gpm): 4, 2 %  Int ofs to gpm, multiply ofs by 448.83  Int ofs to gpm, multiply ofs to gpm,			

4			ATTACH	MENT 2		Records Use Or	nly
1					"	Records osc or	
1	SOP-5224-2			d Data Sheet		Los Alamos	
	Sprin	g/Surface Water	Sampling Fiel				
	Site name: "	utin Sean	Date: 7	2 1111	site time:	My 700	~
page-		note mixtin	52045 7		ather: 50	nny cos	5
	Sampling crew:	T. Vande-Vis	W. Sovne		cun. Il		
	Two-minute safety	drill: 100 on	ever succe	nom) _T (kn	elle Vis	<b>at</b> (time)	730
		at (location) 5 m	Turbidimeter	serial number:	20		
	YSI Meter number	: 60 Date: 2 23		Time: 10 15	Method	1: PP	17
	Sample Retrieval Sample Event ID:		ample ID Numbe		11,12,94		
	Sample Event ID.	100	FIELD PAF	AMETERS		# 44 PT 15	1
	pH (su): 6.8			S/cm): 350,	y .	dity (NTU): 3	
	Temperature (°C):	7 3	DO (mg/L):	7.91	Q (gr	om): 0.82	50-
	Explanation of Q J	nethod, including calc	culations: Men	steel man	nuly wit	2 graduate	-
	from war t	ook Der 20sec ) (3) =	نك : 4 بالـ 3)	1852) = O	82 gpm	cfs to gpm, multiply	cfs bv 44
	(1,0300)			,,,,,	Note: 1 o conveit	ore to abust underby	1 5 1 10
v.			SITE DESCRIPTION	(circle all that app	Donoflo	w (persistent flo	ow)
-	Media type:		(Spring)	Wading	Station (	Gage: at / abo	ve / be
	Sample location	Banl		Other (specif		rbox	
			natural feature Riffle	Eddy	Di	ffuse C	Other
10-	Description of	Pool					
		Mitton descripti					Mud
	Sampling Site:	Written descripti		Cobble	Gravel	Sand	- 177
	Sampling Site: Substrate:	Bedrock	Concrete		Gravel Rising	Other (specify	
	Sampling Site: Substrate: Stage Condition	Bedrock s: Stable normal	Concrete	Cobble		Other (specification)	y): N
-	Sampling Site: Substrate: Stage Condition Hydraulic Even	Bedrock s: Stable normal	Concrete Low / high Snowmelt	Cobble Falling	Rising Drought Gray	Other (specification) Other (specification)	y): 10/ fy): 10/
II	Sampling Site: Substrate: Stage Condition Hydraulic Even Stream Color:	Bedrock s: Stable normal /	Concrete Now / high Snowmelt	Cobble Falling Flood	Rising Drought Gray	Other (specification)	y): N
	Sampling Site: Substrate: Stage Condition Hydraulic Even	Bedrock Stable normal / Courtine Brown	Concrete  Now / high Snowmelt Clear Gr Laminar	Cobble Falling Flood een Blue Recirculat	Rising Drought Gray	Other (specification) Other (specification)	y): 10/ fy): 10/
	Sampling Site: Substrate: Stage Condition Hydraulic Even Stream Color: Description of	Bedrock Stable normal / Executive Brown Turbulent	Concrete  Now / high Snowmelt Clear Gr Laminar tion: Vr	Falling Flood een Blue Recirculat	Rising Drought Gray ing Sta	Other (specification) Other (specification) Other (specification) Grant	y): 10/ fy): 10/
	Sampling Site: Substrate: Stage Condition Hydraulic Even Stream Color: Description of	Bedrock Stable normal / Executive Brown Turbulent	Concrete  Now / high Snowmelt Clear Gr Laminar tion: Wr Photo	Cobble Falling Flood een Blue Recirculat s and GPS	Rising Drought Gray	Other (specification) Other (specification)	y): 10/ fy): 10/
	Sampling Site: Substrate: Stage Condition Hydraulic Event Stream Color: Description of flow:	Bedrock Stable normal / Countine Brown Turbulent Written descript Name: Name:	Concrete  I low / high  Snowmelt  Clear Gr  Laminar  tion: VY  Photo  Coordinate	Cobble Falling Flood een Blue Recirculat s and GPS S: 2 2	Rising Drought Gray ing Sta	Other (specification)	y): Mayor IV Other
	Sampling Site: Substrate: Stage Condition Hydraulic Event Stream Color: Description of flow:  GPS point #1:	Bedrock Stable normal / Exercise Brown Turbulent Written descript Name: Description:	Concrete  I low / high  Snowmelt  Clear Gr  Laminar  tion: Wr  Photo  Coordinate	Cobble Falling Flood een Blue Recirculat s and GPS s: Facing: N	Rising Drought Gray ing Sta	Other (specification)	y): <i>M</i> - y): <i>IU</i> Other
	Sampling Site: Substrate: Stage Condition Hydraulic Event Stream Color: Description of flow:  GPS point #1: GPS point #2: Photo #1: Photo #2:	Bedrock Stable normal / E: Routine Brown Turbulent Written descript Name: Description: Sour Description: O P 5	Concrete  Tow / high  Snowmelt  Clear Gr  Laminar  tion: Wr  Photo  Coordinate  vice	Falling Flood een Blue Recirculat s and GPS s: Facing: No.	Rising Drought Gray ing Sta  700 18  Time: 1040 Time: 1041	Other (specification)	y): Nh fy): IU Other
	Sampling Site: Substrate: Stage Condition Hydraulic Event Stream Color: Description of flow:  GPS point #1: GPS point #2: Photo #1: Photo #2:	Bedrock Stable normal / E: Routine Brown Turbulent Written descript Name: Description: Sour Description: O P 5	Concrete  Tow / high  Snowmelt  Clear Gr  Laminar  tion: Wr  Photo  Coordinate  vice	Falling Flood een Blue Recirculat s and GPS s: Facing: No.	Rising Drought Gray ing Sta  700 18  Time: 1040 Time: 1041	Other (specification)	y): Nh fy): IU Other
	Sampling Site: Substrate: Stage Condition Hydraulic Event Stream Color: Description of flow:  GPS point #1: GPS point #2: Photo #1: Photo #2:	Bedrock s: Stable normal / E: Routine Brown Turbulent Written descrip  Name: Description: Soun Description: Description:	Concrete  Tow / high  Snowmelt  Clear Gr  Laminar  tion: Nr  Photo  Coordinate  vice  trein  Telen  Yeld no	Facing: W Facing: SE  Cobble  Falling  Flood  Recirculat  Sand GPS  S:  Facing: W Facing: W Facing: SE	Rising Drought Gray ing Sta  70 18  Time: 1040 Time: 1041 Time: 1041 Time: 540	Other (specification)	y): Nh fy): IU Other
	Sampling Site: Substrate: Stage Condition Hydraulic Event Stream Color: Description of flow:  GPS point #1: GPS point #2: Photo #1: Photo #3: Other notes:	Bedrock  Is: Stable normal /  Executine  Brown  Turbulent  Written descript  Name:  Description: San  Description: Dat  He spot tost  and same	Concrete  Tow / high  Snowmelt  Clear Gr  Laminar  tion: Nr  Photo  Coordinate  vice  trein  Telen  Yeld no	Facing: W Facing: SE  Cobble  Falling  Flood  Recirculat  Sand GPS  S:  Facing: W Facing: W Facing: SE	Rising Drought Gray ing Sta  70 18  Time: 1040 Time: 1041 Time: 1041 Time: 540	Other (specification)	y): Nh fy): IU Other
	Sampling Site: Substrate: Stage Condition Hydraulic Event Stream Color: Description of flow:  GPS point #1: GPS point #2: Photo #1: Photo #2: Photo #3: Other notes:	Bedrock  S: Stable normal /  E: Routine  Brown  Turbulent  Written descrip  Name:  Description: Sam  Description: OS  Description: DS  Relinqu  Relinqu	Concrete  Tow / high  Snowmelt  Clear Gr  Laminar  tion: Wr  Photo  Coordinate  vice	Facing: W Facing: SE  Cobble  Falling  Flood  Recirculat  Sand GPS  S:  Facing: W Facing: W Facing: SE	Rising Drought Gray ing Sta  70 18  Time: 1040 Time: 1041 Time: 1041 Time: 540	Other (specification)	y): Nh fy): IU Other
	Sampling Site: Substrate: Stage Condition Hydraulic Event Stream Color: Description of flow:  GPS point #1: GPS point #2: Photo #1: Photo #3: Other notes:	Bedrock  S: Stable normal /  E: Routine  Brown  Turbulent  Written descrip  Name:  Description: Occupation: Occupa	Concrete  Tow / high  Snowmelt  Clear Gr  Laminar  tion: Nr  Photo  Coordinate  vice  trein  Telen  Yeld no	Facing: W Facing: SE  Cobble  Falling  Flood  Recirculat  Sand GPS  S:  Facing: W Facing: W Facing: SE	Rising Drought Gray ing Sta  70 18  Time: 1040 Time: 1041 Time: 1041 Time: 540	Other (specification)	y): Nh fy): IU Other
	Sampling Site: Substrate: Stage Condition Hydraulic Event Stream Color: Description of flow:  GPS point #1: GPS point #2: Photo #1: Photo #2: Photo #3: Other notes:	Bedrock  S: Stable normal /  E: Routine  Brown  Turbulent  Written descrip  Name:  Description: Sam  Description: OS  Description: DS  Relinqu  Relinqu	Concrete  Tow / high  Snowmelt  Clear Gr  Laminar  tion: Nr  Photo  Coordinate  vice  trein  Telen  Yeld no	Facing: W Facing: SE  Cobble  Falling  Flood  Recirculat  Sand GPS  S:  Facing: W Facing: W Facing: SE	Rising Drought Gray ing Sta  70 18  Time: 1040 Time: 1041 Time: 1041 Time: 540	Other (specification)	y): Nh fy): IU Other
	Sampling Site: Substrate: Stage Condition Hydraulic Event Stream Color: Description of flow:  GPS point #1: GPS point #2: Photo #1: Photo #2: Photo #3: Other notes:	Bedrock  S: Stable normal /  E: Routine  Brown  Turbulent  Written descrip  Name:  Description: Sam  Description: OS  Description: DS  Relinqu  Relinqu	Concrete  Tow / high  Snowmelt  Clear Gr  Laminar  tion: Nr  Photo  Coordinate  vice  trein  Telen  Yeld no	Facing: W Facing: SE  Cobble  Falling  Flood  Recirculat  Sand GPS  S:  Facing: W Facing: W Facing: SE	Rising Drought Gray ing Sta  70 18  Time: 1040 Time: 1041 Time: 1041 Time: 540	Other (specification)	y): Nh fy): IU Other
	Sampling Site: Substrate: Stage Condition Hydraulic Event Stream Color: Description of flow:  GPS point #1: GPS point #2: Photo #1: Photo #2: Photo #3: Other notes:	Bedrock  S: Stable normal /  E: Routine  Brown  Turbulent  Written descrip  Name:  Description: Sam  Description: OS  Description: DS  Relinqu  Relinqu	Concrete  Tow / high  Snowmelt  Clear Gr  Laminar  tion: Nr  Photo  Coordinate  vice  trein  Telen  Yeld no	Facing: W Facing: SE  Cobble  Falling  Flood  Recirculat  Sand GPS  S:  Facing: W Facing: W Facing: SE	Rising Drought Gray ing Sta  70 18  Time: 1040 Time: 1041 Time: 1041 Time: 540	Other (specification)	y): Nh fy): IU Other



