



# **Environmental Functional Area**

**Environmental Support and Programmatic Outreach Group**

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UCRL-AR-126783-13

**Lawrence Livermore National Laboratory  
Livermore Site  
Annual Storm Water Monitoring Report for  
Waste Discharge Requirements 95-174**

**Annual Report  
2012–2013**

**August 2013**

**Greg S. Lee**

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August 2013*

**Lawrence Livermore National Laboratory  
Livermore Site Annual Storm Water  
Monitoring Report  
for Waste Discharge Requirements 95-174**

**Reporting Period May 1, 2012 through April 30, 2013**

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## Acronyms and Definitions

ALP	Arroyo Las Positas
ALPE	Arroyo Las Positas East (storm water influent sampling location)
ALPO	Arroyo Las Positas Outfall (storm water influent sampling location)
ASS2	Arroyo Seco South (storm water influent sampling location)
ASW	Arroyo Seco West (storm water effluent sampling location)
AWQC	ambient water quality criteria
B	building
BMP	best management practice
Bq/L	becquerel/liter
CA	California
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
COD	chemical oxygen demand
DI	deionized
DO	dissolved oxygen
DOE	Department of Energy
DRB	Drainage Retention Basin, renamed Lake Haussmann
ERD	Environmental Restoration Department
gpm	gallons per minute
GRNE	Greenville Road East (storm water influent sampling location)
HMMA	Hazardous Materials Management Area
hr	hour
LCW	low conductivity water
LLNL	Lawrence Livermore National Laboratory
LLNS	Lawrence Livermore National Security, LLC
MCL	maximum contaminant level
µg/L	micrograms per liter
mg/L	milligrams per liter
MUSD	Maintenance and Utilities Services Department
N/A	not analyzed
NOEC	no observed effects concentration
NPDES	National Pollutant Discharge Elimination System
O&G	oil and grease
pCi	picocurie
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
ppb	parts per billion
PVC	polyvinyl chloride
PTU	portable treatment unit
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act of 1976
RHWM	Radioactive and Hazardous Waste Management

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## **Acronyms and Definitions (Continued)**

SC	specific conductance
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SI	système internationale
SM	standard method
SWPPP	Storm Water Pollution Prevention Plan
T	trailer
TCE	trichloroethene (or trichloroethylene)
TDS	total dissolved solids
TF	treatment facility
TOC	total organic carbon
TSS	total suspended solids
U.S. EPA	United States Environmental Protection Agency
VOC	volatile organic compound
WAA	waste accumulation area
WDR	Waste Discharge Requirements
WPDC	West Perimeter Drainage Channel (storm water effluent sampling location)

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## **EXECUTIVE SUMMARY**

Results of the storm water quality monitoring program at Lawrence Livermore National Laboratory (LLNL) in Livermore, California are reported as required in the Waste Discharge Requirements (WDR) 95-174, National Pollutant Discharge Elimination System (NPDES) Permit No. CA0030023. This report presents results for the 2012–2013 water year including: the Storm Water Pollution Prevention Plan (SWPPP) facility inspection results, wet and dry season observations, storm water discharge analytical data, and a summary interpretation of the data.

The facility inspection results indicated a few minor instances at the Livermore Site in which best management practices (BMPs) listed in the SWPPP were not properly implemented, but that corrective actions have either been made or are in progress. Other than minor debris accumulation (primarily leaves and sticks) at some sampling locations, storm water observations did not identify any pollutants. Although there are no numeric effluent limits placed on storm water discharges, data are compared with various criteria to determine if water quality remains similar to natural or upstream conditions, or that concentrations are below levels of concern. Acute and chronic fish toxicity testing indicated no toxicity in effluent storm water samples. Storm water samples showed three influent constituents (nitrate, gross alpha, and gross beta) above LLNL site-specific threshold comparison criteria. All of the data exceeding LLNL thresholds during 2012–2013 are attributed to off-site activities upstream of the Laboratory since there were no effluent constituents above LLNL site-specific thresholds. All other effluent monitoring results were less than comparison criteria. These results indicate that LLNL's current BMPs are effective and that operations at the LLNL Livermore Site during 2012–2013 did not impact storm water quality.

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## 1.0 Introduction

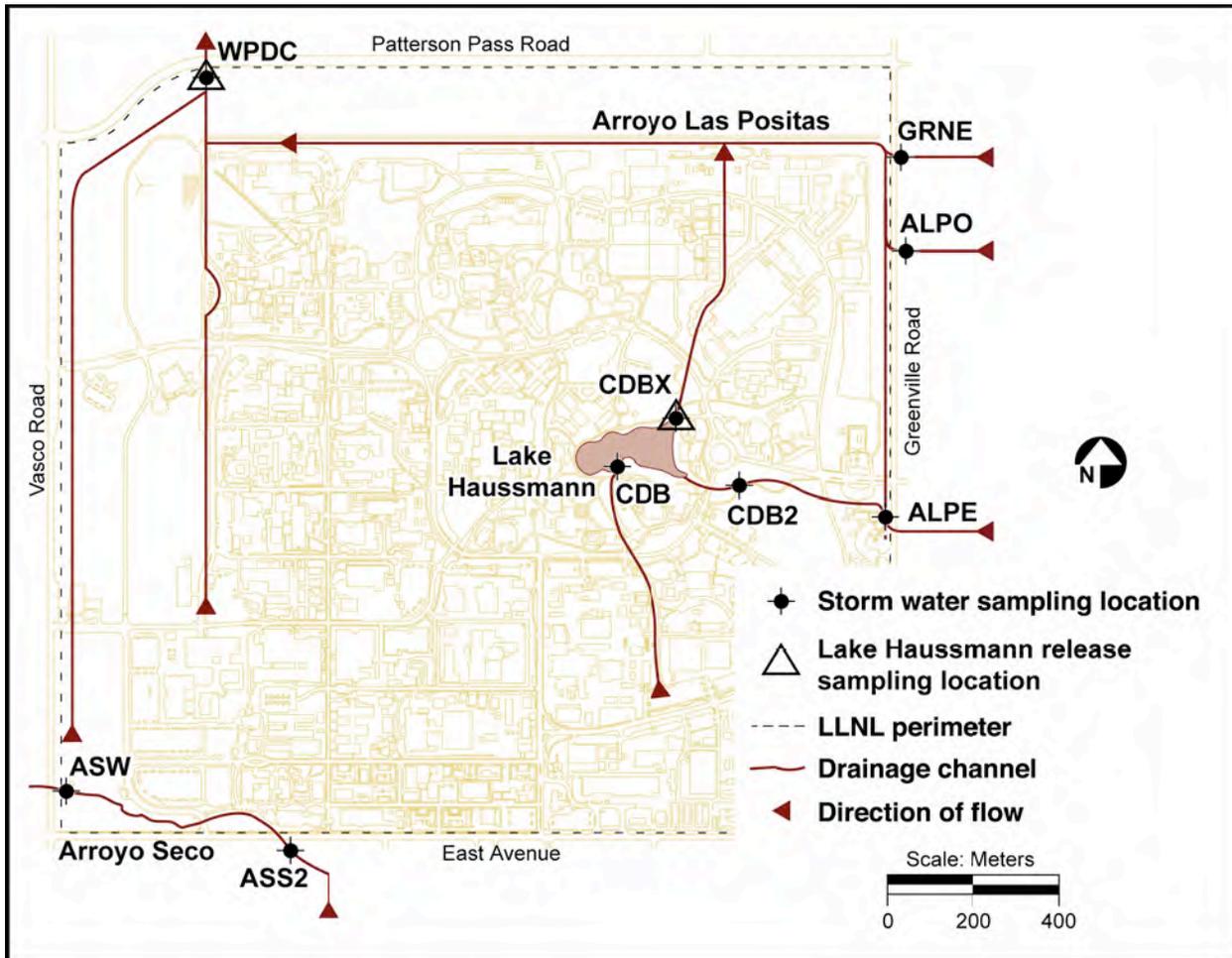
This report discusses the results of the 2012–2013 Livermore Site storm water monitoring program. Storm water quality monitoring results for the LLNL Livermore Site are summarized, fulfilling the annual reporting requirements of WDR 95-174, issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) on August 23, 1995, (hereafter referred to as “the Permit”). The Permit expired on August 23, 2000. LLNL submitted a Report of Waste Discharge (and an NPDES permit application) to renew the Permit on February 18, 2000, meeting the requirement to submit a renewal application 180 days in advance of permit expiration. SFBRWQCB staff confirmed the administrative continuance in November 2000 (Morse 2000).

The Livermore Site is a 3.28-km<sup>2</sup> facility that is crossed by two intermittent streams, Arroyo Las Positas and Arroyo Seco. The average annual rainfall at the Livermore Site is 13.7 inches (34.8 cm), and the rainfall for the 2012–2013 reporting period was 8.60 inches (21.84 cm). Monthly rainfall totals are presented in **Table 1**. LLNL monitors influent and effluent water quality as required by the Permit. The six perimeter storm water sampling locations are shown in **Figure 1**, along with three internal (on-site) monitoring locations around the drainage retention basin, renamed Lake Haussmann.

**Table 1.** Monthly rainfall totals (in inches) collected at the LLNL site meteorological station.

<b>Date</b>	<b>Monthly Total (inches)</b>
May 2012	0
June 2012	0.13
July 2012	0
August 2012	0
September 2012	0
October 2012	0.27
November 2012	2.41
December 2012	3.43
January 2013	1.1
February 2013	0.39
March 2013	0.44
April 2013	0.43
<b>Water Year TOTAL</b>	<b>8.60</b>

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**Figure 1.** Routine storm water sampling and observation locations.

## 2.0 Nonstorm Water Discharges

The SFBRWQCB issued the Permit to LLNL, allowing storm water discharges associated with industrial activities and four categories of nonstorm water discharges, including mechanical equipment sources (e.g., air conditioners), building and grounds maintenance (e.g., landscape irrigation), fire suppression and safety systems (e.g., hydrant testing), and water systems (e.g., backflow preventors). In addition, the Permit allows LLNL to administratively control several building conduits that remain open because they are impractical to seal.

