



Environmental Functional Area

Water, Air, Monitoring & Analysis

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

**Annual Report
2010–2011**

August 2011

Michael A. Revelli



**Lawrence Livermore
National Laboratory**

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

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REGIONAL BOARD INFORMATION

Contact Person:
Bruce Wolfe

Address:
Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

GENERAL INFORMATION

A. *NPDES No:*
CA0030023

B. *Operator:*
LLNS

Contact Person:
Reginald F. Gaylord
Lawrence Livermore National Laboratory
P.O. Box 808, L-510
Livermore, CA 94551
(925) 423-1875

C. *Facility/Site:*
Livermore Site

Contact Person:
Bruce Schultz
Lawrence Livermore National Laboratory
P.O. Box 808, L-626
Livermore, CA 94551
(925) 423-3978

Facility SIC Codes:
SIC Code 8733 Non-Commercial Research Organizations
SIC Code 9711 National Security

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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 Hausmann
gpm	gallons per minute
GRNE	Greenville Road East (storm water influent sampling location)
HMMA	Hazardous Materials Management Area
hr	hour
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
PTU	portable treatment unit
QA/QC	quality assurance/quality control
RHWM	Radioactive and Hazardous Waste Management
SC	specific conductance
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SI	système internationale

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Acronyms and Definitions (Continued)

SM	standard method
SWPPP	Storm Water Pollution Prevention Plan
T	trailer
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
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 2010–2011 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. Six constituents of storm water samples (total suspended solids, copper, lead, nitrate, gross alpha, and gross beta) were above LLNL site-specific threshold comparison criteria; however, with one exception, all of the data exceeding LLNL thresholds during 2010–2011 were associated with influent locations and are attributed to off-site activities upstream of the Laboratory. Only one effluent sample, from the Arroyo Seco West (ASW) location, showed a nitrate concentration that was above the LLNL threshold. LLNL responded by investigating potential sources of nitrate between the ASW and ASS2 locations. Nitrate concentrations in effluent samples collected during the second storm were below the LLNL-specific comparison criteria. All other effluent monitoring results for chemical and radioactive parameters were less than comparison criteria. These results indicate that LLNL's current BMPs are effective and that operations at the LLNL Livermore site during 2010–2011 did not impact storm water quality.

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1.0 Introduction

This report discusses the results of the 2010–2011 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-km² facility that is crossed by two intermittent streams, Arroyo Las Positas and Arroyo Seco. The average annual rainfall at the Livermore site is 34.6 cm, and the rainfall for the 2010–2011 reporting period was 34.9 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 cm) collected at the LLNL site meteorological station.

Date	Monthly Total (cm)
May 2010	0.99
June 2010	0.00
July 2010	0.00
August 2010	0.00
September 2010	0.05
October 2010	2.74
November 2010	5.56
December 2010	8.56
January 2011	1.14
February 2011	5.92
March 2011	9.22
April 2011	0.71
Water Year TOTAL	34.89