Manual Groundwater Level Measurements

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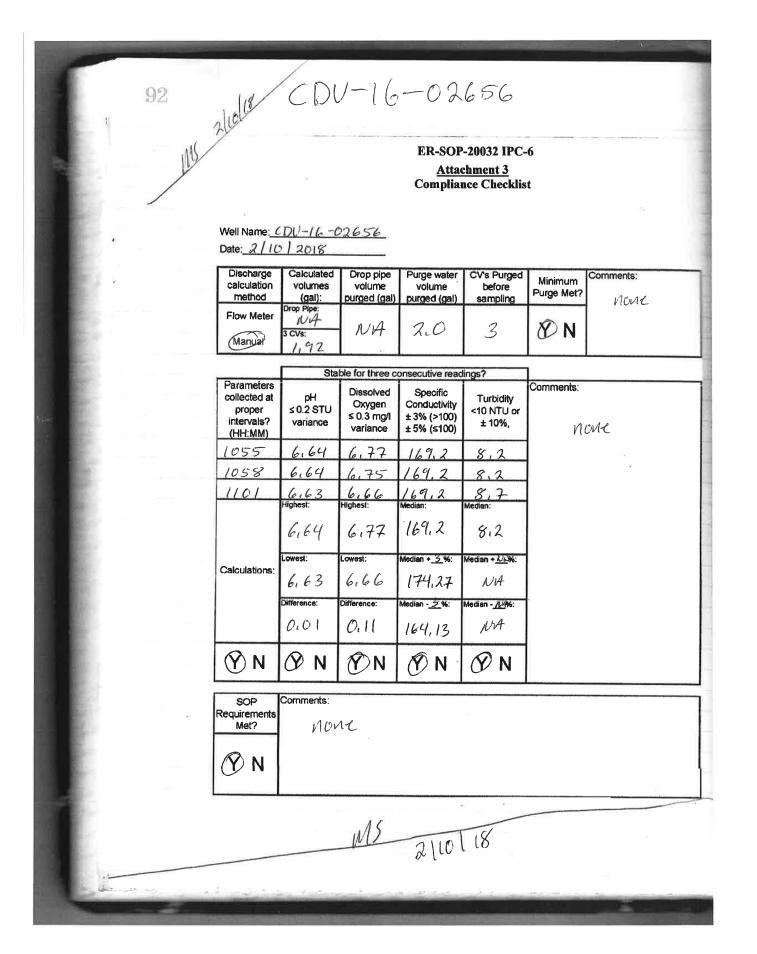
### **ATTACHMENT 1**

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### **Groundwater Level Field Form**

-							
PART 1 Well Si	te information						
Well Name	do	Z-Z-Z018	Time onsite (MST)	Activity			
FLC-16-	75780	2-6-6018	0850	Presweep			
Personnel T. Bowh	Pull Transduce	New Transducer Need	M. Shendo	Cable Longiliuft)	Cable SN: 236867 Batte y % remaining:		
Telemetry: Yes \ No	Pull Transduce V	New LT SN:	NA	Memory % remaining:	Batte y % remaining.		
Connect Time:		New LT PSI Rating:	Manufacture Date	Log Note Memory %	I og Note Battery %		
0855	473706	NA	MA	NA	20		
Water Level (ft)		P (ps:):	TICI	Stop Test: Yes No	Change Desicant		
0.05'		50.0	4.70		YES I NO I NA		
Last Start Date:	NA	Data File Name:	NA				
PART 2: Manual N							
Measuring Point	TOCATOP outer cas		Stick-up Measured on Site	Previous MP Us	sed 🔀		
	0855	Water Level Meter St		Notes:			
Time (MST)	2023	39	243	DTW = Dry to TD@ 7.29'850			
DTW (ft bMP)	7. 29 BTOC	Measu	rements in feet	Div			
Time (MST)	0858	I.SD ft	7352.9 ms1				
DTW (A PWE)	7.29 BTOL	MP Height fi	2.00				
Time (MST)	2.2013	MP Elevation	the same of the sa				
DTW (8 6MP)	2	DTW	- 7.29 BTIL				
Time (MST)	0858 7.29'BTOC	Groundwater Elevation (GWE) Reference Level					
<u> </u>	7.00	Zip Tie on Kellim's Grip	The second secon				
Transducer Perform	nance and Programming				*		
Part 3 Transducer	ErronDrift Acceptance		Part 4: Programming & Fina Readings				
Wt. Reading Time (MST)	91	Progamming Time		Time (MST)	Reading		
Wt. (transducer reading) (ft).		New Fest Name		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	The desired		
GWE from MM		Reference Level		11/1			
Difference in value.		Current Cepth		11/11			
Error tolerance of transducer:		Meas Interval	2.2.10	10/			
C natationaries	ng 1847 m	Start Date:	200				
The expectation	6-7-1	Start Time			Save from Washington		
15 PSI-0.03ft 30 Deleted Tests:	PSI-0,07 N. 100 PSI-0.	23 R 500 PSI-1,16 1.	Synch Cleaks, Yes 1 No		producedly about 1 and 1		
					QA. Date and install		

2/10	18	(	CDV	-16	- 0	8	265	6		91	
/	(4)		Gro	undwat	er Samp	lir	ng Log				- 1
	1:2018			13,18 NA		_	Well Diamet	er: 2 en: 5,30	nches n LTac	Date: 2/10/2018 Notes: Pruyp off	F
	water V-16-C	100	Water Level: *TD: //	0 6 50				creen: 1/10	n.6 For		- 1
ampling D	evice: P	P	*DTW: 🥳	7.02'	btoc_	-	Water Colu		ft, gal.	Packer Pressure	
	Point: 6		Drop Pipe:	NIA	9	_	1CV: 3CV:	0.69		Before: Ni4 psi	- 1
	BTIC / BG			Note N	/IP height (sti	cku	p) of TOC/TI	C for Alluviais	2.30 ft.	Actuation: 1014 psi	- 1
DTW = (L	SD - Water	Level)Wa	ater Column = = (Water Colum	(TD - DTW)	Drop Pipe	B =	(TD/Pump in	take x Drop Pipe (1CV x 3)	Diameter	Opening: NA psi After: NA psi	
IJME UST/DST		TEMP	SPEC COND µs/cm	DO mg/l	Turb NTU	HOF	ORP	Water Level*	Discharge Rate	NOTES	
Stability:	≤ 0.2 STU variance	*C	± 3% (>100) ± 5% (≤100)	≤ 0.3 mg/l variance	<10 or ± 10%	Yes of No	mV	n. <u>570c</u>	(GPM)	NOTES	
in act	$\Omega$	- 614	1, ,,,1	uc L		Г	face				-
1028 1029	Pum 7,56		168,6	7.20			183,2	7,85	0,085	water cloudy odorless	
1031	7.07		169,3	7,34	19.0	N	185,9	7,87	0,085		1.7
1034		5,3	168.5	6.92		Г		8,02	0.085		
	6.68	5,3	168,5	6,90	14.5	W	183.9	8,45	0.085	-	- 1
				6,89		Τ.	183, 7	8,60	0,085		- 3
1039	Ι.	5,3	168,5			Т					
1042	6.66	5.4	168,5	6,83	1419 Time	N	183,2		0,085		- 7
1042	Pum	pott	/ Reclu	erge	10.45	L	Runp	in		wester slightly	
1045	6.66	5,4	169,0	6,92	10.0	N	179,9	8,19	0.679	cloudy adorless	
	6.65		169.1			Т	180.9		0.079		
1051	6,64		168.9	6,73			181,6	8,65	0,079		
1051	_	IP off	100		Time 1055	1	Pumi	on			_ 1
		1		1			181,3	8,03	0,070	Particulate odorless	1 1
	6.64	6.1	169.2			Ť		8,34ms			
1058	6.64	5,4	169,2	6.75		12	181.7				1 3
1101	6.63	5,4	169,2	6,66	8,7		189.9	8,60	0.07	9 1	-14
1108	Sta	It So	umplin	7	1240		Sam	ling lo	mple		
Yes in HA	CH column	= HACH Turk	oidimeter #_IVI	used becau	ise NA				Final Wat		
Contact V		1/2 2.0	gal	Drum#:	Munic NH/NR	H	E		*Purge:	Formation water purged prior to	1
*Purge W	ater: ite Water:	2.1	ga	ID:	0980		155090	d Tunk	sampling sampling	(excluding drop pipe water and water)	



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ATTACHMENT 1
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Groundwater Level Field Form