LLNL tracks authorized nonstorm water discharge sources through the Building Drain Management database and key plans, and an internal drain connection permitting process. As required by the Permit, Provision C.8, LLNL evaluates all new construction, remodeling, and equipment upgrades to determine if it is practical to eliminate permitted discharge sources. If it is practical to do so, the discharge is eliminated. Modifications that result in new connections to building conduits are added to the Building Drain Management database.

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Authorized nonstorm water discharge sources and open building conduits are included in LLNL's Dry Season Observation Program. These observations help LLNL verify that the BMPs applied to these discharge sources continue to be properly implemented. Areas in the Dry Season Observation Program include secondary containment areas, loading and receiving areas, floor drains open to the storm drainage system, and automatic sump pumps. These locations and observation results are discussed in detail in this report in Section 4.0, Visual Observations. Nonroutine releases are summarized in **Appendix A, Table A-1**. This table includes unplanned releases reportable under the Permit, Provision C.1, and nonroutine releases allowed under the Permit but requiring prior notification under Provision C.7.

### **3.0 Annual Site Inspections**

Each of the Principal Directorates (LLNL's high level organizational unit) at LLNL conducts an annual inspection of its facilities to verify implementation of the SWPPP and ensures that measures to reduce pollutant loading to storm water runoff are adequately and properly implemented. The Principal Associate Directors for each of the Principal Directorates certify that their facilities comply with the provisions of the Permit and the SWPPP. Each Principal Directorate documents and keeps on file the annual inspection results (as required by the Permit). These records include the dates, places, and times of the site inspections and the names of individuals performing the inspections. Because of the large number of facilities inspected (more than 500 buildings and trailers), the detailed inspection results are not included in this report, but the individual inspection records are available for submittal or review upon request. All inspections were completed; findings and deficiencies are summarized in **Appendix A, Table A-2**.

A few inspections noted inconsistent or incomplete implementation of BMPs in the annual SWPPP inspections. All of these issues have either been corrected or are in the process of being corrected as described in **Appendix A, Table A-2**. All other inspections indicated that the applicable BMPs were implemented correctly and adequately.

### **4.0 Visual Observations**

Dry season observations were performed and are provided in **Appendix A, Table A-3**. The Permit requires that observations be conducted at least twice during the dry season (May through September). These observations occurred on June 22 and September 11, 2012, at storm water effluent sampling locations (**Figure 1**, Arroyo Seco West [ASW] and West Perimeter Drainage Channel [WPDC]), at storm water influent sampling locations (**Figure 1**, Arroyo Seco South [ASS2], Arroyo Las Positas East [ALPE], Arroyo Las Positas Outfall [ALPO], and Greenville Road East [GRNE]), at areas with a "high potential" of storm water pollution, and at nonstorm water discharge locations to determine the presence of stains, sludges, odors, and other anomalous conditions. "High potential" areas include areas with automatic (e.g., sump pumps) or direct connections to the surface and areas where activities may result in accidental releases to the surface (e.g., loading/receiving areas and open rinse areas).

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To determine the “high potential” areas, LLNL compiled and categorized potential storm water pollution areas, using information from the following sources:

- *LLNL Livermore Site Annual Storm Water Monitoring Report* (Brandstetter 1994);
- LLNL’s Building Drain Management Database;
- LLNL’s *Report of Waste Discharges*, March 1995 (Mathews and Welsh 1995); and
- LLNL’s Observation Records.

LLNL then conducted inspections, visual observations, and assessments of these potential areas for storm water pollution. Areas determined as “high potential” are included in the dry season observation program as follows:

- Arroyo Seco and Arroyo Las Positas (observations conducted at influent and effluent locations);
- Avenue K storm drain;
- Automatic sump pump area at Building 191;
- Loading/receiving areas in Buildings 194 and 341;
- Concrete wash area near Parking Lot F-2; and
- Floor drain areas open to the environment in Buildings 111, 194, 391, and 551.

During this reporting period, the dry season observations did not identify any unusual discharges. Observed evidence of flow at some locations was from discharges of treated groundwater allowed under the *Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Record of Decision* (US Department of Energy 1992). All indications of nonstorm water flows were attributable to permitted discharges or natural sources.

Wet season observations are summarized in **Appendix A, Table A-4**. The Permit requires that wet season observations be conducted monthly during the wet season (October 2012 through April 2013) when significant storm events occur (a significant storm is defined as runoff lasting more than one hour). These observations are conducted at storm water influent and effluent sampling locations. Observations often indicated turbidity at both influent and effluent locations, but no unusual conditions or anomalies were observed. Storm event observations were recorded during the non-qualifying December 2012 storm, and during the qualifying January and February 2013 storms. Wet season observations were also conducted during the months of October and November 2012, and March and April 2013; however, these observations did not coincide with a storm event.

## **5.0 Storm Water Sampling and Analysis**

The Permit requires collection of two samples each wet season at effluent locations ASW and WPDC and at influent locations ALPE, ALPO, ASS2, and GRNE. Permit-driven storm water samples were collected on January 24, 2013 and February 19, 2013; however, there was insufficient runoff at ALPO during the storms to sample this influent location. Samples were collected as soon as possible after runoff began (most within the first hour). Water quality data from these storm water samples for the 2012–2013 reporting period are presented in **Appendix A, Table A-6 and Table A-7**. Quality assurance and quality control (QA/QC) checks are performed

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on all sampling and analysis from LLNL. All data analysis included standard QA/QC practices. LLNL reports on QA annually in the Site Annual Environmental Report (Jones et al. 2012); this information is available upon request.

The Permit currently does not contain numeric limits for storm water effluent. Therefore, site-specific comparison criteria were developed from historical data to identify out-of-the-ordinary data values (**Table 2**). These criteria are used to identify data values that require further investigation and explanation. In addition to the Livermore Site-specific comparison criteria, storm water results are compared to other published values, including: United States Environmental Protection Agency (U.S. EPA) benchmarks; *The Water Quality Control Plan, San Francisco Bay Basin (Region 2)* (Basin Plan) (SFBRWQCB 1995); US EPA and State maximum contaminant levels (MCLs) and Ambient Water Quality Criteria (AWQC). Although these latter criteria were established for other regulatory programs, use of a broad range of criteria can help LLNL evaluate the quality of Livermore Site storm water effluent and determine the adequacy of BMPs. If a measured concentration is found to be higher than the comparison criteria, but the value is the same or higher at the influent location, the source is assumed to be unrelated to Livermore Site operations; therefore, further analysis is not warranted.

**Table 2.** Livermore Site-specific threshold comparison criteria for selected water quality parameters for storm water runoff.

Parameter	Comparison criteria
Total suspended solids (TSS)	750 mg/L <sup>a</sup>
Chemical oxygen demand (COD)	200 mg/L <sup>a</sup>
pH	<6.0, >8.5 <sup>a</sup>
Nitrate (as NO <sub>3</sub> )	10 mg/L <sup>a</sup>
Ortho-phosphate	2.5 mg/L <sup>a</sup>
Beryllium	1.6 µg/L <sup>a</sup>
Chromium(VI)	15 µg/L <sup>a</sup>
Copper	36 µg/L <sup>a</sup>
Lead	15 µg/L <sup>b</sup>
Mercury	Above RL <sup>c</sup>
Zinc	350 µg/L <sup>a</sup>
Diuron	14 µg/L <sup>a</sup>
Oil and grease	9 mg/L <sup>a</sup>
Tritium	36 Bq/L <sup>a</sup>
Gross alpha	0.34 Bq/L <sup>a</sup>
Gross beta	0.48 Bq/L <sup>a</sup>

Note: The sources of values above these are examined to determine if any action is necessary.

<sup>a</sup> Site-specific value calculated from historical data and studies. These values are lower than the MCLs and EPA benchmarks except for zinc, total suspended solids (TSS), and chemical oxygen demand (COD).

<sup>b</sup> California and EPA drinking water action level

<sup>c</sup> RL = reporting limit = 0.0002 mg/L for mercury

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### 5.1 Toxicity Monitoring

As required by the Permit, grab samples were collected from the site storm water effluent location, WPDC, and analyzed for acute and chronic toxicity using fathead minnows (*Pimephales promelas*) as the test species. These tests are required only at effluent location WPDC and are not conducted with water from corresponding influent locations. The testing laboratory provides water for the control sample, which consists of EPA synthetic moderately-hard water.

In the acute test, 96-hour survival is observed in undiluted storm water collected from location WPDC. The Permit states that an acceptable survival rate is 20 percent lower than a control sample. If the acute toxicity test is failed, the Permit requires LLNL to conduct toxicity testing during the next significant storm event. After failing two consecutive tests, LLNL must perform a toxicity reduction evaluation to identify the source of the toxicity. The 96-hour acute toxicity test results from the January 24, 2013 sample collected at WPDC (100 percent survival, compared to 100 percent survival in the laboratory control sample) show that this water was not acutely toxic to fathead minnow survival (**Table 3a**).

The 7-day chronic fish toxicity test compared the survival and growth of fathead minnow larvae in the storm water sample (again collected at WPDC on January 24, 2013) to the survival and growth of the minnow larvae in a laboratory control sample water. The test results are summarized in **Table 3b**. The analytical laboratory reported no statistically significant differences for either end point, and the no observed effect concentrations (NOECs) for both survival and growth were determined to be 100 percent. These results demonstrate that there was no observed toxicity in LLNL storm water effluent.

**Table 3a.** Single point acute fish toxicity test results for January 24, 2013, at WPDC.

Location	Sample	% Survival		
		Replicate A	Replicate B	Mean
Laboratory Control	EPA synthetic “moderately hard” water	100	100	100
WPDC	Site Effluent	100	100	100

**Table 3b.** Chronic fish toxicity test results for January 24, 2013, at WPDC.

Sample Concentration (%)	7-day survival Avg. (%)	7-day weight <sup>a</sup> Avg. (mg)
100% Laboratory Control	100	0.538
100% WPDC Site Effluent	100	0.532

<sup>a</sup> Average weight of the fathead minnow larvae at the end of the 7-day toxicity test.