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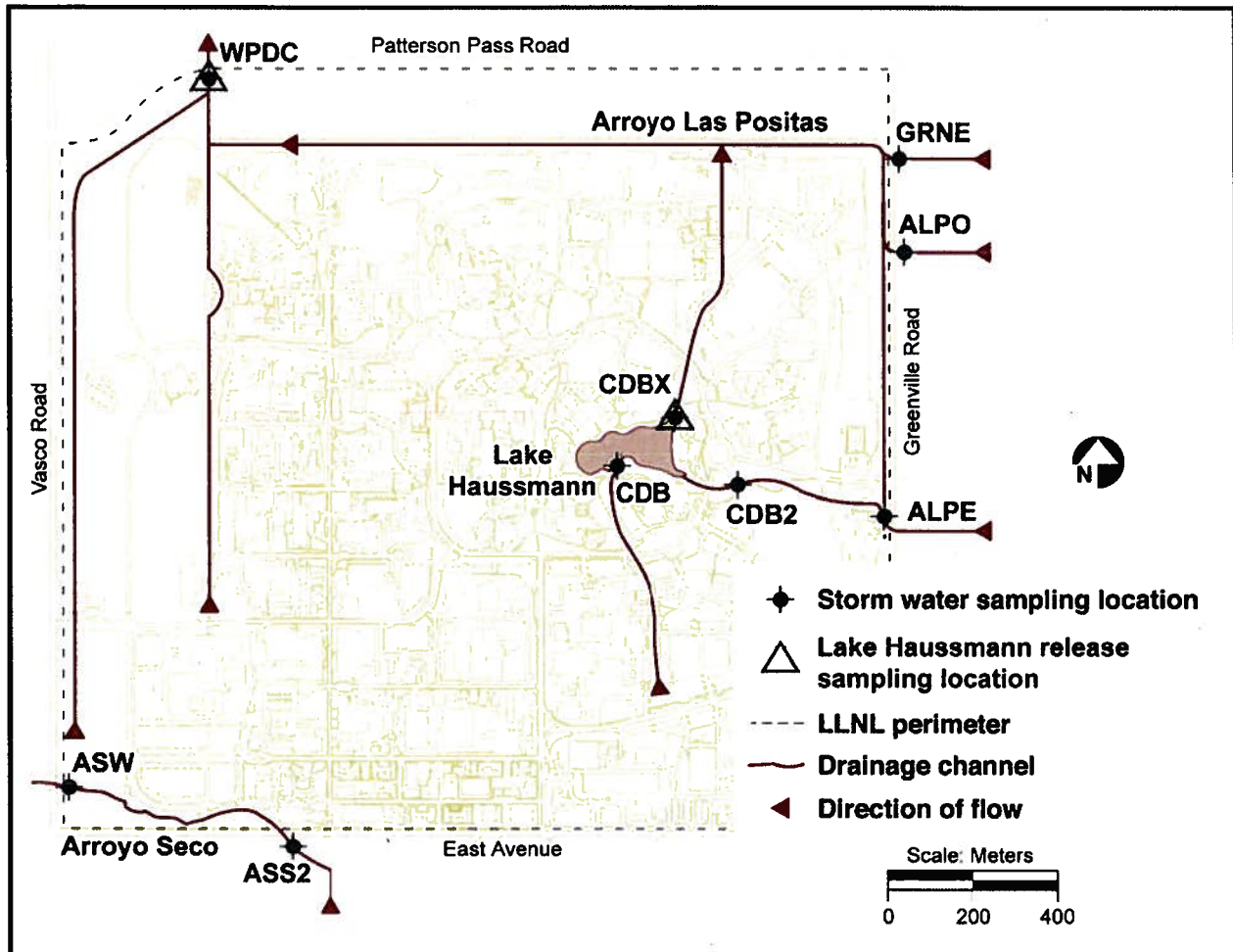


Figure 1. Routine storm water sampling and observation locations.

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 28 and September 20, 2010, 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 2010 through April 2011) 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 occurred in November and December 2010, and February and March 2011; although significant runoff was only associated with the February and March observations. Wet season observations were also conducted during the months of October 2010, and January and April 2011. However, due to the timing and duration of rainfall events during this wet season, the October, January, and April 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 February 16, 2011, and February 25, 2011; however, there was insufficient runoff at ALPO during the first storm to sample this influent location. Samples were

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collected as soon as possible after runoff began (most within the first hour). Water quality data from these storm water samples for the 2010–2011 reporting period are presented in **Appendix A, Tables A-5 and A-6**. Quality assurance and quality control (QA/QC) checks are performed 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 (Gallegos et al. 2010); 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 ^a
Chemical oxygen demand (COD)	200 mg/L ^a
pH	<6.0, >8.5 ^a
Nitrate (as NO ₃)	10 mg/L ^a
Ortho-phosphate	2.5 mg/L ^a
Beryllium	1.6 µg/L ^a
Chromium(VI)	15 µg/L ^a
Copper	36 µg/L ^a
Lead	15 µg/L ^b
Mercury	Above RL ^c
Zinc	350 µg/L ^a
Diuron	14 µg/L ^a
Oil and grease	9 mg/L ^a
Tritium	36 Bq/L ^a
Gross alpha	0.34 Bq/L ^a
Gross beta	0.48 Bq/L ^a

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

^a 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).

^b California and EPA drinking water action level

^c 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 February 16, 2011, sample collected at WPDC (100 percent survival, compared to 100 percent survival in the laboratory control sample) showed 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 minnows in the storm water sample (again collected at WPDC on February 16, 2011) to the survival and growth of the minnows in a laboratory control sample water. From the data reported (**Table 3b**), 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 February 16, 2011, 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 February 16, 2011, at WPDC.