PART 1: Well St	a Information	A State of the state of	s and the second		
Well Name CDV-/6- Personnel:	02656	Date: 2110/18	Time onsite (MST): 9:14 Am	Samplines	
Personnel:	La LT	J. MiShene	1	Cable Length(ft):	Cable SN
Telemetry:	Pull Transducer Yes \ NO	New Transducer Needs		ID f4 Memory % remaining:	330670 Battery % remaining:
Connect Time:	Transducer SN:	New LT PSI Rating:	Manufacture Date:	NA- Log Note Memory %	93% Log Note Battery %
9:14	472136	NH	NA	NA	NA
Water Level (ft) 7438,19 ms Last Start Date:		P (psi): 1, 7, Data File Name: W	T (C)	Stop Test: Yes (No)	Change Desicant: Yes \
Last Start Date:	Δ.	Data File Name:	A		XX.000.0000000000000000000000000000000
PART 2: Manual M		SUCCESSION ASSESSMENT OF AN		a we many the residency	And the second second second
	(TOC)(top outer cas	ing) TIC (inner)	Stick-up Measured on Site	Previous MP U	sed
Time (MST):	9:25	Water Level Meter Se 3424		Notes:	
OTW (ft.bMP);	7.02 600	Measur	ements in feet	NA	
Time (MST)	9:28	LSDft	7443,18 ms)	W	
DTW (ft bMP):	7,02 btoc	MP Height ft.	+ 2.30	*** **********************************	
Time (MST)	Watel	MP Elevation	= 7445, 48		
DTW (R BMP):	211	DTW:	= 7,026toc		
Time (MST).	9130 <del>\$120</del>	Groundwater Elevation (GWE)			
10 (ILDINIF)	11,0	Reference Level Zip Tie on Kellim's Grip	: NO		
Transdacer Renform	ance and Programming	1.00-0.00			
Parl 3: Transducer f	FronDrift Acceptance	O Solidar III Company	Part 4: Proc	ramming & Final Readings	
WL Reading Time (MST).		Progamming Time:		Time (MST)	Reading
WL (Iransducer reading) (ft).		New Test Name:		2 M (	
GWE from MM		Reference Level :			
Difference iπ value:		Current Depth:	1/5		
Error tolerance of transducer:		Meas Interval	2/10/	10	
Uverbun Error Toler	ides	Start Date:			
[ ] Netsidi EnerTale	nivos	Start Time	14		
15 PSI-0.03t. 30 Deleted Tests:	PSI-0.07 R. 100 PSI-0.	23 ft. 500 PSI-1.16 ft.	Synch Clocks: Yes \ No		QA Date and Initial

Manual Groundwater Level Measurements

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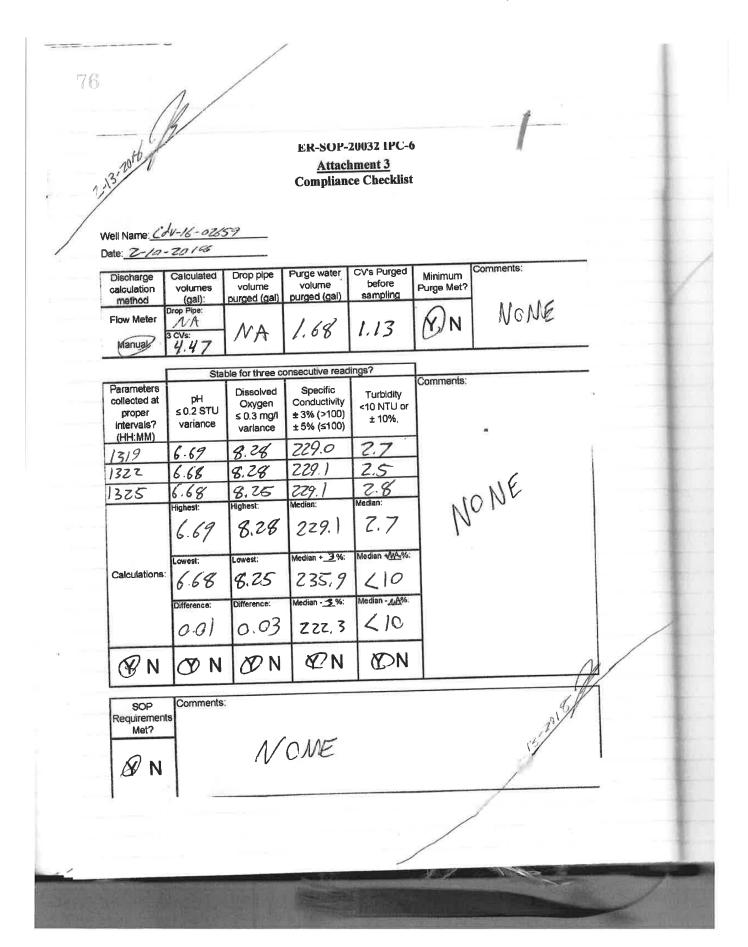
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### **ATTACHMENT 1**

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#### **Groundwater Level Field Form**

PART 1: Well S	te Information	7 7 7			
Well Name		Date:	Time onsite (MST):	Activity	
Cdv-16.00	1657c	2-10-2018	1035	I Checks	
Demograph:		.,		Cable Length(ft):	Cable SN
T. Bon	am, A. Sto	ever & D	. Jaromillo	MA	MA
Telemetry: Yes \ (No)	Pull Transducer	New Transducer Need		Memory % remaining:	Battery % remaining:
	Yes (No)	New LT SN:	MAG	MA	MA
Connect Time:	Transducer SN:	New LT PSI Rating:	Manufacture Date:	ILog Note Memory %	Log Note Battery %
NA	MA	MA	M	MA	MA
Water Level (ft)		P (psi);	T(C)	Stop Test: Yes \(N)	Change Designat:
NA		NA	Mt		Yes I No I NA
Last Start Date:	A	Data File Name:	MA	***************************************	<u> </u>
			///		549
PART 2: Namual N		Sale-day and the sale of the s		THE SECTION OF THE SE	
Measuring Point	TOC (top outer cas		Stick-up Measured on Site	Previous MP L	Ised Z
	1038	Water Level Meter Se		Notes:	
Time (MST)	, 30	342	1/	TO METO	7.20 6TIC
DTM (B blan)	2.20 8776	Measur	rements in feet	10.	1:00 011
DTW (R.bMP):	1.2000	<b></b>			
Time (MST).	1041	LSDft	Nh/	i	
THE GUICIT	/ .	COOK	(1)/		
DTW (R bMP):	7. ZOBTEC	MP Height ft.	44/		
	01/		1971	1	
Time (MST)	1.16/	MP Elevation	/=	1	
	1	1//		1	
DTW (# bMP):		OTW:	•	1	
	MUI			1	
Time (MST).	10 41	Groundwater		l	
TD (ftbMP):	7.20 BILC	Elevation (GWE)		ŀ	
TO ALCOMP L	1000	/ Reference Level	110	ł	
		Zip Tie on Ketilim's Grip	:///7		
AND DESCRIPTION OF THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED I	since and Programming				
Part 3: Transducer	ErronOritt Acceptance	A CONTROL OF THE CONT	Part 4: Pro	gramming & Final Readings	
WL Reading		Progamming Time:			
Time (MST).		roganining rate.		Time (MST)	Reading
WL (transducer		New Test Name:			
reading) (ft).	~				
GWE from MM		Reference Level		Ne -	
Difference in	**************************************			1 111	<del> </del>
value:		Current Depth:	201	A	
Error tolerance		Meas Intervel	2-10-201	11	· · · · · · · · · · · · · · · · · · ·
of transducer:		Magar Informati		//	
Within Error Toler	ror o	Start Date:			
F 1					
Outsido Ener 7ali	Arthur Ca	Start Time			
15 PSI-0.03R. 10	PSI-0.07 M. 100 PSI-0.	23 ft 500 PSL1 (6 t	Synch Clocks: Yes \ No		
Deleted Tests:	/ 307 310.	AND SANT OF LIVE.			QA Date and Initial



Manual Groundwater Level Measurements

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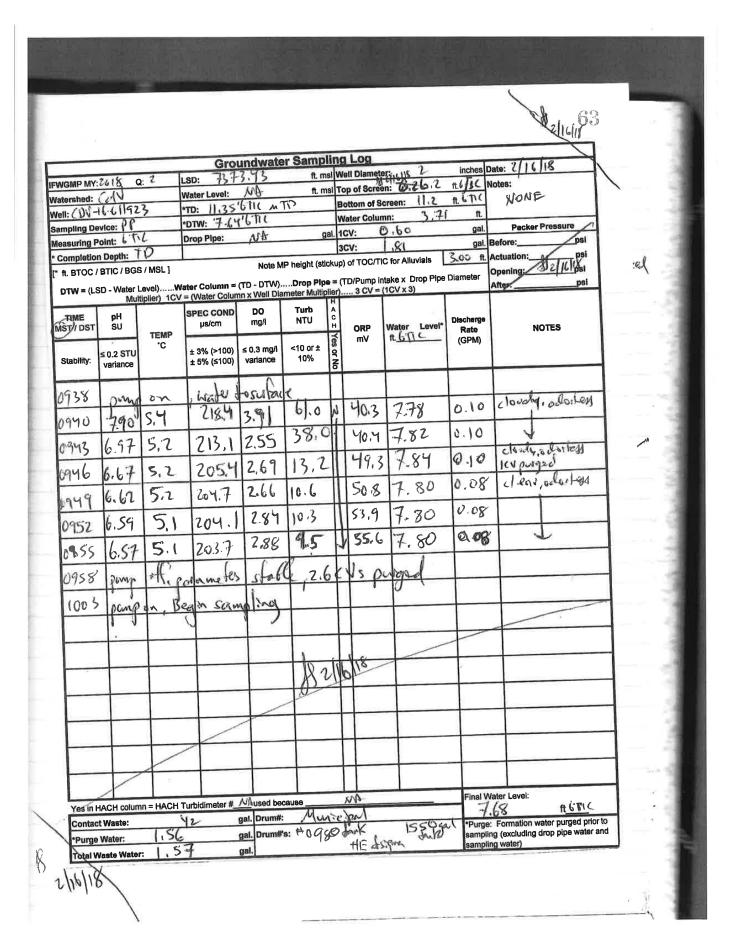
Reference