### 5.2 Nonradioactive Parameters

**Table 4** lists the constituents in the January 24, 2013 and the February 19, 2013 storm water samples that exceeded the threshold comparison criteria in **Table 2** (full results are in **Appendix A, Table A-6 and A-7**); however, all of the data exceeding LLNL thresholds are

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attributed to off-site activities upstream of the Laboratory. Upstream activities near the Livermore Site on the Arroyo Seco and Arroyo Las Positas include another scientific research institution, grape vineyards, an electrical transfer station, and cattle ranching; these activities are potential sources for the constituents shown in **Table 4**.

**Table 4.** Constituents in storm water greater than the LLNL-specific threshold comparison criteria.

Constituent	Date	Location	Influent or Effluent	Result	LLNL Threshold Criteria
Nitrate (as NO <sub>3</sub> )	1/24/13	GRNE	Influent	19 mg/L	10 mg/L
	2/19/13	GRNE	Influent	43 mg/L	10 mg/L
	2/19/13	ALPE	Influent	10 mg/L	10 mg/L
Gross Alpha	1/24/13	GRNE	Influent	0.45 Bq/L	0.34 Bq/L
Gross Beta	1/24/13	GRNE	Influent	0.86 Bq/L	0.48 Bq/L

Nitrate concentrations above the LLNL comparison criteria of 10 mg/L, but below the MCL of 45 mg/L, were found in samples collected at GRNE during the first and second storms, and at ALPE during the second storm (**Table 4**). GRNE and ALPE are influent locations so these results are attributed to off-site activities and are not related to LLNL operations

As in past years, bromacil and glyphosate (both widely used herbicides) were detected in storm water samples. Concentrations of bromacil at influent locations ranged from <0.5 µg/L to 16 µg/L, but bromacil was not detected (<0.5 µg/L) in effluent samples at WPDC and ASW. Similarly, concentrations of glyphosate at influent locations ranged from <20 µg/L to 1,300 µg/L (ASS2); the maximum concentrations reported in effluent samples were 33 µg/L at WPDC and 190 µg/L at ASW. (See **Appendix A, Table A-6 and Table A-7**).

One unusual compound, pentachlorophenol (PCP), had been identified at low levels in several samples collected during the 2007–2008 and 2008–2009 storm years. However, this year as in the past three storm years, PCP was not detected at any influent or effluent sampling location. Since 1987, most of the PCP used in the U.S. has been restricted to the treatment (as a wood preservative) of utility poles and railroad ties.

### **5.3 Radioactive Parameters**

Environmental measurements are reported in *Système Internationale* (SI) units. The SI unit for radioactivity is the becquerel (Bq), equal to 1 nuclear disintegration per second. The more commonly used unit, picocurie (pCi), is equal to 1 nuclear disintegration per 27 seconds. Results for tritium, gross alpha, and gross beta activities from storm water samples collected during 2012–2013 are included in **Appendix A, Tables A-6 and A-7**. The gross alpha and gross beta measurements of radioactivity were above their LLNL specific comparison criteria (0.34 Bq/L and 0.48 Bq/L, respectively) at the GRNE location on January 24, 2013 (**Table 4**). Given that GRNE is an influent location, upstream of LLNL activities, these results appear to be unrelated to LLNL operations. All other results for gross alpha, gross beta, and tritium activities were less than their respective comparison criteria (**Table 2**).

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LLNL began analyzing storm water for plutonium in runoff in 1998. Samples were analyzed from the Arroyo Seco and Arroyo Las Positas effluent locations (ASW and WPDC). The plutonium activities measured in samples from ASW and WPDC on January 24, 2013 and February 19, 2013, were below the detection limit (0.0037 Bq/L, or 0.100 pCi/L). (See **Appendix A, Tables A-6 and A-7**)

## **6.0 Summary and Conclusions**

The storm water monitoring program at LLNL goes beyond the requirements of the Permit by sampling at more locations and for more parameters than the Permit requires. This additional monitoring is called for under the environmental monitoring requirements of various Department of Energy (DOE) Orders. Furthermore, LLNL investigates water quality parameters that are found to be above historic levels as demonstrated by the site-specific comparison criteria in **Table 2**.

Storm water observations were performed monthly during the wet season and quarterly during the dry season, with no major deficiencies noted. Inspections of BMPs listed in the SWPPP revealed some areas for improvement, for which corrective actions have either been made or are in progress.

Storm water samples showed three influent constituents (nitrate, gross alpha, and gross beta) above LLNL site-specific threshold comparison criteria; however, all of the data exceeding LLNL thresholds during 2012–2013 are attributed to off-site activities upstream of the Laboratory. In addition, acute and chronic fish toxicity testing indicated no toxicity in storm water runoff samples, and all other effluent monitoring results were less than comparison criteria. These monitoring results indicate that LLNL's current BMPs are effective and that operations at the LLNL Livermore Site during 2012–2013 did not impact storm water quality.

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**APPENDIX A TABLES**

Tables A-1 through A-7

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**Table A-1.** May 1, 2012 – April 30, 2013 - Summary of non-routine releases, Livermore Site.

<b>Date</b>	<b>Location</b>	<b>Description</b>
5/2/12	B-141	An LLNL employee's personal vehicle ran out of fuel while parked in the A-4 parking lot, west of B-141. During the refueling process, approximately 500 milliliters of gasoline were spilled onto the asphalt parking lot, affecting an area approximately 1-foot wide by 2-feet long. Absorbent was applied to the spill location by a Radioactive and Hazardous Waste Management (RHWM) technician and the spilled material was cleaned up. The spill was isolated to the asphalt surface. It did not reach a storm drain or come in contact with soil.
	B-581	A worker was pulling cable on the northeast side of B-581, when a cable struck and broke a deionized (DI) water valve. The broken valve released 300–400 gallons of DI water, which ran across the asphalt into a nearby storm drain. Workers immediately placed a rubber mat over the storm drain to prevent further discharges. Due to the location of the storm drain and weather conditions, the DI water is not believed to have reached an arroyo or gone offsite.
6/4/12- 6/5/12	B-255	An irrigation water leak on the south side of B-255 began Monday, June 4 and was stopped on Tuesday, June 5. The valve that controlled six irrigation sprinkler heads had failed. Each irrigation sprinkler head has a flow rate of 1.85 gpm. It was estimated that approximately 8,200 gallons of irrigation water were released. The released water entered a storm drain catch basin. Groundwater treatment facility TFC-E discharges treated groundwater into the same storm drain. The TFC-E discharge (flow rate of 16.8 gpm) carried the chlorinated irrigation water offsite and into Arroyo Las Positas. Although less than 10,000 gallons, the chlorinated irrigation water did flow offsite. This release was reported to the SFBRWQCB by phone message and email.
6/5/12	T-4997A	Legacy pumps were being moved into an LLW cargo container. One of the pumps was somewhat unstable on its wooden pallet. It was transferred onto a plastic secondary containment pallet and laid on its side, where it began leaking. The pump was returned to its original location and the area was cordoned off. Approximately 3–5 gallons of liquid spilled onto the asphalt (both inside T-4997A and on the driveway leading into T-4997A). Based on visual inspection and process knowledge, it was determined that the spilled liquid was from a closed loop cooling water system. The oil in the pumps, which had long since been removed, had contained low levels of tritium. Results of an analysis showed that tritium was not detected above the minimum detectable concentration (MDC).
6/28/12	B-391	At approximately 10:00 AM, a water leak from a buried low conductivity water (LCW) supply pipe was discovered at B-391. The water flow rate was approximately 2 gpm for about 5.5 hours. Approximately 660 gallons of water flowed from the leaking pipe, through ivy ground cover, into a storm drain, and potentially into Arroyo Las Positas (where it would have flowed off site). Due to the location of the leak, which was located along a seam and fitting where two pipes were joined, the leak could not be immediately stopped. At approximately 3:30 PM, an LLNL crew set up a pump that transferred the LCW to the sanitary sewer. Repairs to the pipe were completed by 10:00 AM June 29. This release was reported to the SFBRWQCB by phone message and email. Additional information: Based on building operational records, the LCW system at B-391 had been leaking for a considerable amount of time (possibly over a period of one year or more) with an estimated loss of approximately 3,000 gallons/day of LCW. LLNL investigated this long-term loss, and suspected that LCW was leaking from the building LCW delivery system, but could not identify a leak point until staff noticed the leak that was reported on June 28. It was difficult to detect the long-term leak because treated ground water flows through the nearby drainage channel that flows to Arroyo Las Positas. In addition, there are numerous eucalyptus trees in the area that would have transpired the water. Some or most of the water may have been transported into the vadose zone, which is composed of very permeable sand and gravel layers. It is not believed that the release of LCW prior to June 28 flowed to the surface, to the drainage channel, or offsite.
7/2/12	B-255	Water was coming out of a grassy area due to a broken irrigation line. The irrigation water was immediately turned off. The released water remained predominantly within the grassy area, with approximately 20 gallons pooling onto the adjacent asphalt to the east of the release site.

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**Table A-1.** May 1, 2012 – April 30, 2013 - Summary of non-routine releases, Livermore Site.