Sample Concentration (%)	7-day survival Avg. (%)	7-day weight ^a Avg. (mg)
100% Laboratory Control	100	0.534
100% WPDC Site Effluent	100	0.571

^a Average weight of the fathead minnows at the end of the 7-day toxicity test.

5.2 Nonradioactive Parameters

Table 4 lists the constituents that exceeded the threshold comparison criteria in **Table 2** during storms sampled in 2010–2011 (full results are in **Appendix A, Tables A-5 and A-6**). Note that with one exception, only influent samples showed constituent concentrations above the threshold

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comparison criteria. 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
TSS	2/16/11	ALPE	Influent	910 mg/L	750 mg/L
Copper	2/16/11	ALPE	Influent	57 µg/L	36 µg/L
Lead	2/16/11	ALPE	Influent	35 µg/L	15 µg/L
Nitrate (as NO ₃)	2/16/11	GRNE	Influent	23 mg/L	10 mg/L
Nitrate (as NO ₃)	2/16/11	ASW	Effluent	12 mg/L	10 mg/L
Gross Alpha	2/16/11	ALPE	Influent	0.50 ± 0.15 Bq/L	0.34 Bq/L
Gross Beta	2/16/11	ALPE	Influent	0.84 ± 0.17 Bq/L	0.48 Bq/L

A copper concentration of 57 µg/L, above the 36 µg/L LLNL-specific comparison criteria, was found in the sample collected at ALPE during the first storm. Because ALPE is an influent location, this result is attributed to off-site activities and is not related to LLNL operations. The maximum concentration of copper in any effluent location sample was 6.8 µg/L, collected at ASW during the second storm.

Similarly, a lead concentration of 35 µg/L, above the 15 µg/L LLNL-specific comparison criteria, was found in the sample collected at ALPE during the first storm. Again, because ALPE is an influent location, this result is attributed to off-site activities and is not related to LLNL operations. The maximum concentration of lead in any effluent location sample was 5.1 µg/L, collected at ASW during the second storm.

A TSS value of 910 mg/L, above the 750 mg/L LLNL-specific comparison criteria, in water samples from influent location ALPE was also attributed to off-site, upstream activities performed by groups unrelated to LLNL (**Table 4**). This elevated TSS at ALPE is the likely explanation for the elevated copper and lead concentrations in this water sample. Copper and lead may exist in both the dissolved and particulate portions of the storm water runoff and the analytical results are reported for total metals in the water sample. Again, given that ALPE is an influent sampling location the TSS and metals results appear to be unrelated to LLNL operations.

Nitrate concentrations, above the LLNL comparison criteria of 10 mg/L but well below the MCL of 45 mg/L, were found in samples collected from GRNE and ASW on February 16, 2011 (**Table 4**). GRNE, however, is an influent location; and therefore, that elevated nitrate value (23 mg/L) is not related to LLNL activities. The 12 mg/L nitrate concentration reported for the February 16, 2011, effluent sample collected at ASW, while within the range of results for influent samples from Arroyo Las Positas collected during that same storm, was greater than the

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2.3 mg/L nitrate concentration reported for the upstream Arroyo Seco influent sampling location (ASS2).

Because runoff from landscaped areas between the ASW and ASS2 locations could contribute to the nitrate concentration reported in the ASW sample, that source was immediately investigated. However, landscape services personnel had not applied fertilizer to this area for approximately twelve weeks prior to sampling and that application was in accordance with applicable LLNL BMPs.

Another possible source of nitrates in samples collected at ASW is the treated groundwater that discharges from Treatment Facility A (TFA), immediately upstream of the ASW sampling location. TFA is permitted under CERCLA for removing volatile organic compounds (VOCs) from groundwater. Except for three days (February 19th, 20th, and 21st), TFA was in operation throughout the month of February 2011, discharging at a rate of approximately 240 gpm. Nitrate concentrations in groundwater, from extraction wells that supply TFA, typically range from 20 mg/L to 40 mg/L. Hence, any TFA effluent that comingles with stormwater runoff, between the ASS2 and ASW sampling locations, would have the effect of increasing nitrate concentrations in runoff samples. Results from the second sampling event (February 25, 2011) showed a similar trend for nitrates at these locations (ASS2 = 0.73 mg/L; AWS = 1.7 mg/L), but in this case both values were well below the LLNL comparison criteria for this constituent. LLNL continues to monitor for nitrates and investigate potential sources.