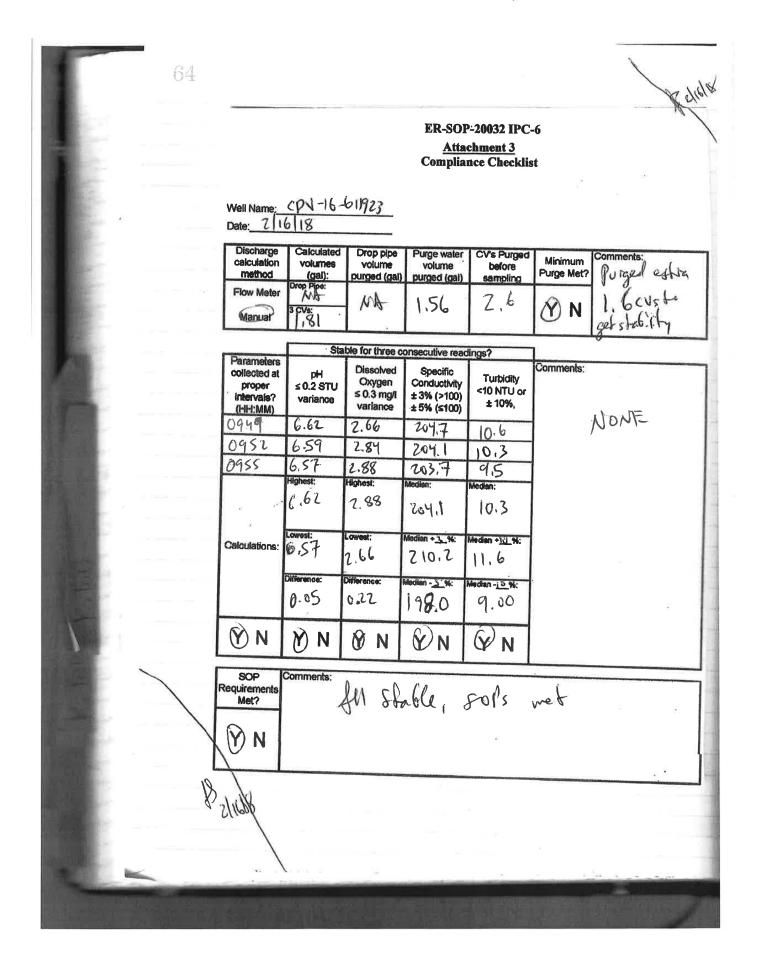
TACHMENT 1

# ATTACHMENT 1 Page 1 of 1

## Groundwater Level Field Form

PART 1: Well SI	la Information	ti er:		4424	- 100 A 100 A		
Well Name		Date:	Time onsite (MST):	Activity			
CdV-16-0	2659	2-10-2018	1230	monual I	Che N		
Damonnal:				Cable Lengthifty:	Ceble SN		
T, Bouh	m, D. Johnis	e & A. Stock	V	Rusto	236863		
Yes \ No	Pull Transducer Yes \ No	New Transducer Neede New LT SN:	A	Memory % remaining:	Battery % remaining:		
Connect Time:	Transducer SN:	New LT PSI Rating:		Log Note Memory %	Log Note Battery %		
1232	38/373	MA	NA	MT	18		
Water Level (ft)		P (psi):	T (C)	Stop Test: Yes \ No \ Change Desicant: Yes \ No \ NA			
7295.17 Lest Start Date:		0.91	5.89		Yes I No I WA		
Lest Start Date:		Data File Name:	MA				
PART 2: Manual M		ar and the second second	///				
	TOC (top outer cas	710.0	lord v				
Measuring Point	TOC (top outer cas	Vivater Level Meter Se	Stick-up Measured on Site	Previous MP U	sed 🔯		
Time (MST)	1254	34244		Notes:			
DTW (ft.bMP):	8.62'STOC	Measur	ements in feet	NONE			
Time (MST).	1257	LSDft	7300.50 msi				
DTW (R bMP):	8.62'6TCK	MP Height ft.	+3.24				
Time (MST)		MP Elevation	=7303.74 msi				
DTW (# bMP):		DTW:	-8.62 btoc				
Time (MST).	1257 10.90'600c	Groundwater Elevation (GWE) Reference Level	7295./2'msi				
to the bland.	10 . 10 Dag	Zip Tie on Kellim's Grip	: N A	1			
Transdatoer Perform	ance and Programming		7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	<del></del>			
AND RESIDENCE OF THE PERSON NAMED IN COLUMN 1	Erron Drift Acceptance	THE RESERVE AND ADDRESS OF THE PARTY.	B-2 ( B-2	gramming & Final Readings			
	The state of the s		ran-aceto	desimand o cher cresondo	<u> </u>		
WL Reading Time (MST).	1535	Progamming Time:		Time (MST):	Reading		
WL (transducer reading) (ft).	7295.12ms	New Test Name:	3h/				
GWE from MM	7295.12 ms1	Reference Level .	18/				
Difference in value:	0.00	Current Depth: 2-10	1				
Error tolerance of transducer:	0.03	Meas Interval					
X waten time toler	ade o	Start Date:					
[] Ostudo En acifal	oritr'ica	Start Time					
15 PSI-0.03t. 30	PSI-0.07 N. 100 PSI-0.	23 ft. 500 PSI-1.16 ft.	Synch Clocks: Yes \ (No)				
5 PSI-0.03ft. 30 PSI-0.07 ft. 100 PSI-0.23 ft. 500 PSI-1.16 ft. SYDOT Clocks: Yes 1 No.   QA Date and Initial   QA Date and Initial							
					1		





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### **ATTACHMENT 1** Page 1 of 1 **Groundwater Level Field Form**

PART TAVELS	tto fojformatjon	Committee of the commit		y toxing:		
Well Name		Dete: 16/18	Time onsite (MST)	ACTIVITY GW San		
Personnel:	focke TVa	webls, D Jan	amillo	Cable Length(ft):	Cable SN:	
relemetry: Yes \ (\)(a)	Pull Transducer Yes \ No	New Transducer Need New LT SN:	led: Yes \ (No)	Memory % remaining: Battery % remaining:		
Connect Time:	Transducer SN:	New LT PSI Rating:	Manufacture Date:	Log Note Memory %	Log Note Battery %	
Vater Level (ft)		P (psi):	T(C)	Stop Test: Yes \ No	Change Desicant: Yes \ No \ NA	
Last Start Date:		Data File Name:	2/16/18			
ART & Migrael S	(easterments					
Measuring Point	TOC (top outer car		Stick-up Measured on Site	Previous MP (	Ised	
ime (MST):	0908	Water Level Meter Se	erial No.	Notes:		
OTW (ft bMP):	7.66 6TIL	Measur	rements in feet			
ime (MST)	0912	LSDft	7373,43			
TVV (R bMP):	7656716	MP Height ft.	+3.00			
ime (MST)	760915	MP Elevation				
TW (# BMP):	7.69 6TIC	DTW:	.7.64			
ime (MST). D (ftbMP):	0918 7.646 TIC	Groundwater Elevation (GWE) Reference Level	1 - 0 - 1			
	V.	Zip Tie on Kellim's Grip	:			
wasdister Perform	med and Programming	-		<u> </u>		
MO. Transcussi I	Front Drift Acceptance	The second second			interesting and the second	
VI. Reading ime (MST).		Progamming Time:	Pastern	palasing & Pent Rendings	T	
VL (transducer sading) (ft).		New Test Name:		Time (MST).	Reading	
WE from MM	·	Reference Level.	Q <sub>0</sub>			
ifference in liue:		Current Diepth:	D 2/16/1	8		
rror tolerance I transducer:		Meas Interval				
Within Remort 1 okes		Start Date:				
Octubs En or Fold	enterioris	Start Time				
PSI-0.00ft. 30 releted Tests:	PSI-0.07 R. 100 PSI-0.	23 R. 500 PSI-1.16 R.	Synch Clocks: Yes \ No			
					QA Date and Initial	

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### **Groundwater Level Field Form**

### Groundwater Level Field Form

PART 1 Well S	ite Information				
Well Name		Date	Time onsite (MST)	Activity	7.00
CdV-16-6	11923	2-2-2018	1006	Presweep	
Personnel*				Cable Lengthift)	Cable SN:
T. Bonhan	M. Shudo, A	Vail & K.T.	ow _	12	227809
Telemetry: Yes \ Ng	Yes \ Mg	New LT SN:	A Yest Wo	Memory % remaining:	Batte y % remaining.
Connect Time:	Transducer SN:	New LT PSI Rating:	Menufacture Date	Log Note Memory %	I og Note Battery %
1007	165/26	NA	NA	MA	18
Water Level (ft)	/	P (ps ):	TICI	Stop Test: Yes (Mo)	Change Desicant
0 49	?	0.71	837		Yes I MO I WA
Last Start Date:	A . A	Dala File Name:			
	NA		NA		
PART 2: Manual N				***************************************	
Measuring Point	TOCKtop outer casi	ng) My(inner)	Stick-up Measured on Site	Previous MP L	lsed 🔀
	TALLEN	Water Level Meter Se	erial No.	Notes:	
Time (MST)	1007	5424	3		0
DTW (ft bMP).	7.80 BTO	Measur	ements in feet	Dry to top of well not	pump but
CALLA SIC DIAN )	TOPER PUMP			Well not	dr/
Time (MST)	10/0	LSD ft	7376. Z3 msi	,	
DTW (A BMP)	7 90'BBC	MP -leight ft.	+000 BTE		
Time (MST)	m/	MP Elevation	=7376.73 msi		
DTW (1 6MP)	7.333	DTW:	-7378.58 MI		
Time (MST)	,	Groundwater Elevation (GWE)			
TO (ICOMP)		Reference Level Zlp Tie on Kellim's Grip	MA		
Transducer Perform	nance and Programming		7,113		
	ErronDrift Acceptance		Pad 4: Pro	gramming & Fina Readings	-
WL Reading					7
Time (MST)		Progamming Time		Time (MST)	Reading
'Nt. (transducer reading) (ft).		New Test Name		14	
GWE from MM		Reference Level	2.2.2014	A Company of the Comp	
Offlerence in value.		Current Depth	2.6		
Error tolerance of transducer:		Meas Interval			
[] Managementary	***	Start Date:			
	k 4 s	Start Time	· · · · · · · · · · · · · · · · · · ·		
15 PSI-0.03R 30 Deleted Tests:	PSI-0.07 R. 100 PSI-0.2	3 R 500 PSI-1.16 1.	Synch Clocks Yes 1 😡		GA Date and Initial
1	AW				Per Cincuru (fi al
					1