Date	Location	Description
7/8/12-7/9/12	TFB	<p>An untreated water release started at 4:00 AM Sunday, July 8 when the Treatment Facility B (TFB) control system automatically shut down the treatment unit after an electronic error. The facility interlocks were engaged for several of the wells and these wells were turned off automatically by the control system. However, four wells remained operational despite the interlocks, an atypical occurrence since the interlocks at this facility had been recently tested and found to be functioning properly. The release was noticed at 7:00 AM Monday, July 9, and the four wells were manually turned off between 7:15 and 7:30 AM. The discharge occurred from a single point and the untreated water reached the drainage ditch that runs along the west side of the LLNL property. This is also the normal discharge location for the treated water.</p> <p>The total volume of untreated water that was released was 59,900 gallons. A portion of this volume infiltrated into the ground and the rest reached the drainage ditch. The average concentration of Total Volatile Organic Compounds (TVOCs) in the release water was 18.3 ug/L, resulting in a release of 4.1 grams of TVOCs within a period of 27 hours. There would have been some evaporative loss of both water and TVOC to atmosphere on July 8 when the air temperature reached 86 degrees Fahrenheit. This release was reported to the SFBRWQCB by phone message and email.</p>
7/9/12	B-581	<p>Approximately 5 gallons of treated water was inadvertently discharged to a gravel area on the south side of B-581. The treated water had been accumulating in a plastic tub under a leaking pipe. It had taken days to arrange for 50-foot tall scaffolding to be erected in order to implement repairs to the pipe. The water was treated with 900 ppm of ChemTreat BL-1821, which contains 10 to 30% sodium nitrite, CAS 7632-00-0. Sodium nitrite is listed under CERCLA (Reportable Quantity [RQ] = 100 lbs), and is considered a hazardous substance/material under the CWA and DOT, Appendix A, Table 1. Personnel have been re-educated about proper handling for this type of dilute process water. The amount of sodium nitrite released was much less than the CERCLA RQ. The released treated water did not reach a storm drain and cleanup efforts were begun immediately.</p>
7/9/12	B-253	<p>Sprinklers on the north side of B-253 remained on, at a flow rate of approximately 27 gpm, for approximately 5 1/2 hours. The majority of the water remained in the landscaped area and approximately twenty percent (1,800 gallons) flowed onto Fifth Street. The water was turned off immediately once it was discovered.</p>
8/2/12	B-695	<p>While dumping a trash bin, a Labor Shop employee noticed diesel spilling from the back of the garbage truck. It appeared that the spill was around 5 gallons or less of red dye diesel fuel. The source of the leak was probably a container that was placed in a garbage dumpster by B-695. The spill was contained by using absorbent. The spill occurred on asphalt and did not enter the nearby arroyo or any storm or sewer drains. The contents of the garbage truck were emptied onto plastic and the contaminated trash was segregated from the non-contaminated trash. Ultimately, a 55-gallon drum of contaminated trash was segregated and managed as hazardous waste (the non-contaminated trash was sent to Altamont). The source of the diesel leak was a 5-gallon bucket of old diesel fuel.</p>
8/14/12	B-071	<p>A tractor leaked hydraulic oil while being used on the east side of B-071 for a landscaping project. When noticed, the tractor was immediately taken out of service. Approximately one quart of hydraulic oil leaked onto the sod and soil under the tractor. No RQ threshold was exceeded. Absorbent was immediately placed on the spill and the cleanup, including the removal of the oil soaked sod and soil was completed the same day. The released hydraulic oil was quickly contained and did not discharge to the storm drainage system or an arroyo.</p>
9/10/12	B-381	<p>A broken irrigation line released approximately 75 gallons of water adjacent to the north edge of North Inner Loop Road, south of B-381. Approximately 55 gallons flowed onto the soil and into an electrical vault that has a French Drain System, which flows to ground. Approximately 20 gallons flowed off of the cover on the electrical vault, into the nearby storm drain, and did not drain offsite.</p>

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**Table A-1.** May 1, 2012 – April 30, 2013 - Summary of non-routine releases, Livermore Site.

<b>Date</b>	<b>Location</b>	<b>Description</b>
9/11/12	B-218	An irrigation water leak was discovered in a section of the 2-inch PVC main line located at B-218. The discharged water flowed entered a storm drain that discharges to Arroyo Seco. The water flow rate was 25 gpm for 4.5 hours; total release of approximately 6,750 gallons. All of the water flowed into the storm drain via the catch basin. The storm culvert discharges to Arroyo Seco under the East Avenue Bridge, where there is standing water. However, there was no water or any sign of dampness on the Sandia side of the bridge. It was also completely dry for at least 100 feet east of the West Perimeter Drive Bridge. There is no evidence that the water went offsite or even extended more than 200 feet from the discharge culvert. Most of the water below the East Avenue Bridge is from the Environmental Restoration Department (ERD) pump and treat station at B-216.
9/18/12	B-153	Mechanical technicians working near the southwest corner of B-153 were using a forklift to move a small vacuum pump staged in a secondary containment tray. As the pump was lifted, the tray tipped, spilling approximately two quarts of oil to the asphalt. The technicians immediately initiated a cleanup response by placing absorbent pads on the spilled oil. The used absorbent pads were collected and absorbent clay was worked into the spill. All of the used absorbent pads and used absorbent clay were placed in a hazardous waste collection container to be managed for disposal as hazardous waste through RHW. The spilled oil remained inside the tented area, on asphalt, and did not come in contact with water, storm drain, or soil.
9/26/12	B-611	Diesel dispenser #5 at the B-611 fueling station had a small leak. It was immediately taken out of service and locked out. Less than 200 milliliters of diesel fuel leaked onto the fueling station's concrete island. LLNL staff immediately used absorbent to clean up the spill. Additional absorbent was placed on the island under the dispenser's nozzle to absorb any drips.
10/3/12	B-581	Approximately one gallon of hydraulic fluid was released from a genie lift outside of B-581. The lift was sitting on steel plates over a non-paved (dirt) area. While most of the fluid remained on top of the plates, approximately one quart flowed through a hole in one of the plates and into the soil. Absorbent pads were placed on the steel plates and any accessible fluid was cleaned up. Once the genie lift and the steel plates are removed, the soil beneath will be excavated.
10/24/12	B-381	A fire drain line used for system testing on Monday, October 22 was apparently never fully closed at the conclusion of the test. Approximately 1,440 gallons of water were released at a flow rate of 1/2 gpm for approximately 48 hours. The water flowed about 100 yards to a storm drain in a low spot in the landscaping. That catch basin culvert continues about 100 feet west to the drainage channel along Outer Loop Road. There were some random pockets of water along the drainage channel, but it is very unlikely that the water would have reached Arroyo Las Positas or went offsite.
10/24/12	B-531	Approximately one quart of hydraulic oil leaked from a tractor parked on gravel in the Maintenance and Utilities Services Department (MUSD) soil yard. The spill was immediately cleaned up and plastic was placed under the tractor until it could be repaired. None of the hydraulic oil reached the storm drainage system or an arroyo.
11/27/12	T-6302	A diesel fuel leak from a forklift onto asphalt was discovered in the Rigger Yard (located north of T-6302). Less than four fluid ounces of fuel leaked over an area of approximately 8 inches in diameter. Absorbent was used to immediately clean up the spill. The cause of the leak was a loose O-ring. The forklift was repaired and returned to service. None of the diesel fuel reached the storm drainage system or an arroyo.
11/29/12	East Ave Security Checkpoint	A small amount of fluid leaked from a vehicle at the Security Check Point on East Avenue (OS012), located just east of Vasco Road. Remnants of the puddle of fluid were driven through creating tracks down East Avenue and onto LLNL's Livermore Site. An RHW Field Technician responded to the site and cleaned up the small spill between Kiosks OS012A and OS012B by using approximately four pounds of absorbent. The tracks had absorbed into the asphalt. It was not raining, none of the liquid reached the storm drainage system or an arroyo and the spill that had not absorbed into the asphalt was immediately cleaned up.
11/28/12	B-041	A leaking irrigation line was discovered in the evening at B-041. The duration of the flow was unknown. The entire area was saturated due to rain and it was impossible to determine the direction or extent of any prior saturation or runoff due to the leak. There is a storm drain about 100 feet southwest of the leak point,

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<b>Date</b>	<b>Location</b>	<b>Description</b>
		but there was no evidence that the water entered the storm drain.
12/6/12	B-391	A broken underground water pipe in the landscape area along the south side of B-391 released water into an open storm drain. The exact time that the release began is not known, the rate of flow was approximately 25–30 gpm. It was estimated that approximately 3,600 gallons of water were released. The water from the storm drain flowed east into a culvert that discharges into the arroyo at the LLNL north perimeter. The culvert and arroyo were visually confirmed to show free-flowing water. It is assumed that the water from the release reached the Arroyo Las Positas and left the site. This release was reported to the SFBRWQCB by phone message and email.
12/10/12	B-391	Engine oil leaked from a crane located on the asphalt pathway outside of the main lobby of B-391. The leak, approximately two fluid ounces of engine oil, covered an area of 6 inches by 10 inches. Absorbent was immediately placed on the spill and the cleanup was completed in less than a half hour. The released oil did not discharge to the storm drainage system or an arroyo.
12/18/12	B-581	Oil leaked from the Transformer 1836 enclosure, onto the concrete pad, and less than one quart leaked into the soil below. A plan was developed to shut down the transformer the next morning to determine the source of the leak. An RHW technician conducted a cleanup of the soil around the concrete pad. Absorbent pigs were placed on the concrete pad around the transformer enclosure to capture any future oil that may leak before the shutdown. After shutdown and repair was complete, the RHW technician picked up the remaining pigs for disposal as hazardous waste.
1/15/13	T-5104	Approximately five gallons of water leaked from a safety shower, causing a frozen pool of water on the asphalt. The spill did not reach the storm drainage system or an arroyo. MUSD staff responded and turned off the water to the safety shower.
1/22/13	T-2685	A taxi leaked about a half of cup of gear oil. The leak was contained on the asphalt parking surface. The spill was cleaned up by the fleet garage.
2/2/13	T-2685	An LLNL sanitary sewer main line became clogged and overflowed between approximately 5:30 AM and 10:30 AM at manhole 48-B west of T-2685. Approximately 9,000 gallons entered the adjacent storm sewer system, flowed approximately 1/3 mile north and discharged into Arroyo Las Positas north of B-191. Maintenance mechanics responded immediately to remove the clog and restore flow. Based on visual observations on the morning of the release, as well as February 4, no residue such as toilet paper or other human waste indicators were observed in Arroyo Las Positas in the vicinity of the outfall. A wildlife biologist performed a survey and did not observe any evidence of impact to fish or amphibians. Two representatives from the City of Livermore Source Control Division responded on February 4 to evaluate the discharge into the Arroyo, no residual or visual indications of the overflow were found. Since there are only a few hundred employees on duty early weekend mornings, only a small fraction of the total discharge is expected to be domestic sources. The bulk of the flow is generated from routine discharges of mechanical equipment and CERCLA treated ground water that is permitted to be discharged into the storm drain. The release was reported to the California Emergency Management Agency (CalEMA), an ROC was sent to the SFBRWQCB and a report was submitted to the Chemical Emergency Planning and Response Commission (CEPRC).
2/8/13	B-611	Approximately 1/2 gallon of unleaded fuel was released to the concrete during vehicle refueling operations. The gasoline flowed north, creating an affected area of approximately 2.5-feet wide by 20-feet long. Absorbent material was applied to the spill and all of the released gasoline was absorbed. None of the released gasoline made contact with soil, water, or a storm drain. All of the cleaned up material was managed as hazardous waste for disposal through RHW.
2/11/13	B-523	Trim SC120 (a water soluble oil) leaked from a band saw located in the northeast section of the B-523 Work Shop. Most of the leaked oil went into the collection pan under the band saw. A small amount, approximately eight fluid ounces, leaked onto the concrete floor. Absorbent was immediately used to soak up the spill on the concrete and the band saw was tagged Out of Service. Approximately two fluid ounces of the oil flowed outside of the structure onto concrete adjacent to the building. Absorbent was immediately used and no oil reached the storm sewer system.