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 36 µg/L, while the maximum concentration reported in an effluent sample was 1.8 µg/L at WPDC. Similarly, concentrations of glyphosate at influent locations ranged from <20 µg/L to 280 µg/L; the maximum concentrations reported in effluent samples were 29 µg/L at WPDC and 28 µg/L at ASW. All maximum concentrations reported for bromacil and glyphosate at both influent and effluent locations were associated with samples from the February 16, 2011 storm. (See **Appendix A, Tables A-5 and A-6**).

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 2009–2010 storm year, 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 2010–2011 are included in **Appendix A, Tables A-5 and A-6**. The gross alpha and gross beta measurements of radioactivity were above their LLNL specific comparison criteria (0.34 Bq/L

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and 0.48 Bq/L, respectively) at the ALPE location on February 16, 2011 (**Table 4**). Given that ALPE 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**).

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 February 16, 2011, and February 25, 2011, were below the detection limit (0.0037 Bq/L, or 0.100 pCi/L). (See **Appendix A, Tables A-5 and A-6**)

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.

Six constituents of storm water samples (total suspended solids, copper, lead, nitrate, gross alpha, and gross beta) were above LLNL site-specific threshold comparison criteria; however, with one exception, all of the data exceeding LLNL thresholds during 2010–2011 were associated with influent locations and are attributed to off-site activities upstream of the Laboratory. Only one effluent sample, from the Arroyo Seco West (ASW) location, showed a nitrate concentration that was above the LLNL threshold. As previously discussed, LLNL responded by investigating potential sources of nitrate between the ASW and ASS2 locations. Nitrate concentrations in effluent samples collected during the second storm were below the LLNL-specific comparison criteria. All other effluent monitoring results for chemical and radioactive parameters were less than comparison criteria. In addition, the acute and the chronic fish toxicity tests showed no toxicity in LLNL storm water effluent. These results indicate that LLNL's current BMPs are effective and that operations at the LLNL Livermore site during 2010–2011 did not impact storm water quality.

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APPENDIX A TABLES

Tables A-1 through A-6

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Table A-1. May 1, 2010 – April 30, 2011 - Summary of Nonroutine Releases, Livermore Site.

Date	Location	Description
5/3/10	B-321C	Approximately eight gallons of coolant was released to the floor of the machine shop in room 1415, and approximately two gallons migrated under a roll up door onto the outdoor asphalt. The released coolant was cleaned up using absorbent material, which was collected and managed as hazardous waste. None of the coolant entered a storm drain, culvert, drainage channel, or soil.
5/10/10	B-581	A damaged sprinkler pipe released 50 – 100 gallons of water to the ground floor of the Diagnostic Building. Inside the building the spill was recovered and discharged to sewer. A small amount of water left the building and traveled approximately 20 feet into an asphalt gutter. There was no puddle outside to recover; the water did not reach a storm drain.
5/20/10	B-511	An unattended ERD drilling rig discharged approximately 200 gallons of uncontaminated city water to ground when a valve on the drilling truck was left open. No water reached the storm or sanitary sewers.
5/24/10	B-494	Approximately 50 gallons of water was released from a fire sprinkler system. The majority of the water flowed into the sanitary sewer system via a floor drain below the leak. An estimated 20 gallons flowed out the adjacent open roll-up door, then traveled east onto the concrete pad of Tent 5997. Approximately 10 gallons, which pooled on the floor of 5997, were picked up with absorbent and disposed through RHW. The remaining water soaked into the adjacent asphalt or flowed into the sanitary sewer. No water reached soil or a storm drain.
6/9/10	B-132N	Approximately one pint of hydraulic fluid leaked from a privately owned vehicle on the asphalt parking lot west of B-132N. Absorbent was applied to the fluid and the car was towed from the parking lot. RHW completed the clean up of the spill and managed the waste.
6/10/10	A-1 Parking Lot	Absorbent was used to clean up a small volume gasoline spill in the A-1 parking lot. The absorbent was collected and managed by RHW.
6/14/10	B-625 yard area	A hydraulic oil line failed on a crane during loading operations. The crane was immediately shut down to halt the release. Absorbent material was placed on the affected asphalt and a drip pan was placed beneath the source of the dripping fluid. The absorbent material was worked into the affected asphalt in an effort to remove the spilled hydraulic fluid. The contaminated absorbent and hydraulic fluid collected in the drip pan were managed as hazardous waste through RHW.
6/21/10	West of North Outer Loop Road by B-291	Approximately 3 ½ gallons of latex paint was spilled when a partially filled five-gallon container fell off a truck. A small amount of the paint ended up on both the asphalt road and the dirt shoulder. Absorbent was immediately placed on the spill and RHW later cleaned the area. All of the paint on the dirt was cleaned up, and as much as possible was removed from the asphalt. The waste was managed as hazardous by RHW.
6/25/10	B-191	A crane operator backed into a hose bib while working on the west side of B-191. Potable water from the hose bib discharged at a rate of approximately 20 gpm, releasing approximately 600 gallons before the line could be secured. Most of the water discharged infiltrated into the hillside; the remaining water ran northward downhill and pooled onto the roadway that is adjacent to Arroyo Las Positas. None of the water reached the arroyo.
6/30/10	B-453	A Cooling Tower valve was inadvertently turned, causing an overflow. The release was stopped within a few minutes and was estimated to be less than 5,000 gallons. The water contained low levels of chlorine (sodium hypochlorite), a biocide, and a corrosion inhibitor. The coolant water flowed to the northwest and was contained in an open soil area. All the water stayed on-site and did not flow to the storm drain system. The water evaporated and infiltrated into the soil. This release was reported to the SFBRWQCB as a “Low Impact/Nuisance” category in LLNL’s Spill Reporting Matrix.
7/23/10	LLNL Fire Station	Approximately five gallons of Class A fire fighting foam (99.75% water and 0.25% FireAde-2000) was flushed through the pumping system of a fire truck. The foam traveled across the concrete driveway, north along the Southgate Drive gutter, and stopped just before reaching the catch basin. Most of the foam evaporated quickly, and any remaining puddles were swept up for disposal.