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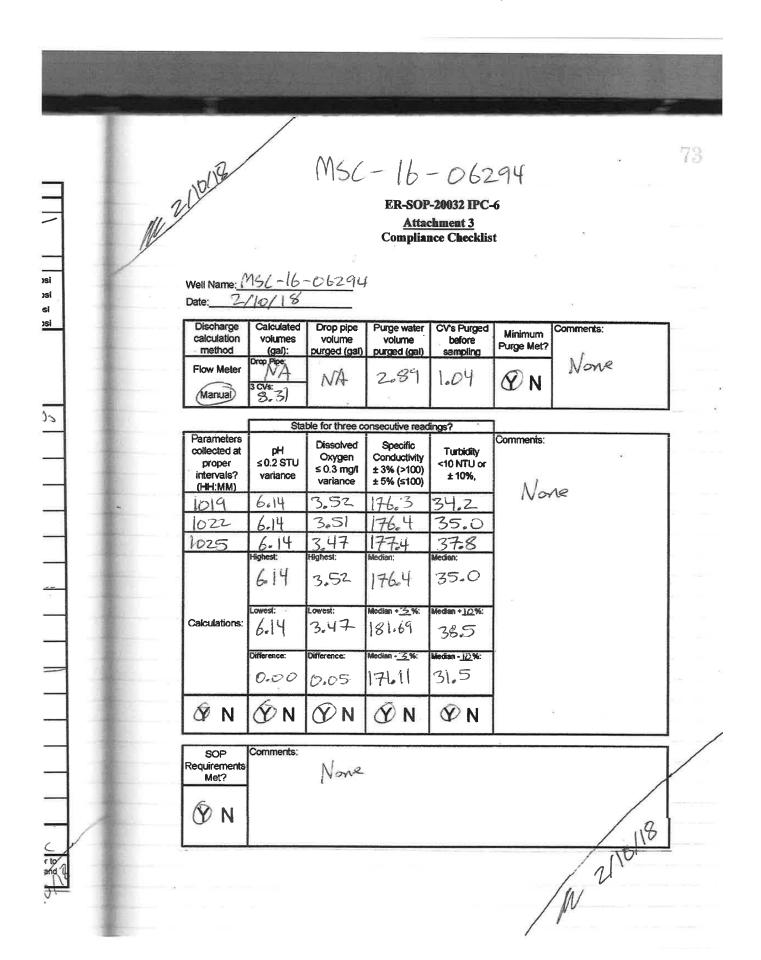
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### **Groundwater Level Field Form**

The same					The state of the s
PART 1 Well SI	te information				
Well Name	1 0/707	Date:	Time onsite (MST)	Activity	
MSC-1	6-66275	2-2-2018	1100	Presiden	
Personnel T. Ponhan	2. A. Vidil A	New Transducer Need New LT SN:	TON	PreSize	Cable SN: 7808
Telemetry: Yes \ Ng	Pull Transduce	New Transducer Need	ed. Yes V Mo	Memory % remaining:	Batte y % remaining.
Yes \ Ng/	Yes \ No	New LT SN:	NA	NA	16
Connect Time: 1/03 Water Level (ft)	Transducer SN: L/94495	New LT PSI Rating:	Manufacture Date	l og Note Mergory %	og Note Pattery %
Water Level (ft)		P (ps:):	TICI	Stop Test: Yes (No)	Change Desicant: Yes \ Wo \ NA
Last Start Date:	2	0.10	6-64		Yes I ON NA
Last Start Date:	AM	Data File Name	MA		
PART 2 Manual N					
Measuring Point	TOC (top outer cas		Stick-up Measured on Site	Previous MP U	sed X
Time (MST)	1103	Water Level Meter Se 34243	rial No.	Notes:	
DTW (ft bMP)	10.40BTE	Measur	ements in feet		
Time (MST)	1106	1,SOft	7370.79/051		
OTW (N BMP)	10.40 BUC	MP Height ft.	+2.578120	NONE	
Time (MST)	2783	MP Elevation	=7373.38m	7 0	
DTW it bMPY	1.1.10	DTW:	- 10.40 BIK		.1
TD (ft bMP)	10.76 BTIC	Groundwater Elevation (GWE) Reference Level	7362,98 msi		
	10.0	Zip Tie on Kellim's Grip	WA		
Transducer Perform	rance and Programming				
Part 3 Transducer I	Erron Drift Acceptance		Part 4 Pro	gramming & Final Residings	
WL Reading Time (MST)		Progamming Time		Time (MST)	Reading
Wf. (transducer reading) (ft).		New Test Name		2//	
GWE from MM		Reference Level	2.2018		
Olfference in value.		Current Depth (	-1-10	7,000	
Error tolerance of transducer:	***	Meas Interval			
G representation		Start Date:		and the second second	
J 40 15 15.19	(III a	Start Time	7		
15 PSI-0.03t 10   Deleted Tests:	PSI-0.07 A. 100 PSI-0.	23 R 500 PSI-1.16 1.	Synch Clocks Yes (No)		CV Day and Day
11	WE	1			GA Date and Initial

10/18	MSC -	16-062	294		
2/10/18		er Sampling Lo		inches Date: 2/	6 (12)
IFWGMP MY: 2018 Q: 2	LSD: 7288,94	the state of the s	meter:	a Paric Notes: LIL	starts
Watershed: Water/CIV Well: MSC-16-06294	Water Level: NA	TIC Bottom	of Screen: D. 57	REDITE IM SCIE	aneol :
Sampling Device: PP	Drop Pipe: NX	Gal 1CV:	2077	gal. Packer	Pressure
Measuring Point: 15TJC		3CV:	8,31	gal Before:	NA psi
(DOC (MC) 1	Note	MP height (stickup) of TO	Ģ. 110 to to t		psi psi
DTW = (LSD - Water Level)W Multiplier) 1CV	/ater Column = (TD - DTW) = (Water Column x Well Di	ameter Multiplier) 3 C	V = (1CV x 3)	After:	V JSI
TIME PH	SPEC COND DO  µs/cm mg/i	Turb A NTU C H ORI		Discharge	IOTES
1EMIP	±3% (>100) ≤ 0.3 mg/l	<10 or ± 0 10% N		(GPM)	
Stability: ≤0.2 STU variance	±5% (≤100) variance	10% S		cloud	y, alorless
0931 7.58 6.3	229.3 4.38	124.8 N-26.	3 7.04	0.05	3,
ALL COLO	11121	surface oumo	anscel to c	ecrolebas	
Note: 0928 Pump	1.3	face a=	0.05 90V	h i	
0929 Pump on	Charles I	1	23 7.67.10	10 DY 6005	y cloudys tess
0934 6.73 5.9		10 17 1	77.18	0.04 Slight	ty cloudys
0937 6.45 5.7	1,00	1. 7	77.29		1
09406345.6	0.0	1	7 7		
09143 6.30 5.6				111	
0946 626 5.5	172.9 4.0		19 7.52		
0949 6.23 5.4	171.5 4.0	2 705 7	7.7.60	+++-	
0452 6.20 5.3	The state of the s	043.0 8	3.9 7.73	1 1	
0955 6.19 5.4		643,3 91	5.3 7.89	0,55	
0958 6.18 5.3		441,5110	3.48.02	11	
1/17/	* 1	1 141	6.8 8.13	0.06	_
	1 11 0 1	1	3.3 8.24		
100 100 10			8.3 8.38		
1007 6.15 5.3			21.9 8.50		V
1010 6.14 5.	Turbidimeter # 1 used b		C18 00	Final Water Level:	n.BTP

	Q: 'Z	LSD:								
		Materia.	0	fl.n		Well Diame		ft.	Date: 2/10/18 Notes: 45/18	
		Water Level:	21/0/10	ILI		Bottom of S	croan:	∌ ft.	Notes: 2/10/18	
		*DTW: ///	7		$\overline{}$		mn:/j/	ft		
		Drop/Pipe:			al.		W.	. gal.		
		/		4D L - : L4 (-4)	-1		C for Allumials		Delierer, T	
									Opening:psi	
SD - Water Mu	Level)Wi	ater Column = = (Water Column	(TD - DTW) nn x Well Dia	Drop Pip ameter Multip	e =	) 3 CV =	(1CV x 3)		After:psi	
pH SU		SPEC COND µs/cm	mg/l	Turb NTU	HACH			Discharge	NOTES	
≤ 0.2 STU variance	*C	± 3% (>100) ± 5% (≤100)	≤ 0.3 mg/l variance	<10 or± 10%	Yes or No	mV	n_BIFC	(GPM)		
6.13	5,3	175,5	3.51	33.2	N		8.62	0.06	Shapitly cloudys	
		175.4	3.48	33.5	1	126.7	8.74			
6.14	5,3	176.3	3.52	342	1	129.7	8.89			
6.14	5,4	176.4	3.51	35.0		131.7	9.07			
6.14	54	177.4	3.47	37.8	1	138.4	9.18	V	V	
D	o Day	10	ILV	ouried		+ pavz	meters	Stall	e	
Duna	o on	Beail	Law	holin	4	1				
112	1	7,0	0		1	co. l	12116	dita	for techovae	
Wel	buse	1 . )	1	1 1	T	1 0	91	1. 1	1 1 1	
WEL	has	not rec	norge	12 per	1	No Ke	ipi crew	1,5001	dolecis	TARK
Por	itize	d sui	te							100
1					1					-
+		+			†					-
-	-	-	-	215	2	+-			1.	-
			2	101	+		1	-		7
		1111		1						Thefar
		1			1					796
1			-		+	+	·			- 3-6
									1	100
				THE RESERVE OF THE PERSON NAMED IN		7 .	7- 1	Final Wa	iter Level:	136
	-		_		0	T		*Purge:	Formation water purged prior to	
ater: ste Water:	2.89	ga		480			901 taylo	sampling	g (excluding drop pipe water and ) water)	
	evice: Point: In Depth: In Depth: In Bric / BG SD - Water Mu PH SU  \$0.2 STU variance  6.13  6.14  6.14  Furn Purn Well Pot	Proint: In Depth: In Depth	Point: Drop & Point: Project Per   Project P	Point: Drop bipe:  In Depth:  IN BTIC / BGS / MSL ] Note M  SD - Water Level)Water Column = (TD - DTW)  Multiplier) 1CV = (Water Column x Well Die  PH SU TEMP  SO 2 STU variance  \$\frac{\pmathbb{2}{3}\pmathbb{3}}{175.5} \frac{3}{3.5}	Proint: Drop Spe: Special Spec	Point:	Point: Drop Fipe: gal. 1CV: 3cV: // In Depth:	Point: Drop Spe: gal. 10V: 30V: In Depth: Multiplier) 1CV = (Water Column x Well Diameter Multiplier) 3 CV = (1CV x 3)  PH SU	Propriet:    Dropriet:   Drop	Water Column