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<b>Date</b>	<b>Location</b>	<b>Description</b>
2/15/13	B162	Approximately ten gallons of sewage was discharged when water flowed from a sanitary sewer cleanout just east of B-162 and northwest of T-1602 onto the surrounding asphalt. MUSD staff coned off the affected area and used a double-cleanout just south of the overflow to clear out a clog in the line. A bleach solution was sprayed onto the affected area and the cones were left in place over the weekend. No sewage reached the storm sewer system.
2/25/13	T-2701	A cracked shower drain line in T-2701 allowed a small amount of water to leak out from underneath the trailer and migrate a short distance to the south exterior landscape area. The shower was taken out of service for repair. Approximately 5–10 gallons of “grey water” was released from the crack in the pipe. All of the grey water absorbed into the soil under the trailer and a small area of landscaping on the south side of T-2701.
3/13/13	B-492	LCW water was seeping upward onto the asphalt northeast of B-492. The water had not migrated into the nearby storm drain system, which runs to the Arroyo. Precautions were taken by placing absorbent pigs around the storm drain, and the maintenance mechanics observed the area on a periodic basis overnight to ensure that the water flow did not increase and/or enter the storm drain. IMF managed the repair of the leaking pipe.
4/19/13	B-341	A Praxair liquid nitrogen tractor-trailer leaked about 5 gallons of hydraulic oil onto the asphalt on the south side of B-341 due to a broken seal. Fire Department personnel spread absorbent under the rig to soak up the hydraulic oil and plugged the hydraulic line with putty to prevent any residual liquid from dripping. It was determined that the damaged hydraulic system affected operation of the trailer, not the tractor, and the vehicle was able to return to Praxair. The hydraulic oil and absorbent were cleaned up by RHWM personnel. No hydraulic oil reached the storm sewer system.
4/20/13	B-322	There was a fire at B-322 involving an acid tank used to contain spent hydrochloric and hydrofluoric acids (3% strength). The fire was out within approximately 15 minutes. The source of the fire appeared to be the tank heater. All plating tanks that are located over secondary containment are pumped to the facility’s hazardous waste retention tank. Any release of acid was contained within this system. Approximately 1,000 gallons of city water (50 gpm x 20 min = 1,000 gal) from the fire sprinkler head directly above the tank were released into the room and some ran under the door and out of the building onto the ground. Judging from the wet areas on the pavement outside, it would appear that the release outside the building was significantly less than 1,000 gallons. The Fire Department put absorbent materials across the doorways. The pH of all water exiting the building and on the floor inside the building was found to be neutral. Approximately 250 gallons of city water was released to ground from charging and discharging the fire hoses. Facility personnel walked the storm drain line. The next catch basin in line was dry and there was no release offsite.
4/24/13	B-193	Maintenance Mechanics responded to an equipment alarm at the Sewer Diversion Facility (SDF, B-193) and found a broken plastic elbow on a 2-inch city water supply line, which supplies water to an eyewash in the vicinity of the SDF tank farm. They were able to locate a traffic box in the area and shut off the water supplying the eyewash. The water had sprayed onto asphalt and ran approximately 20 feet to a storm drain that is plumbed through approximately 50 feet of culvert to Arroyo Las Positas. An estimated 500 gallons flowed into Arroyo Las Positas and is assumed to have traveled the few hundred feet of channel to Patterson Pass Road, and offsite. This release was reported to the SFBRWQCB by phone message and email.
4/30/13	B-361	PLS Labor personnel were backing up their government vehicle in the parking lot west of B-361 when they noticed evidence of leaking fluid from the vehicle on the asphalt. They parked the vehicle and determined that approximately 7 fluid ounces of power steering fluid were released onto the asphalt. Dry sorb was applied to the affected areas of the asphalt, and the contaminated dry sorb was containerized and managed through RHWM. There was no impact to the surrounding soil or storm drain system.

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**Table A-2.** Summary of best management practice inspections in potential pollutant source/industrial activity areas.

<b>Principal Directorate Responsible for Potential Pollutant Source/Industrial Activity</b>	<b>Deficiencies in BMPs or BMP Implementation and Additional/Revised BMPs or Corrective Actions.</b>
1-Director's Office/Security Organization	No direct responsibility for facilities at the Livermore Site. (Facilities managed by Operations & Business)
2-Engineering	No direct responsibility for facilities at the Livermore Site. (Facilities managed by Operations & Business)
3-Computation	<u>B041</u> : Outdoor storage of materials/equipment could degrade storm water quality. Remove, relocate, or cover noted items. <u>T3577</u> : Repair roof downspout. Reattach to wall.
4-Physical & Life Sciences	No direct responsibility for facilities at the Livermore Site. (Facilities managed by Operations & Business)
5-Global Security	No direct responsibility for facilities at the Livermore Site. (Facilities managed by Operations & Business)
6-Weapons and Complex Integration	No deficiencies were found.
7-National Ignition Facility and Photon Science	<u>B298, B381, B382, B481, B482, B490, B491, B493, B571, B581, B583, B671, B681, OS682, T2825, T3724, T3725, T3726</u> : Storm drain maintenance required to remove debris and prevent blockage. <u>B165, B392, B581, B582</u> : Outdoor storage of materials/equipment could degrade storm water quality. Remove, relocate, or cover noted items. <u>B165</u> : Remove flaking lead based paint. <u>B392</u> : Remove degraded adhesive material from ground.
8-Operations and Business	<u>B133, B142, B151, B152, B154, B155, B321E</u> : Storm drain maintenance required to remove debris and prevent blockage. <u>B133</u> : Install barrier to prevent soil erosion. <u>B190, B406, B597, LGS-57, ERD S200 Facilities (TFA U011, TFC U187, TFE-SW MTU-03, TF5475), T4399</u> : Outdoor storage of materials/equipment could degrade storm water quality. Remove, relocate, or cover noted items. Improve general housekeeping. <u>Site-wide</u> : Many waste and cardboard recycling dumpsters have lids that are broken and do not properly close. Survey dumpsters and fix non-functioning lids.

Table A-3. Record of Dry Season Observations.				Discharge Observations		
Location	Inspector	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Observations	Description
ALPE	Karl Brunckhorst	22-Jun-12	10:21 AM	Leaves, sticks, paper		
ALPO	Karl Brunckhorst	22-Jun-12	10:18 AM	Leaves, sticks, paper, plastic	Light construction taking place south of sample location	
ASS2	Karl Brunckhorst	22-Jun-12	10:00 AM	Leaves, sticks		
ASW	Karl Brunckhorst	22-Jun-12	10:08 AM	Leaves, sticks		ERD'S Treatment Facility "A" is discharging, no corrective action needed
AVE. K	Karl Brunckhorst	22-Jun-12	10:54 AM	Leaves, sticks, paper, plastic, cans		
B111	Karl Brunckhorst	22-Jun-12	10:04 AM	Leaves, sticks		
B-191 / HEAF	Karl Brunckhorst	22-Jun-12	10:46 AM			
B194	Karl Brunckhorst	22-Jun-12	10:41 AM		Clean	
B341	Karl Brunckhorst	22-Jun-12	10:30 AM	Leaves, sticks	No work activity going on	
B391	Karl Brunckhorst	22-Jun-12	10:35 AM	Leaves, sticks		
B551W	Karl Brunckhorst	22-Jun-12	10:28 AM	Leaves, sticks		
GRNE	Karl Brunckhorst	22-Jun-12	10:16 AM	Leaves, sticks, plastic		
LABOR ONLY	Karl Brunckhorst	22-Jun-12	10:51 AM			Evidence of rinsing activities where non-hazardous materials are being removed within containment area, no corrective action taken
WPDC	Karl Brunckhorst	22-Jun-12	10:13 AM	Leaves, sticks		Lake Haussmann & ERD Treatment Facility B discharging, no corrective action needed
ALPE	Karl Brunckhorst	11-Sep-12	10:26 AM	Leaves, sticks, paper		
ALPO	Karl Brunckhorst	11-Sep-12	10:23 AM	Leaves, sticks, paper, plastic	Light construction taking place south of sample location	
ASS2	Karl Brunckhorst	11-Sep-12	10:02 AM	Leaves, sticks		
ASW	Karl Brunckhorst	11-Sep-12	10:10 AM	Leaves, sticks		ERD's Treatment Facility "A" is discharging, no corrective action needed
AVE. K	Karl Brunckhorst	11-Sep-12	10:52 AM	Leaves, sticks, paper, plastic, cans		Evidence of irrigation water
B111	Karl Brunckhorst	11-Sep-12	10:06 AM	Leaves, sticks		
B191 / HEAF	Karl Brunckhorst	11-Sep-12	10:41 AM		Clean	