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Table A-1. May 1, 2010 – April 30, 2011 - Summary of Nonroutine Releases, Livermore Site.

8/6/10	Corner of First Street and Ave. F	Approximately three to five gallons of diesel was spilled on the roadway at the corner of First Street and Avenue F. The affected area was approximately 40 feet long by 4 feet wide. Adsorbent was used to soak up as much of the spill as possible, which was cleaned up and managed by RHWM personnel. The spilled material did not reach the storm drain.
8/9/10	B-581	A hydraulic line on a crane came loose and released approximately five to ten gallons of hydraulic oil to the asphalt on the southeast end of B-581. The leak was quickly contained by placing a trash can under the broken line, and adsorbent was applied to the asphalt. No hydraulic oil entered the soil or any storm drain.
8/30/10	B-581	Approximately one cup of diesel fuel was spilled on the asphalt parking lot NW of B-581. It was immediately cleaned up with adsorbent and disposed. No diesel reached the ground or a storm drain.
9/2/10	B-323	Fire-fighting foam was discharged onto the ground adjacent to the southeast corner of B-323. The activity was stopped and efforts were made to clean up the foam. Less than five gallons was discharged, none reached the storm drain.
9/7/10	B-612	A container lid was not properly secured and approximately ½ gallon of latex paint was spilled onto the asphalt within the B-612-4 yard. Absorbent material was immediately placed on the spill, the paint was absorbed, and the drum lid was properly secured. RHWM managed the clean up and disposal. None of the spilled material reached soil, storm drain, or otherwise left the facility.
9/21/10	PTU-12, NW of B-551W	A break in the discharge pipe from PTU-12 resulted in up to 18,720 gallons of treated groundwater being discharged to ground. (Worst-case scenario assumes the break went undiscovered for 12 hours.) Approximately 80% of this discharge flowed into a loading dock drain, which is connected to the LLNL sanitary sewer system. This discharge into the sanitary sewer system is allowed under Permit #1510-G. The remaining approximately 3,750 gallons of treated groundwater flowed into a grassy area adjacent to Lake Haussmann. None of the water reached the storm drainage system so no immediate reporting was required; however, LLNL made a courtesy notification to the SFRWQCB.
9/30/10	B-354	A sink used to clean contaminated or potentially contaminated equipment from an animal care facility overflowed and a small amount of liquid made its way out of the room and soaked into the ground. Wastewater from the sink is normally pumped into one of two above ground retention tanks located outside the building. Equipment decontaminated in the sink is swiped prior to leaving the sink area and the sink is swiped and verified to be clean before it is used again. The last equipment cleaned in the sink before it overflowed was from an experiment that only involved carbon-14. All swipes and the water sample were at background. There was no radioactive contamination from the spilled water.
10/1/10	B-272	A two-inch irrigation line broke, releasing 1,300 – 2,000 gallons of water. No water was discharged offsite.
10/7/10	B-471	A line from Well 1254, which supplies untreated ground water to Portable Treatment Unit-10 (PTU-10), broke and discharged approximately 300 gallons. As the discharge traveled north, some water soaked into the ground. The remaining water reached a storm drain (protected by an absorbent pig), which flowed into Lake Haussmann. There, it presumably blended with water flowing from the lake and discharged to Arroyo Las Positas. Although the untreated ground water contained low concentrations of trichloroethylene (TCE, about 50 ppb), the TCE level was below reporting limits and reportable quantities. At these low concentrations, there was no expectation of any impact to aquatic wildlife. This release was reported to the SFBRWQCB in accordance with LLNL's Industrial Storm Water Permit (95-174) and Storm Water Pollution Prevention Plan (SWPPP) as a "Low Impact/Nuisance" category in LLNL's Spill Reporting Matrix.
11/2/10	B-322	Deionized (DI) water was released at an approximate rate of 25 gpm from a broken pipe within valve box VB-CD-2, located east of B-322 and north of the 325 Cooling Towers. The majority of the estimated 1,125 gallons of DI water that was released remained in the valve box. No water reached a storm drain or an arroyo.