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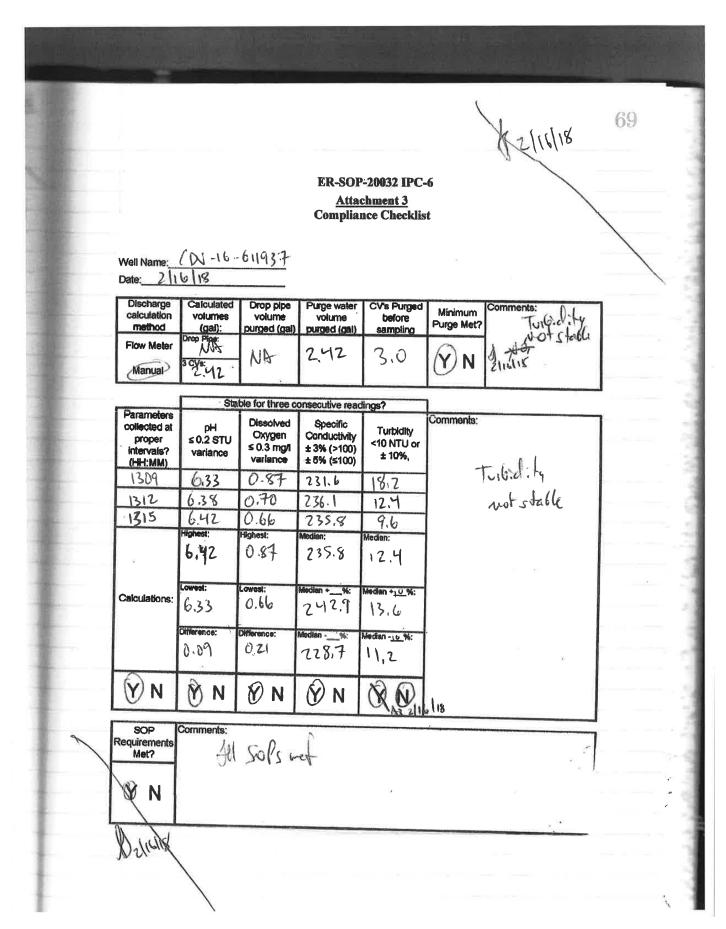
### ATTACHMENT 1

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### **Groundwater Level Field Form**

PART 1: Well Sit	a Information	A Park Commencer		16.A	100 mg - 100	
Well Name	1	Date:	Time onsite (MST):	Activity	<u> </u>	Well
	-01294	2/10/18	0912		P.C	
and the same of th	antields A.	Vigils T. Van		Cable Langths		Cable SN
Telemetry: Yes \ (100)	Pull Transducer Yes \ (10)	New Transducer Neede New LT SN:	d: Yes (450)	Memory % rer	naining:	Battery & remaining:
Connect Time:	Transducer \$N:	New LT PSI Rating:	Manufacture Date:	Log Note Mem	CYNY	Log Note Baltery %
Water Level (ft)	a 21	P(05):   S	T (C)	Stop Test. Ye	s I No	Change Desicant: Yes \ No \ NA
Last Start Date:	Mil	Data File Name:	NA			2
PART 2: Manual M	essurements		de de Carlos	M. Colonia		
Measuring Point	TOC (top outer casi		Stick-up Measured on Site	□ P	revious MP Us	ed 🗙
Time (MST)	0914	Water Level Meter Se 34 ZL	riel No. 十니	Notes:		
DTW (ft.bMP):	6.86'BAR	Medsun	ements in feet	N	A	
Time (MST)	0917	LSDft	7288.44 ms			
OTW (ft bMP):	6.86'BTX	MP Height ft.	+3.07	/2		
Time (MST)	2/10/18	MP Elevation	=7291.51 ms			
DDA (R bMP):		DTW:	- 6.86'BJFC			
Time (MST).	0918 11.1018TH	Groundwater Elevation (GWE) Reference Level	7284.65 ms			
NA	NĂ	Zip Tie on Kellim's Grip	NO			
CARROLL SECTION OF THE RES	ance and Programming					
Pari 3: Transducer I	Errori Drift Acceptance	- Committee of the comm	Part 4: Pro	gramming & Fina	Readings	
WL Reading Time (MST).		Progamming Time:		Time	MST)	Reading
WL (transducer reading) (ft).		New Test Name:			4	
GWE from MM		Reference Level	2/10/	8		
Difference In value:		Current Depth:				
Error tolerance of transducer:		Meas Interval				
Within Error Tele	1979 A	Start Date:				
1 0 4 30 Er or 7 8	(Kiliforda	Start Time				
15 PSI-0.03A. 30	PSI-0.07 ft. 100 PSI-0.	23 ft. 500 PSI-1.16 ft.	Synch Clocks: Yes \			, y
Deleted Tests:	NA					QA Date and Initial

			Gro	undwate	er Samp	lin	g Log	or: 2	inches	Date: 2 16/18
IFWGMP MY	2018	Q: Z	.sp: 73	59.59		_	Vell Diamete	/ ^		Notes:
Watershed:	CON		Nater Level:	AVA	ft, m		op of Scree	- 6	AL TIC	NONE
Well: CD			TD: 11.55	0 6 11	-	_	Vater Colum	11 6	5 ft.	
Sampling D	evice: 11		Drop Pipe:	NA	g	al. 1	ICV:	0.81	gal.	Packer Pro
* Completic	Point: [ ]		ртор строи				CV:	2.42		Before:
TO A DTOC	IDTIC / BGS	S / MSL 1		Note N	IP height (sti	ckup	) of TOC/TI	C 10.1	-	Actuation:
DTW = (L	27		ater Column = = (Water Colum	(TD - DTW) nn x Well Dia	Drop Plpa meter Multip	e = (	TD/Pump in 3 CV = (	itake x Drop Pipe (1CV x 3)	Diameter	After:
TIME MST / DST	pН		SPEC COND µs/cm	DO mg/l	Turb NTU	A C H	ORP	Water Level*	Discharge Rate	NOT
Stability:	≤ 0.2 STU variance	TEMP C	± 3% (>100) ± 5% (≤100)	≤ 0.3 mg/l variance	<10 or ±	Yes or No	mV	R. Gric	(GPM)	
1248	6.61	6.1	211.0	4.25	87.0	N	69.1	7.63	0.10	(lovely)
1254	6.23	5.9	200.8	1.33	76.9	$\prod$	71.3	7.90	0,06	
1254	6.17	5.6	1973	2.06	54.4	1	66.5	7.95	0.06	Claritype
1257	6.20	5.6	209.7	1.87	38.2	$\prod$	49.7	8.26	0.06	1100
1350	6.23	5.6	219.8	1,49	41.8	#	34.8	8.49	0.06	
1303		5,7	726.6	1,21	35.9	#	21.5	8,69	0.06	+ ;
1306			229,9	0.87	26.0	4	14.3	8,78	0.06	clesod
1309	6.33	5.9	231.6	-	18.2	+	7.4	8.87	0.06	-
1342		5.9	236.1	0.66	9.6	+	1-7.3	9.05	0.00	
1315	6.42	100		1	+-	1	0 1	not stabl		1
Di Ne	la pup		1	recl	1010	1	1119 1	3,20	1119	
13 21		000	eg.M.Ja.	mpl my		+				
14/05	6m	p off.	desmol Try	Comp	141	+	1100			
	_	-			1	1	1/19/18			
			Andrew State of State	-	-	$\dashv$			+-	
				1				A	Final W	/ater Level:
		n = HACH T	urbidimeter #_	jal. Drum#:	Mun	V 1				later Level:
Contac	t Waste:				5. 6980	لمل	K	155000	*Purge	: Formation water ng (excluding drop
1	Water:		100	gal. Drumm	. 010	A	" HEE	syma while	sampli	ng (excluding drop ng water)