Table A-3. Record of Dry Season Observations.				Discharge Observations		
Location	Inspector	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Observations	Description
B194	Karl Brunckhorst	11-Sep-12	10:38 AM			
B341	Karl Brunckhorst	11-Sep-12	10:31 AM	Leaves, sticks, plastic	No work activity going on	
B391	Karl Brunckhorst	11-Sep-12	10:34 AM	Leaves, sticks		
B551W	Karl Brunckhorst	11-Sep-12	10:29 AM	Leaves, sticks		
GRNE	Karl Brunckhorst	11-Sep-12	10:20 AM	Leaves, sticks, plastic	Fine, sand-like material laid down on roadside near sample location	
LABOR ONLY	Karl Brunckhorst	11-Sep-12	10:47 AM	Leaves		Evidence of rinsing activities where non-hazardous materials are being removed within containment area, no corrective action needed
WPDC	Karl Brunckhorst	11-Sep-12	10:14 AM	Leaves, sticks		Lake Hausmann and ERD's Treatment Facility "B" is discharging, no corrective action needed

**Table A-4.** Record of Wet Season Observations.

Location	Inspector	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Discharge Observations		Comments
					Turbidity	Runoff	
ALPE	Karl Brunckhorst	31-Oct-12	1:55 PM	Leaves, sticks, paper, plastic	No	No Runoff	
ALPO	Karl Brunckhorst	31-Oct-12	1:52 PM	Leaves, sticks, paper, plastic	No	No Runoff	Light construction south of and adjacent to sample location.
ASS2	Karl Brunckhorst	31-Oct-12	1:36 PM	Leaves, sticks	No	No Runoff	
ASW	Karl Brunckhorst	31-Oct-12	1:40 PM	Leaves, sticks	Low	No Runoff	ERD's Treatment Facility "A" discharging.
GRNE	Karl Brunckhorst	31-Oct-12	1:48 PM	Leaves, sticks, paper, plastic	No	No Runoff	
WPDC	Karl Brunckhorst	31-Oct-12	1:44 PM	Leaves, sticks, plastic	Low	No Runoff	ERD Treatment Facility B is discharging
ALPE	Craig Fish	16-Nov-12	2:37 PM	Leaves, sticks	No	No Runoff	
ALPO	Craig Fish	16-Nov-12	2:35 PM	Leaves, sticks, paper	No	No Runoff	
ASS2	Craig Fish	16-Nov-12	2:15 PM	Leaves, sticks	No	No Runoff	
ASW	Craig Fish	16-Nov-12	2:20 PM	Leaves, sticks	Low	No Runoff	ERD's Treatment Facility "A" discharging
GRNE	Craig Fish	16-Nov-12	2:35 PM	Leaves, sticks, paper	No	No Runoff	
WPDC	Craig Fish	16-Nov-12	2:25 PM	Leaves, sticks	Low	No Runoff	Lake Haussmann & ERD Treatment Facility B discharging
ALPE	Karl Brunckhorst	5-Dec-12	9:57 AM	Leaves, sticks	Moderate	Significant	Non-Qualifying storm event
ALPO	Karl Brunckhorst	5-Dec-12	9:52 AM	Leaves, sticks, paper	Moderate	Significant	Non-Qualifying storm event
ASS2	Karl Brunckhorst	5-Dec-12	9:36 AM	Leaves, sticks	Moderate	Significant	Non-Qualifying storm event
ASW	Karl Brunckhorst	5-Dec-12	9:40 AM	Leaves, sticks	Moderate	Significant	ERD's Treatment Facility "A" discharging. Non-qualifying storm event.
GRNE	Karl Brunckhorst	5-Dec-12	9:48 AM	Leaves, sticks, plastic	Moderate	Significant	Non-Qualifying storm event
WPDC	Karl Brunckhorst	5-Dec-12	9:44 AM	Leaves, sticks	Moderate	Significant	Lake Haussmann & ERD Treatment Facility B discharging. Non-qualifying storm event.

**Table A-4.** Record of Wet Season Observations.

Location	Inspector	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Discharge Observations		Comments
					Turbidity	Runoff	
ALPE	Karl Brunckhorst	24-Jan-13	1:50 PM	Leaves, sticks	Moderate	Significant	Qualifying Monitored storm event
ALPO	Karl Brunckhorst	24-Jan-13	2:02 PM	Leaves, sticks, paper, plastic	No	No Runoff	Qualifying Monitored storm event
ASS2	Crystal Rosene	24-Jan-13	1:55 PM	Leaves, sticks	Low	Significant	Qualifying Monitored storm event
ASW	Crystal Rosene	24-Jan-13	2:10 PM	Leaves, sticks	Moderate	Significant	ERD's Treatment Facility "A" discharging. Qualifying Monitored storm event.
GRNE	Karl Brunckhorst	24-Jan-13	2:05 PM	Leaves, sticks, paper, plastic	Low	Significant	Qualifying Monitored storm event
WPDC	Crystal Rosene	24-Jan-13	2:40 PM	Leaves, sticks	Moderate	Significant	Lake Haussmann & ERD Treatment Facility B discharging. Qualifying Monitored storm event.
ALPE	Gary Bear	19-Feb-13	12:45 PM	Leaves, sticks	Moderate	Significant	Qualifying Monitored storm event
ALPO	Gary Bear	19-Feb-13	12:55 PM	Leaves, sticks	No	No Runoff	Qualifying Monitored storm event
ASS2	Karl Brunckhorst	19-Feb-13	12:35 PM	Leaves, sticks	Moderate	Significant	Qualifying Monitored storm event
ASW	Karl Brunckhorst	19-Feb-13	12:50 PM	Leaves, sticks	Moderate	Significant	ERD's Treatment Facility "A" discharging. Qualifying Monitored storm event.
GRNE	Gary Bear	19-Feb-13	1:16 PM	Leaves, sticks	Moderate	Significant	Qualifying Monitored storm event
WPDC	Karl Brunckhorst	19-Feb-13	1:15 PM	Leaves, sticks	Moderate	Significant	Lake Haussmann & ERD Treatment Facility B discharging. Qualifying Monitored storm event.
ALPE	Karl Brunckhorst	27-Mar-13	2:40 PM	Leaves, sticks, plastic, sediment buildup	No	No Runoff	
ALPO	Karl Brunckhorst	27-Mar-13	2:37 PM	Leaves, sticks, paper	No	No Runoff	

**Table A-4.** Record of Wet Season Observations.

Location	Inspector	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Discharge Observations		Comments
					Turbidity	Runoff	
ASS2	Karl Brunckhorst	27-Mar-13	2:22 PM	Leaves, sticks	No	No Runoff	
ASW	Karl Brunckhorst	27-Mar-13	2:26 PM	Leaves, sticks, plastic	Low	No Runoff	ERD's Treatment Facility "A" discharging
GRNE	Karl Brunckhorst	27-Mar-13	2:33 PM	Leaves, sticks, paper, plastic	No	No Runoff	
WPDC	Karl Brunckhorst	27-Mar-13	2:30 PM	Leaves, sticks, plastic	Low	No Runoff	Lake Haussmann & ERD Treatment Facility B discharging.
ALPE	Karl Brunckhorst	30-Apr-13	10:22 AM	Leaves, sticks, paper, plastic	No	No Runoff	
ALPO	Karl Brunckhorst	30-Apr-13	10:20 AM	Leaves, sticks	No	No Runoff	
ASS2	Karl Brunckhorst	30-Apr-13	10:05 AM	Leaves, sticks	No	No Runoff	
ASW	Karl Brunckhorst	30-Apr-13	10:07 AM	Leaves, sticks	Low	No Runoff	ERD's Treatment Facility "A" discharging.
GRNE	Karl Brunckhorst	30-Apr-13	10:17 AM	Leaves, sticks, paper, plastic	No	No Runoff	
WPDC	Karl Brunckhorst	30-Apr-13	10:12 AM	Leaves, sticks	Low	No Runoff	Lake Haussmann & ERD Treatment Facility B discharging.

*Lawrence Livermore National Laboratory Livermore Site  
Annual Storm Water Monitoring Report for Waste Discharge Requirements 95-174  
August 2013*

**Table A-5.** October 2012 - April 2013 daily rainfall totals (for days with >0.2 inches precipitation), Livermore Site.