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Table A-1. May 1, 2010 – April 30, 2011 - Summary of Nonroutine Releases, Livermore Site.

11/8/10	B-140	Two vehicles collided on West Perimeter Drive just north of B-140. Emergency responders placed absorbent material on the roadway and gravel/dirt shoulder to collect the various automotive fluids, which leaked/flowed onto these areas. RHWM staff cleaned up the site by placing the absorbent and the contaminated soil into a 55-gallon drum for disposal as hazardous waste. It is estimated that approximately 3 gallons or less of automotive fluids were contained in the half-full drum of solid waste that was removed for disposal by RHWM. No automotive fluids reached the storm drainage system.
11/11/10	B-511	Less than a quart of diesel spilled from an emergency generator (north of B-511) onto the asphalt, and the spill was immediately cleaned up with absorbent. The used absorbent was put into a plastic bag and managed as solid waste. No spilled material reached a storm drain.
11/12/10	B-391	Less than 100 gallons of DI water spilled northwest of B-391, no water reached a storm drain.
11/15/10	B-511	A small amount of previously spilled diesel (see 11/11/10 above) wept out of the asphalt into the narrow strip of soil located between the asphalt and the fence. Approximately 0.3 cubic feet of contaminated soil was removed, put into a plastic bag, and managed as solid waste. No spilled material reached a storm drain.
12/2/10	T-4675	Transformer 476NB, located on the north side of T-4675, leaked about one gallon of R-Temp® oil onto the concrete pad. MUSD staff immediately cleaned up the spill using absorbent, and surrounded the spill with absorbent pigs since there was a chance of rain. The spilled material did not reach ground or the storm drainage system.
12/10/10	B-383	A 4-inch sanitary sewer line leaving B-383 became blocked, allowing sewage to backup through a manhole, flow west across a parking lot, and enter a storm drain catch basin. A small amount of the released sewage traveled past the catch basin and mixed with runoff (from a previous storm) that had accumulated in a low spot in the culvert. Approximately 20 gallons of sewage was released. All of the released material was contained in the culvert, catch basin, and on the asphalt surface. A vacuum truck removed all the accumulated liquid from the culvert, absorbent mats were placed on the freestanding liquid on the asphalt surface, and RHWM personnel removed the damp solid sediments from the catch basin. Following the cleanup, a dilute bleach solution was applied to the affected surface area asphalt. Approximately 50 gallons of liquid (primarily rain water contaminated with dilute sewage) were removed from the culvert and later released to the sanitary sewer. Three 55-gallon drums of solid waste were generated from the catch basin clean out and asphalt surface area cleanup. The solid debris waste was managed for disposal through RHWM. All of the released material was contained on site and cleaned up. No effluent reached the Arroyo Las Positas.
12/13/10	B-581	Approximately 200 gallons of water was discharged from a sprinkler riser in order to change out the heads. In accordance with standard mitigation practice, a hose was used to plumb the discharge pipe to a sanitary sewer cleanout. However, the hose popped out of the cleanout and approximately 5 gallons of water was released onto the asphalt and concrete. Approximately 3 gallons went onto bare dirt. Another 2 gallons flowed across 40 feet of asphalt, which allowed a small volume (approximately 1 gallon) to reach a storm drain catch basin. This discharge falls into the system flushing activity in the LLNL SWPPP.
12/16/10	Labor Yard off S Outer Loop Dr.	In conjunction with flushing a new fire hydrant line, located near the former Labor Yard off South Outer Loop Drive, city water flowed for about ten minutes from a 2- ½ inch hose at a rate of 400 gpm. The water traveled along the ground to the northwest, but did not flow over the lip of the sediment basin; therefore no water left the site.