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### **ATTACHMENT 1**

### Page 1 of 1 Groundwater Level Field Form

PART 1: Well Sit	e Information				
well Name:	1937	2/16/18	Time on site (MST):	Activity: Sampling 1	Jell
Personnel S	rocker, The	DerVis		Cable Length(ft):	Cable SN:
Telemetry. Yes \ No	Pull Transducer: Yes \ No	New Transducer Neede New LT SN.	ed: Yes \ No	Memory % remaining:	Battery % remaining 2/16/18
Connect Time:	Transducer SN:	New IT PSI Rating:	Manufacture Date:	Log Note Memory %	Leg Note Battery %
Water Level (ft)		Prpsi):	T [C]	Stop Test Yes \ No	Change Desicant: Yes \ No \ NA
Last Start Date		Data File Name:	W		
PART 2: Manual M	easurements				
Measuring Point:	TOC (top outer casi	ng) (TIC (innec)	Stick-up Measured on Site	Previous MP Us	sed 🗹
Time (MST)	1236	Water Level Meter Se	orial No.	Notes:	
DTW (ft.bMP):	6.60671	Measur	ements in feet		
Time (MST)	1239	LSDft	7359.59		
DTW (ft bMP):	6.60'6TIC	MP Height ft.	+ 3.00		
Time (MST)	12/16/8	MP Elevation	= 7362,59	ļ	
DTW (ft bMP):	Ta zhol		- <b>0b</b> .60	[	
Time (MST)	1736	Groundwater Elevation (GWE)	7333, 17		
TD (ft bMP):	11.2201.	Reference Level Zip Tie on Kellim's Grip		ř	
Transituan Desfare	sance and Programming		7 4 } 7		
	ErroriDrift Acceptance		Part 4: Pro	gramming & Final Readings	
Wt-Reading Time (MST)		Progamming Time:		Time (MST):	Reading
WL (transducer reading) (ft):		New Test Name:	,		- 77-
GWE from MM		Reference Level :	10	1	
Difference in value:		Current Depth:		2/16/18	
Error tolerance of transducer:		Meas Interval:	"5"	117	
Within Error Tolor	range	Start Date:			
Outsido Error Fol	virise) ou	Start Time:	Cresch Clocker V 17-		
Deleted Tests:	PSI-0.07 ft. 100 PSI-0.	23 ft. 500 PSI-1.16 ft.	Synch Clocks; Yes \ No	<u> </u>	QA: Date and Initial:

Manual Groundwater Level Measurements

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Revision: 1, IPC-1

Reference

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### **ATTACHMENT 1**

Page 1 of 1

### **Groundwater Level Field Form**

PART 1 Well S	te Information	The second			
Well Name		Date:	Time onsite (MST)	Activity	
COV-16-6	11937	2-2-2018	105	PARTIBUR	
Personnel:	The same of the sa			Presweep Cable Longlinfty	Cable SN
T. Bonha	M. M. Shend	New Transducet Need	K. TOW	Memory % remaining	487736
Yes \No	Yes \ No	New LT SN:	A	NA	Batte y % remaining.
Connect Time:	Transducer SN:	New LT PSI Rating:	Manufacture Date	l og Mote Memory %	l og Note Beltery %
1016	440035	I MA		MA	6
Water Level (ft)	1	P (ps):	TICI	Stop Test: Yes	Change Desicant: Yes \ No.\ NA
Last Start Date:	15-7-18113	Data File Name:	1.6.9/	I	Tree . (Gr. A)
	VA		NA		×
PART 2: Manual M					
Measuring Point	TOC (top outer cas		Stick-up Measured on Site	Previous MP U	sed 💢
	1011	Water Level Meter Se	erial No.	Notes:	
Time (MST)	1010	.5	9243	l .	
DTW (R bMP)	756.52	Measur	ements in feet		
Time (MST)	1019	LSDit	7359.59 inst	No	16
DTW (ft bMP)	6.52 DE	MP Height ft.	+ 3.00 875	$I = I \setminus O$	
Time (MST)	1.1187	MP Elevation	=7362.57m		
DTW (4 bMP)	327	DTW	-6.52 BDO		
Tune (MST)	1019 11.54 BTIE	Groundwater Elevation (GWE) Reference Level	7356.07mm		
	,	Zip Tie on Kellim's Grip	NA		
Transducer Perform	ence and Programming				
Part 3 Transducer I	Error/Drift Acceptance		Part 4 Pro	gramming & Fina Readings	
WL Reading Time (MST)		Progamming Time		Time (MST)	Doc dies
Wl. (transducer reading) (ft).		New Test Name		11106 (47.51)	Reading
GWE from MM		Reference Level		1/1	
Olflerence in value.		Current Depth	2-2-2018	1	
Error tolerance of transducer.		Meas Interval	D		
[] Marinian - Longo	1	Start Date:	2		
Joseph to		Start Time			
Deleted Tests:	\$1-0.07 R. 100 PS1-0.2	3 R 500 PSI-1.16 t.	Synch Clocks Yes (No)		
F. 1	NA				OA Date and in⊯al

Manual Groundwater Level Measurements

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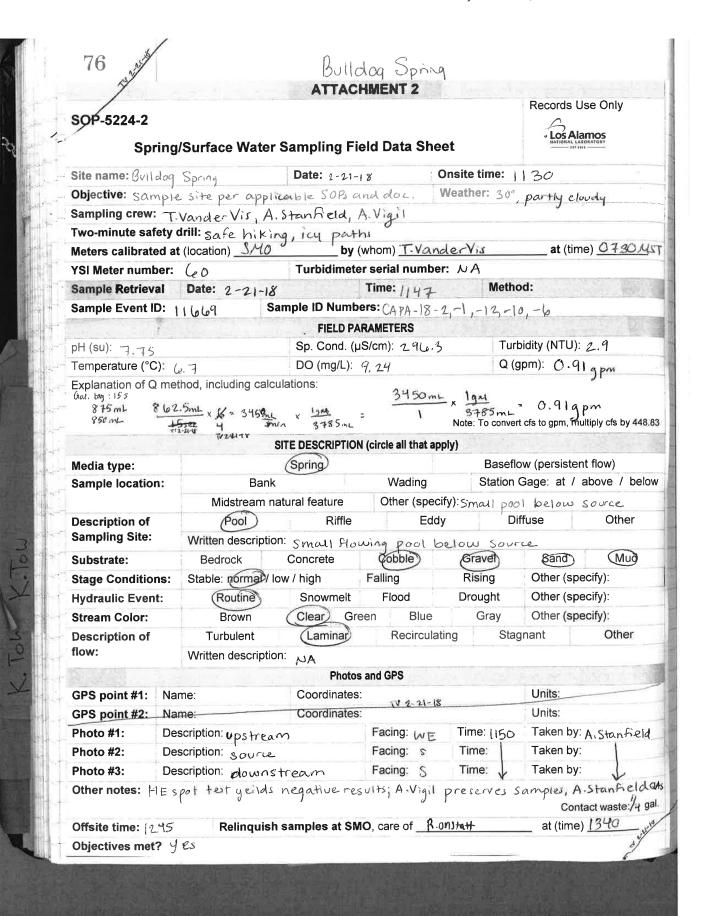
Reference

### ATTACHMENT 1 Page 1 of 1

Groundwater Level Field Form

PART 1: Well SI	te Information	A Alexander	S. Augustania	. 1870	LENGTH MERCH
Well Name		Date:	Time onsite (MST):	Activity	
Surge bed M	chitching wellizzo	12-10-2018	0857	I Cheat	
Personnel:	X		337	Cable Langth(ft):	Cable SN:
T. Ronka	m. A. Stacks	- & D. Tricons//	10	30	529149
Telemetry:	Pull Transducer	New Transducer Need	ed: Yes V.No	Memory % remaining:	
Yest No	Yes \ No/	New LT SN:	WA	MA	Battery % remaining:
	Transducer SN:		Manufacture Date:	Log Note Memory %	Log Note Battery %
0858	520407	MA	11/2	Mk	1
Water Level (ft)		P (psi):	T(C)	Stop Test: Yes \ No	Change Desicant:
Lest Start Date:		0.01	10.70		Yes I No I MA
Last Start Date:	100	Data File Name:		I	
/	NA		MA		
PART 2: Manual M	eastroments	ALCOHOLD TO A			
Measuring Point	TOC (top outer cas	ing) (TIC (Ihner)	Stick-up Measured on Site	Previous MP U	sed 🔏
		Water Level Meter Se	riel No.	Notes:	
Time (MST):	0859	3424	7		
DTW (ftbMP).	DRY		ements in feet	DRY to TD	@ 22.82'BTIC
Time (MST).	C%Z	LSDft			
DTW (ft bMP):	DRY	MP Height ft.	to 15/	F-1	
Time (MST):	2015/	MP Elevation	£		
DTW (# bMP):		DTW.			
Time (MST).	090Z 22.82'6VIC	Groundwater Elevation (GWE)			
(D) ((C) (MP)	22700 0170	Reference Level Zip Tie on Kellim's Grip			
Transdager Perform	unce and Programming			<u> </u>	
Name and Address of the Owner, where the Party of the Par	Errori Drift Acceptance	Company of the second			to properly the second
	House Wendering		Part 4( Pro	gramming & Final Readings	A CONTRACTOR OF THE PARTY OF TH
WL Reading Time (MST)		Progamming Time:		Time (MST):	Reading
WL (trensducer reading) (ft).		New Test Name:		4	
GWE from MM		Reference Level .		1	
Difference in value:		Current Depth:	15		
Error tolerance of transducer:		Meas Interval	210, 2018	1	
With Error Tolke	laco	Start Date:	<u> </u>		
Outside En er 7ale	Allecto	Start Time	300		
15 PSI-0.03t 30 Deleted Tests:	PSI-0.07 9. 100 PSI-0.	23 ft. 500 PSI-1.16 ft.	Synch Clocks: Yes 1		
Dendied rests:					QA Date and Initial