<b>Date</b>	<b>Precipitation Daily Total (Inches)</b>	<b>Day of Week</b>	<b>Description of Event</b>
11/01/2012	0.28	Thursday	>0.27 by 7 am
11/18/2012	0.25	Sunday	
11/30/2012	1.31	Friday	>0.67 by 7 am
12/02/2012	0.83	Sunday	
12/05/2012	0.57	Wednesday	<3 days w/o Runoff
12/22/2012	0.71	Saturday	
12/23/2012	0.60	Sunday	
12/25/2012	0.22	Tuesday	Holiday Closure
01/06/2013	0.2	Sunday	
01/24/2013	0.57	Thursday	SAMPLED
02/19/2013	0.37	Tuesday	SAMPLED
04/07/2013	0.22	Sunday	

**Table A-6.** Storm water quality data for January 24, 2013.

DESCRIBE DISCHARGE LOCATION	DATE/TIME OF SAMPLE LOCATION	TIME DISCHARGE STARTED	ANALYTICAL RESULTS				
			For First Storm Event				
			BASIC PARAMETERS				
			pH	TSS	O&G	TOC	DO
WPDC (ALP Effluent)	1/24/13	Ongoing					
	AM <input type="checkbox"/> 2:40 PM <input checked="" type="checkbox"/>	AM <input type="checkbox"/> PM <input checked="" type="checkbox"/>	7.92	58	<5	11	10
GRNE (ALP Influent)	1/24/13	Ongoing					
	AM <input type="checkbox"/> 2:25 PM <input checked="" type="checkbox"/>	AM <input type="checkbox"/> PM <input checked="" type="checkbox"/>	7.6	110	<5	4.7	11
ALPO (ALP Influent)	1/24/13						
	AM <input type="checkbox"/> PM <input type="checkbox"/> Not Sampled	AM <input type="checkbox"/> PM <input type="checkbox"/> No Runoff	N/A	N/A	N/A	N/A	N/A
ALPE (ALP Influent)	1/24/13	Ongoing					
	AM <input type="checkbox"/> 1:50 PM <input checked="" type="checkbox"/>	AM <input type="checkbox"/> PM <input checked="" type="checkbox"/>	7.62	64	5.6	6	11
TEST REPORTING UNITS:			pH Units	mg/L	mg/L	mg/L	mg O/L
TEST METHOD USED:			SM-4500HB	SM-2540D	E1664HEM	SM-5310C	SM-4500OG
ANALYZED BY (SELF/LAB):			BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

ALP - Arroyo Las Positas

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

**Table A-6.** Storm water quality data for January 24, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event			
	OTHER PARAMETERS			
	Beryllium	Bromacil	Cadmium	Chemical Oxygen Demand
WPDC (ALP Effluent)	<0.001	<0.5	<0.0005	55
GRNE (ALP Influent)	<0.001	16	<0.0005	29
ALPO (ALP Influent) Not Sampled      No Runoff	N/A	N/A	N/A	N/A
ALPE (ALP Influent)	<0.001	<5	<0.0005	110
TEST REPORTING UNITS:	mg/L	ug/L	mg/L	mg O/ L
TEST METHOD USED:	E200.8	E525.2	E200.8	E410.4
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs

ALP - Arroyo Las Positas

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Dilution was raised to 10.101 for the E525.2 for ALPE location only.

**Table A-6.** Storm water quality data for January 24, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS						
	For First Storm Event						
	OTHER PARAMETERS						
	Copper	Diazinon	Diuron	Glyphosate	Hexavalent Chromium	Lead	Mercury
WPDC (ALP Effluent)	0.0078	<0.2	<1	<20	0.0021	<0.005	<0.0002
GRNE (ALP Influent)	0.028	<0.2	<1	77	<0.002	0.011	<0.0002
ALPO (ALP Influent) Not Sampled      No Runoff	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ALPE (ALP Influent)	0.014	<2	<1	<20	<0.002	0.011	<0.0002
TEST REPORTING UNITS:	mg/L	ug/L	ug/L	ug/L	mg/L	mg/L	mg/L
TEST METHOD USED:	E200.8	E525.2	E632	E547	E218.6	E200.8	E245.1
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

ALP - Arroyo Las Positas

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Dilution was raised to 10.101 for the E525.2 for ALPE location only.

**Table A-6.** Storm water quality data for January 24, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS						
	For First Storm Event						
	OTHER PARAMETERS						
	Nitrate (asNO3)	Ortho-Phosphate	Pentachloro-phenol	Pyrene	Simazine	Total Dissolved Solids	Zinc
WPDC (ALP Effluent)	7.2	0.32	<1	<0.1	<0.3	220	0.072
GRNE (ALP Influent)	19	0.49	<1	<0.1	<0.3	73	0.094
ALPO (ALP Influent) Not Sampled No Runoff	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ALPE (Influent)	2.7	0.57	<10	<1	<3	51	0.063
TEST REPORTING UNITS:	mg/L	mg/L	ug/L	ug/L	ug/L	mg/L	mg/L
TEST METHOD USED:	E300.0	E365.1	E525.2	E525.2	E525.2	SM-2540C	E200.8
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

ALP - Arroyo Las Positas  
 TSS - Total Suspended Solids  
 SC - Specific Conductance  
 O&G - Oil & Grease  
 TOC - Total Organic Carbon  
 DO - Dissolved Oxygen  
 N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Dilution was raised to 10.101 for the E525.2 for ALPE location only.

**Table A-6.** Storm water quality data for January 24, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS			
	For First Storm Event			
	OTHER PARAMETERS			
	Gross alpha	Gross beta	Tritium	Plutonium 239+240
WPDC (ALP Effluent)	0.026825 ± 0.04329	0.14985 ± 0.0518	4.477 ± 2.849	-0.00022 ± 0.0018722
GRNE (ALP Influent)	0.4477 ± 0.1295	0.8584 ± 0.16502	1.8389 ± 2.5974	N/A
ALPO (ALP Influent) Not Sampled No Runoff	N/A	N/A	N/A	N/A
ALPE (Influent)	0.05106 ± 0.05069	0.20646 ± 0.0629	3.848 ± 2.812	N/A
TEST REPORTING UNITS:	<b>Bq/L</b>	<b>Bq/L</b>	<b>Bq/L</b>	<b>Bq/L</b>
TEST METHOD USED:	E900	E900	E906	AS:PUISO
ANALYZED BY (SELF/LAB):	GEL Labs	GEL Labs	GEL Labs	GEL Labs

Radioactivities are reported as the measured concentration and an uncertainty (s +/-2 counting error). If the concentration is less than or equal to the uncertainty, the result is considered to be a nondetection.

ALP - Arroyo Las Positas

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

**Table A-6.** Storm water quality data for January 24, 2013.

DESCRIBE DISCHARGE LOCATION	DATE/TIME OF SAMPLE COLLECTION	TIME DISCHARGE STARTED	ANALYTICAL RESULTS				
			For First Storm Event				
			BASIC PARAMETERS				
			pH	TSS	O&G	TOC	DO
ASW (Arroyo Seco Effluent)	1/24/13	Ongoing					
	AM <input type="checkbox"/> 2:10 PM <input checked="" type="checkbox"/>	AM <input type="checkbox"/> PM <input checked="" type="checkbox"/>	7.69	30.	<5	9.5	11
ASS2 (Arroyo Seco Influent)	1/24/13	Ongoing					
	AM <input type="checkbox"/> 1:55 PM <input checked="" type="checkbox"/>	AM <input type="checkbox"/> PM <input checked="" type="checkbox"/>	6.91	18.	<5	6.8	11
TEST REPORTING UNITS:			pH Units	mg/L	mg/L	mg/L	mg O/L
TEST METHOD USED:			SM-4500HB	SM-2540D	E1664HEM	SM-5310C	SM-4500OG
ANALYZED BY (SELF/LAB):			BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

**Table A-6.** Storm water quality data for January 24, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS			
	For First Storm Event			
	OTHER PARAMETERS			
	Beryllium	Bromacil	Cadmium	Chemical Oxygen Demand
ASW (Arroyo Seco Effluent)	<0.001	<0.56	<0.0005	42.
ASS2 (Arroyo Seco Influent)	<0.001	<0.5	<0.0005	29.
TEST REPORTING UNITS:	mg/L	ug/L	mg/L	mg O/ L
TEST METHOD USED:	E200.8	E525.2	E200.8	E410.4
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Dilution was raised to 1.124 for the E525.2 for ASW location only.

**Table A-6.** Storm water quality data for January 24, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS						
	For First Storm Event						
	OTHER PARAMETERS						
	Copper	Diazinon	Diuron	Glyphosate	Hexavalent Chromium	Lead	Mercury
ASW (Arroyo Seco Effluent)	0.0085	<0.22	<1.1	<20	<0.002	<0.005	<0.0002
ASS2 (Arroyo Seco Influent)	0.0061	<0.2	<1.1	<20	<0.002	<0.005	<0.0002
TEST REPORTING UNITS:	mg/L	ug/L	ug/L	ug/L	mg/L	mg/L	mg/L
TEST METHOD USED:	E200.8	E525.2	E632	E547	E218.6	E200.8	E245.1
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Dilution was raised to 1.124 for the E525.2 for ASW location only.

Dilution was raised to 1.149 for the E632 for ASS2, ASW locations only.

**Table A-6.** Storm water quality data for February 19, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS						
	For Second Storm Event						
	OTHER PARAMETERS						
	Nitrate (asNO3)	Ortho-Phosphate	Pentachloro-phenol	Pyrene	Simazine	Total Dissolved Solids	Zinc
ASW (Arroyo Seco Effluent)	4.	0.69	<1	<0.1	<0.3	64.	0.096
ASS2 (Arroyo Seco Influent)	2.6	0.46	<1	<0.1	<0.3	37.	0.057
TEST REPORTING UNITS:	mg/L	mg/L	ug/L	ug/L	ug/L	mg/L	mg/L
TEST METHOD USED:	E300.0	E365.1	E525.2	E525.2	E525.2	SM-2540C	E200.8
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

**Table A-6.** Storm water quality data for January 24, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS			
	For First Storm Event			
	OTHER PARAMETERS			
	Gross alpha	Gross beta	Tritium	Plutonium 239+240
ASW (Arroyo Seco Effluent)	0.04773 ± 0.04551	0.19351 ± 0.06475	8.621 ± 3.33	0.00 ± 0.0015392
ASS2 (Arroyo Seco Influent)	0.033374 ± 0.04403	0.17427 ± 0.06697	0.7659 ± 2.5049	N/A
TEST REPORTING UNITS:	<b>Bq/L</b>	<b>Bq/L</b>	<b>Bq/L</b>	<b>Bq/L</b>
TEST METHOD USED:	E900	E900	E906	E906
ANALYZED BY (SELF/LAB):	GEL Labs	GEL Labs	GEL Labs	GEL Labs

Radioactivities are reported as the measured concentration and an uncertainty (s +/-2 counting error). If the concentration is less than or equal to the uncertainty, the result is considered to be a nondetection.