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1/21/11	B-651	A potable water release, discharging to a storm drain channel on the north side of B-651, was traced to a crack in a 1½-inch line in an irrigation valve box that was leaking potable water at an estimated 10 gpm. Although the exact start time is unknown, the leak could have been ongoing for as long as seven days. The maximum volume estimate for a ten-gpm release over a seven-day period is approximately 100,800 gallons, which exceeds the LLNL reportable quantity for potable water releases. The water flowed into a sediment basin, then into Lake Haussmann, and then likely off-site to the Arroyo Las Positas. Given the slow flow rate and blending with existing lake water, any measurable chlorine concentrations would likely dissipate before the water reached the arroyo. The release was reported to the SFBRWQCB by phone and written notification in accordance with our Industrial Storm Water Permit (95-174) and Storm Water Pollution Prevention Plan (SWPPP) as a "Low Impact/Nuisance" category in LLNL's Spill Reporting Matrix.
2/3/11	B-681	Approximately 25 gallons of DI water was released to the gravel surrounding the DI water tank at the eastern corner of B-681. The release occurred in a location where there is no known soil contamination. There was no evidence that the discharged water reached a storm drain culvert or drainage channel.
2/12/11	B-482	A broken irrigation line washed out a portion of the new pad being installed between B-482 and B-490. Before the line could be repaired, approximately 1,350 gallons of water was released and soaked into the ground around the pad area.
2/15/11	B-132S	Approximately one gallon of a water soluble, mineral oil based coolant (a mixture of 95% water and 5% Blasocut®) spilled onto asphalt from a dumpster located on the north side of B-132S. The source of the spill was a batch of resin chips, soaked with the coolant, that were placed in the dumpster prior to being allowed to drain overnight. Absorbent was placed on the spill area of the asphalt and in the dumpster. The absorbent on the asphalt was cleaned up and disposed, and the dumpster was moved to an area with shelter from the rain so that the absorbent would have time to soak up the coolant mixture. The spilled material did not reach the storm drainage system.
3/1/11	B-581	A test of the fire sprinkler flow alarm system at B-581 discharged approximately 100 gallons of water to asphalt outside the building. The discharge traveled across the asphalt and flowed to two hay roll protected storm drains. There is no potential for erosion in this area. This was an allowed discharge under the LLNL SWPPP.
3/2/11	B-383	Coolant was observed leaking from a dumpster located northeast of B-383. The source appeared to be a trash bag, containing plastic turnings wetted with coolant, that had been paced in the dumpster earlier in the week. While in the dumpster, the trash bag ripped allowing the coolant to leak out onto the asphalt. Approximately one gallon of rainwater with trace levels of coolant was visible on the ground, and a small amount of coolant (approximately two cups) was visible in the bottom of the dumpster. The liquid was vacuumed up from the asphalt and the dumpster, and absorbent material was used to absorb the coolant from asphalt. The absorbent was collected and placed in the municipal trash; the liquid waste was managed through the shop's aqueous waste stream. No coolant reached soil or a storm drain.
3/5/11	T-5475	Laborers broke an irrigation line at northwest side of T-5475. The water was shut off in under a minute, resulting in an estimated discharge of less than 50 gallons that soaked into the ground.
3/9/11	Avenue N and Inner Loop Road	Approximately one quart of gasoline was released at the intersection of Avenue N and Inner Loop Road. The spill was cleaned it up with absorbent that was managed with other petroleum-contaminated drysorb. No gasoline reached the edge of the roadway or any storm drain.
3/16/11	B-482 and T-3725	Elemental mercury was released when a small prototype ignitron, stored in a cardboard moving box, broke while being transported on-site (from B-482 to T-3725) in a government truck. The ignitron held about 3 oz (~ 90 ml) of mercury, of which approximately 2 oz were released. Of the 2 oz released, approximately 2 ml were released outside to asphalt; most of the spilled mercury was found in the moving box, in the truck bed, and on the building floor. As soon as the spill was discovered, mercury decontaminant powder was applied to the outdoor spill areas, then vacuumed up with a mercury vacuum. Other areas were similarly cleaned, and the box that held the ignitron tube, as well as all the contents, were disposed as hazardous waste. Dry cool weather minimized the potential for transport and/or volatilization. No mercury reached a storm drain or got offsite. The spill did not exceed a reportable quantity.