SOP-5224-2					Records Use Only	
Spring/	Surface Water	Sampling F	ield Data She	et	- Los Alamos	
Site name: Riviel	5+N Anch E Basiv	Date: 2/12	//10	Onsite time:	130 MST	
Objective: Sample b	aseflow per SOPs.	tapplizable do	is, on p. 3 layboxs	Veather: Synn	4,505	
Sampling crew: 🔎	Sanchez 11	.Shendo, t	to Stantield		09	
Two-minute safety o		uneven su	rtaces, wildli	te	# 2/13/18	
Meters calibrated at			(whom) Tovan		at (time) <del>56</del> 0730	
YSI Meter number:			er serial number	1 0/ /	4 PO	
Sample Retrieval			Time: 1144	A CHARLES	the second secon	
Sample Event ID:	16609 Sa	CONTRACTOR CONTRACTOR	bers: CAPA-18	-15 <sub>2</sub> -14 <sub>2</sub> -1	) ************************************	
	3 <u>1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1</u>		ARAMETERS	T	idit. (AITU). 🔰 🚽	
pH (su): ア86		Sp. Cond. (	µS/cm): 142.6		idity (NTU): 7,7	
Temperature (°C):	5.4 bad is abuding color	DO (mg/L):	10.71	libed Bishall	om): 22.89gpm	
Explanation of Q met	nod, including calcu	Ilations: measi	2.051 cfs ×4	48.83 = 2	2.89 apm	
1/		11911-0	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		cfs to gpm, multiply cfs by 448.83	
contactwaste: 1			ires to man a to	THE RESIDENCE OF THE PARTY OF T	dia to gpin, matapi, dia 2,	
	\$ 100 miles	14-9-1-1-19-Edelorates energy	ON (circle all that ap	and the same of th	w (persistent flow)	
Media type:	Bank	Spring	Wading		Gage: at / above / below	
Sample location:	Midstream na		Other (spec		Sugo: at 1 asotto 1 solution	
Description of	Pool	Riffle		7 40 7	fuse Other	- 3
Sampling Site:	Written description		ffle @ 50			
Substrate:	Bedrock	Concrete	Cobble	(Gravel)	Sand Mud	
Stage Conditions:	Stable normal/ lo	ow / high	Falling	Rising	Other (specify):	
Hydraulic Event:	(Routine)	Snowmelt	Flood	Drought	Other (specify):	
	Brown	(Clear) G	reen Blue	Gray	Other (specify):	
Stream Color:	Turbulent	Laminar	Recircula	ting Stag	nant Other	
Stream Color:  Description of		n: NA			¥-	100
	Written descriptio			OF THE RESERVE OF THE PARTY OF		
Description of	Written descriptio	Phot	os and GPS			
Description of flow:	written descriptio	Phot	The second secon		Units: NA	
Description of flow:  GPS point #1: Na			es: NA		Units:	
Description of flow:  GPS point #1: Na GPS point #2: Na	me: NA	Coordinate	es: NA	, Time:    ф5	Units: Vanfield	
Description of flow:  GPS point #1: Na GPS point #2: Na Photo #1: De	me: NA	Coordinate Coordinate	es: NA es: VA Facing: W Facing: E	Time:	Units: Taken by: A. Stanfield Taken by: A. Stanfield	1
GPS point #1: Na GPS point #2: Na Photo #1: De Photo #2: De	me: NA me: V scription: Upstr scription: Downs scription: Source	Coordinate Coordinate eam	es: NA es: Facing: W Facing: E Facing: S	Time:	Units: Taken by: A. Stanfield Taken by: A. Stanfield Taken by: A. Stanfield	
Description of flow:  GPS point #1: Na GPS point #2: Na Photo #1: De Photo #2: De Photo #3: De Other notes: 🗸 .	me: NA me: V scription: Upstr scription: Downs scription: Source banchez condu preserves al	Coordinate Coordinate eam tream te acts HE sp	Facing: W Facing: E Facing: S Facing: S  Facing: S  Facing: S  Facing: S  Facing: S  Facing: S	Time: V Time: V Alts regative	Units: Taken by: A. Stanfield Taken by: A. Stanfield Taken by: A. Stanfield	
Description of flow:  GPS point #1: Na GPS point #2: Na Photo #1: De Photo #2: De Photo #3: De Other notes: 🗸 .	me: NA me: V scription: Upstr scription: Downs scription: Source banchez condu preserves al	Coordinate Coordinate eam tream te acts HE sp	Facing: E Facing: Soot test's Res	Time: V Time: V Alts regative	Units: Taken by: A. Stanfield Taken by: A. Stanfield Taken by: A. Stanfield	218



### Appendix B

Analytical Suites and Results (on CD included with this document)

## **Appendix C**

Inspection Forms

### Work Order BMP-68947





Maintenance Details

Requested: 7/18/2018 11:34:00 AM

Procedure: Storm Water Control Measures

Inspection Form (EP-DIV-SOP-

20012-1 IPC3)

Last PM: 10/12/2017

Project: IP Rain Event on July 17, 2018

(P-BMP-5868)

Reason: IP Rain Event on July 17, 2018

Special Instructions: Route 4, V006-13-0006-177-CDV2-R8.

RG257
V006
CDV-SMA-2

Contact: Phone:

#	Description	Meas.	No	Yes
rojec	t Map Review, If Yes, submit altered Project Map.	NAR		
20	Have you changed the location of a BMP on the Project Map?	7011		
30	Have you ammended the Project Map in any other way?			
Contro	I Measure Review. Describe recommended action in task comment line as appropriate.	1		
	Established Vegetation [V00602040013] is BMP Operating effectively on arrival? If no, describe	- 1		
50	existing or installed backup control			
	Established Vegetation [V00602040013] Is maintenance, modification, repair, or replacement			
50	recommended or conducted at inspection? If yes, identify maintenance type (repair, replacement, or modification) and describe the maintenance recommendation.		[ <u>-</u>	
20	Earthen Berm [V00603010006] Is BMP Operating effectively on arrival? If no, describe existing or	_		- 1
70	installed backup control.			
	Earthen Berm [V00603010006] Is maintenance, modification, repair, or replacement recommended			
20	or conducted at inspection? If yes, identify maintenance type (repair, replacement, or modification)	ľ	/	
30	and describe the maintenance recommendation.  Earthen Berm [V00603010007] Is BMP Operating effectively on arrival? If no, describe existing or	<del></del>	_V_	_[
90	installed backup control.			<b>-</b>
	Earthen Berm [V00603010007] Is maintenance, modification, repair, or replacement recommended			
	or conducted at inspection? If yes, identify maintenance type (repair, replacement, or modification)	- 1		
100	and describe the maintenance recommendation.			
110	Earthen Berm [V00603010008] Is BMP Operating effectively on arrival? If no, describe existing or installed backup control.		par.	
110	Earthen Berm [V00603010008] Is maintenance, modification, repair, or replacement recommended		- 15	P-1
	or conducted at inspection? If yes, identify maintenance type (repair, replacement, or modification)	- 1	_	
120	and describe the maintenance recommendation.			
120	Earthen Berm [V00603010009] Is BMP Operating effectively on arrival? If no, describe existing or		_	
130	installed backup control.	_	- 1	- 3
	Earthen Berm [V00603010009] Is maintenance, modification, repair, or replacement recommended or conducted at inspection? If yes, identify maintenance type (repair, replacement, or modification)	- 1		
140	and describe the maintenance recommendation.			
	Earthen Berm [V00603010010] Is BMP Operating effectively on arrival? If no, describe existing or			
150	installed backup control.	-		
	Earthen Berm [V00603010010] Is maintenance, modification, repair, or replacement recommended or conducted at inspection? If yes, identify maintenance type (repair, replacement, or modification)	- 1		
160	and describe the maintenance recommendation.	İ		
	Rip Rap [V00604060003] Is BMP Operating effectively on arrival? If no, describe existing or installed	$\neg \vdash$		
170	backup control.		4	
	Rip Rap [V00604060003] Is maintenance, modification, repair, or replacement recommended or			
180	conducted at inspection? If yes, identify maintenance type (repair, replacement, or modification) and describe the maintenance recommendation.	1	D.	р-
	Rock Check Dam [V00606010002] Is BMP Operating effectively on arrival? If no, describe existing or	-		
190	installed backup control.		all.	7
	Rock Check Dam [V00606010002] Is maintenance, modification, repair, or replacement	N.		

	modification) and describe the maintenance recommendation.	NLP		
210	Rock Cap [V00608020012] Is BMP Operating effectively on arrival? If no, describe existing or installed backup control.		= -	
220	Rock Cap [V00608020012] Is maintenance, modification, repair, or replacement recommended or conducted at inspection? If yes, identify maintenance type (repair, replacement, or modification) and describe the maintenance recommendation.		P	2/
SMA C	Controls. Describe recommended action in task line as appropriate			
240	Is there evidence of floatable waste, floatable garbage, or floatable debris within the SMA that could be discharged to receiving waters?			ul:
250	Is there evidence of dust generation or evidence of off-site vehicle tracking of raw, final, or waste materials or sediments?		T	
260	Is there evidence of the introduction of raw, final, or waste material to the SMA?			
270	Has there been a significant increase in erosion potential at the SMA since the last inspection?		1	187
280	Industrial or sanitary wastewater treatment at 16-260 [16-021(C)] Has there been an increase in erosion potential at the Site since the last inspection?		F	
	Report			
Comp	leted:			
Repor	t:			

WO ID: Bmp-44947 Page 3 of 3						
Responded Date: 7/25/14 Time: 6:30 Completed Date: 7/25/14 Time: 6:40						
Name/Z#: 1. Roy64 313118						
Name/Z#: 1. Romero 176877						
Lead Signature: Allut Royk						
"I confirm the information as recorded is true, accurate and complete."						
Certification Statement of Authorization						
"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations."						
Name of Delegated Official of Permittees: Steve Veenis Z#: 109949						
Date: Date on file Delegated Official Signature: Signature on File						
LANL PERSONNEL USE ONLY (initials and dates)						
Accepted: 7/26/18 C Tech QC 1/20/18 FTL:						

# Inspection Report Corrective Measures at Consolidation Unit 16-021(c)-99

ate/Time:	Winter 2018	Rep	ort Nu	mber1
Weather:	Snowing			
ersonnel:	Steve Maze			
	Low-Permeability Cap	Insped	tion	
		Yes	No	Comments
Is there eviden	ce of new settlement?		х	
Is there eviden	ce of cracking?		x	
Is there eviden	ce of erosion/rutting?		х	
Is there eviden	ce of ponding?		X	
Is there eviden	ce of burrowing animals?		×	
Is there eviden	ce of undesirable vegetative growth?		х	
Are the slopes	adequate for surface water drainage?		х	
Is there eviden	ce of soil movement/slope instability?  the soil running parallel to the slope or soil		x	

### Appendix D

Surge Bed Monitoring Well Transducer Data (on CD included with this document)