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

**Table A-7.** Storm water quality data for February 19, 2013.

DESCRIBE DISCHARGE LOCATION	DATE/TIME OF SAMPLE LOCATION	TIME DISCHARGE STARTED	ANALYTICAL RESULTS				
			For Second Storm Event				
			BASIC PARAMETERS				
			pH	TSS	O&G	TOC	DO
WPDC (ALP Effluent)	2/19/13	Ongoing	7.59	68	<5	15	11
	AM <input type="checkbox"/> 1:15 PM <input checked="" type="checkbox"/>	AM <input type="checkbox"/> PM <input checked="" type="checkbox"/>					
GRNE (ALP Influent)	2/19/13	Ongoing	7.19	34	<5	6.3	11
	AM <input type="checkbox"/> 1:16 PM <input checked="" type="checkbox"/>	AM <input type="checkbox"/> PM <input checked="" type="checkbox"/>					
ALPO (ALP Influent)	2/19/13	No Runoff	N/A	N/A	N/A	N/A	N/A
	AM <input type="checkbox"/> PM <input type="checkbox"/> Not Sampled						
ALPE (ALP Influent)	2/19/13	Ongoing	7.39	41	<5	11	11
	AM <input type="checkbox"/> 12:45 PM <input checked="" type="checkbox"/>	AM <input type="checkbox"/> PM <input checked="" type="checkbox"/>					
TEST REPORTING UNITS:			pH Units	mg/L	mg/L	mg/L	mg O/L
TEST METHOD USED:			SM-4500HB	SM-2540D	E1664HEM	SM-5310C	SM-4500OG
ANALYZED BY (SELF/LAB):			BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

ALP - Arroyo Las Positas

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

**Table A-7.** Storm water quality data for February 19, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event			
	OTHER PARAMETERS			
	Beryllium	Bromacil	Cadmium	Chemical Oxygen Demand
WPDC (ALP Effluent)	<0.001	<0.5	<0.0005	57
GRNE (ALP Influent)	<0.001	<0.5	<0.0005	28
ALPO (ALP Influent) Not Sampled      No Runoff	N/A	N/A	N/A	N/A
ALPE (ALP Influent)	<0.001	<0.5	<0.0005	88
TEST REPORTING UNITS:	mg/L	ug/L	mg/L	mg O/ L
TEST METHOD USED:	E200.8	E525.2	E200.8	E410.4
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs

ALP - Arroyo Las Positas

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

**Table A-7.** Storm water quality data for February 19, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS						
	For Second Storm Event						
	OTHER PARAMETERS						
	Copper	Diazinon	Diuron	Glyphosate	Hexavalent Chromium	Lead	Mercury
WPDC (ALP Effluent)	0.011	<0.2	<1	33	<0.002	<0.005	<0.0002
GRNE (ALP Influent)	0.009	<0.2	<1	<20	<0.002	<0.005	<0.0002
ALPO (ALP Influent) Not Sampled      No Runoff	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ALPE (ALP Influent)	0.015	<0.2	<1	<20	<0.002	0.0065	<0.0002
TEST REPORTING UNITS:	mg/L	ug/L	ug/L	ug/L	mg/L	mg/L	mg/L
TEST METHOD USED:	E200.8	E525.2	E632	E547	E218.6	E200.8	E245.1
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

ALP - Arroyo Las Positas

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

**Table A-7.** Storm water quality data for February 19, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS						
	For Second Storm Event						
	OTHER PARAMETERS						
	Nitrate (asNO <sub>3</sub> )	Ortho-Phosphate	Pentachloro-phenol	Pyrene	Simazine	Total Dissolved Solids	Zinc
WPDC (ALP Effluent)	5.1	0.53	<1	<0.1	<0.3	120	0.087
GRNE (ALP Influent)	43	0.67	<1	<0.1	<0.3	180	0.091
ALPO (ALP Influent) Not Sampled No Runoff	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ALPE (Influent)	10	0.81	<1	<0.1	<0.3	310	0.044
TEST REPORTING UNITS:	mg/L	mg/L	ug/L	ug/L	ug/L	mg/L	mg/L
TEST METHOD USED:	E300.0	E365.1	E525.2	E525.2	E525.2	SM-2540C	E200.8
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

ALP - Arroyo Las Positas  
 TSS - Total Suspended Solids  
 SC - Specific Conductance  
 O&G - Oil & Grease  
 TOC - Total Organic Carbon  
 DO - Dissolved Oxygen  
 N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

**Table A-7.** Storm water quality data for February 19, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS			
	For Second Storm Event			
	OTHER PARAMETERS			
	Gross alpha	Gross beta	Tritium	Plutonium 239+240
WPDC (ALP Effluent)	0.028638 ± 0.04255	0.14541 ± 0.05328	2.3865 ± 2.3125	-0.0003811 ± 0.000555
GRNE (ALP Influent)	0.04588 ± 0.04625	0.17686 ± 0.06327	0.3219 ± 1.9943	N/A
ALPO (ALP Influent) Not Sampled      No Runoff	N/A	N/A	N/A	N/A
ALPE (Influent)	0.028083 ± 0.04144	0.13357 ± 0.06142	2.7824 ± 2.2644	N/A
TEST REPORTING UNITS:	<b>Bq/L</b>	<b>Bq/L</b>	<b>Bq/L</b>	<b>Bq/L</b>
TEST METHOD USED:	E900	E900	E906	AS:PUISO
ANALYZED BY (SELF/LAB):	GEL Labs	GEL Labs	GEL Labs	GEL Labs

Radioactivities are reported as the measured concentration and an uncertainty (s +/-2 counting error). If the concentration is less than or equal to the uncertainty, the result is considered to be a nondetection.

ALP - Arroyo Las Positas

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

**Table A-7** Storm water quality data for February 19, 2013.

DESCRIBE DISCHARGE LOCATION	DATE/TIME OF SAMPLE COLLECTION	TIME DISCHARGE STARTED	ANALYTICAL RESULTS				
			For Second Storm Event				
			BASIC PARAMETERS				
			pH	TSS	O&G	TOC	DO
ASW (Arroyo Seco Effluent)	2/19/13	Ongoing					
	AM <input type="checkbox"/> 12:50 PM <input checked="" type="checkbox"/>	AM <input type="checkbox"/> PM <input checked="" type="checkbox"/>	7.09	27.	<5	18.	11
ASS2 (Arroyo Seco Influent)	2/19/13	Ongoing					
	AM <input type="checkbox"/> 12:35 PM <input checked="" type="checkbox"/>	AM <input type="checkbox"/> PM <input checked="" type="checkbox"/>	6.78	20.	<5	6.8	11
TEST REPORTING UNITS:			pH Units	mg/L	mg/L	mg/L	mg O/L
TEST METHOD USED:			SM-4500HB	SM-2540D	E1664HEM	SM-5310C	SM-4500OG
ANALYZED BY (SELF/LAB):			BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

**Table A-7.** Storm water quality data for February 19, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event			
	OTHER PARAMETERS			
	Beryllium	Bromacil	Cadmium	Chemical Oxygen Demand
ASW (Arroyo Seco Effluent)	<0.001	<0.5	<0.0005	68.
ASS2 (Arroyo Seco Influent)	<0.001	<0.5	<0.0005	<25
TEST REPORTING UNITS:	mg/L	ug/L	mg/L	mg O/ L
TEST METHOD USED:	E200.8	E525.2	E200.8	E410.4
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

**Table A-7.** Storm water quality data for February 19, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS						
	For Second Storm Event						
	OTHER PARAMETERS						
	Copper	Diazinon	Diuron	Glyphosate	Hexavalent Chromium	Lead	Mercury
ASW (Arroyo Seco Effluent)	0.013	<0.2	<1	190.	<0.002	<0.005	<0.0002
ASS2 (Arroyo Seco Influent)	0.0087	<0.2	<1	1,300.	<0.002	<0.005	<0.0002
TEST REPORTING UNITS:	mg/L	ug/L	ug/L	ug/L	mg/L	mg/L	mg/L
TEST METHOD USED:	E200.8	E525.2	E632	E547	E218.6	E200.8	E245.1
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

**Table A-7.** Storm water quality data for February 19, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS						
	For Second Storm Event						
	OTHER PARAMETERS						
	Nitrate (asNO3)	Ortho-Phosphate	Pentachloro-phenol	Pyrene	Simazine	Total Dissolved Solids	Zinc
ASW (Arroyo Seco Effluent)	4.	0.69	<1	<0.1	<0.3	64.	0.096
ASS2 (Arroyo Seco Influent)	2.6	0.46	<1	<0.1	<0.3	37.	0.057
TEST REPORTING UNITS:	mg/L	mg/L	ug/L	ug/L	ug/L	mg/L	mg/L
TEST METHOD USED:	E300.0	E365.1	E525.2	E525.2	E525.2	SM-2540C	E200.8
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

**Table A-7.** Storm water quality data for February 19, 2013.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS			
	For Second Storm Event			
	OTHER PARAMETERS			
	Gross alpha	Gross beta	Tritium	Plutonium 239+240
ASW (Arroyo Seco Effluent)	0.06142 ± 0.04736	0.18389 ± 0.07178	0.4477 ± 2.0165	-0.00033448 ± 0.0006142
ASS2 (Arroyo Seco Influent)	0.06327 ± 0.05365	0.16687 ± 0.0777	0.12987 ± 2.1275	N/A
TEST REPORTING UNITS:	<b>Bq/L</b>	<b>Bq/L</b>	<b>Bq/L</b>	<b>Bq/L</b>
TEST METHOD USED:	E900	E900	E906	E906
ANALYZED BY (SELF/LAB):	GEL Labs	GEL Labs	GEL Labs	GEL Labs

Radioactivities are reported as the measured concentration and an uncertainty (s +/-2 counting error). If the concentration is less than or equal to the uncertainty, the result is considered to be a nondetection.

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

DO - Dissolved Oxygen

N/A - Not Analyzed

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater



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