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Table A-1. May 1, 2010 – April 30, 2011 - Summary of Nonroutine Releases, Livermore Site.

3/24/11	B-341	Rainwater mobilized a small amount of oil that had leaked from a pump and machinery located outdoors on the west side of B-341. A tarp was placed over the equipment, absorbent pads were placed on the asphalt and two large absorbent socks were placed in the storm drainage system in the southwest corner of Parking Lot C-4. Observations were made along the storm water route to the Arroyo Las Positas, no evidence of sheen was noted. The spilled material did not reach the Arroyo Las Positas.
3/29/11	B-132S	A hydraulic oil spill, which occurred on Saturday March 26, 2011, was reported to have been cleaned up and any residual absorbent contained in a bermed area. However, when the site was visited on March 29, 2011, it was discovered that the spill had not been completely cleaned-up or contained. It was estimated that approximately two gallons of hydraulic oil leaked onto an asphalt parking lot and river rock placed on top of asphalt. None of the oil was released directly to ground. It is possible, but unlikely, that a light rainfall (less than 0.2 inches) over the weekend produced sufficient runoff for the hydraulic oil to reach the nearest storm drain catch basin (200 feet away). From that catch basin, the storm drain system flows north (approximately 4,400 linear feet) on the Livermore site to the receiving water, the Arroyo Las Positas. It is not expected that any impact occurred in the arroyo from this small release of hydraulic oil, most of which was contained by a concrete curb and adsorbed into the asphalt. Any material with the potential to contaminate storm water was secured on March 29th and the area was swept again with absorbent. The rock and absorbent material exposed to the hydraulic oil were collected and managed appropriately as waste. The leaking equipment was taken to LLNL's heavy equipment shop for repair. The release was reported to the SFRWQCB by phone and through written notification in accordance with LLNL's Industrial Storm Water Permit.
4/19/11	B-511	An LLNL taxi stopped on the south side of B-511 because of a petroleum product leak. A quart to a quart and a half of petroleum product leaked onto the asphalt. The spill was immediately contained by the placement of absorbent and pigs. Subsequently, the material was cleaned up and managed appropriately. No petroleum products reached soil or the storm drainage system.
4/26/11	B-582	A garbage truck broke a hydraulic hose, releasing 20 to 30 gallons of hydraulic oil by the vehicle gate. Although absorbent was spread in and around the puddle, approximately one quart flowed into the storm drain catch basin. The catch basin was vacuumed out and the vacuumed waste was disposed of as hazardous waste. The swept up absorbent was disposed of as non-hazardous waste.

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

Principal Directorate Responsible for Potential Pollutant Source/Industrial Activity	Deficiencies in BMPs or BMP Implementation and Additional/Revised BMPs or Corrective Actions.
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> : Repair roof downspout. Re-attach to east exterior wall. <u>B115</u> : Repair slow leak from hose bib that is dripping water onto vegetation outside building. <u>B439</u> : Pine needles on roof of storage area. Roof downspouts blocked with debris. Maintenance has been requested.
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 Corpyard</u> : Steel materials stored directly on the ground. Improve general housekeeping.
8-Operations and Business	<u>B364</u> : Repair slow leak from hot water boiler (sight glass gasket) that is dripping liquid onto ground outside the building. <u>T1727, B272, B321, B341</u> : Outdoor storage of materials/equipment could degrade storm water quality. Remove, relocate, or cover noted items. Maintain secondary containment, where appropriate. <u>B121</u> : Identify and label non-storm water drain located on the northwest side of building. <u>B113, B116, B140, B197, U291, U325, OS454</u> : Strom drain maintenance required to remove debris and prevent blockage. <u>B317, U470, B543, T5475, T6199</u> : Repair/replace lids on outdoor trash dumpsters to exclude rainwater. <u>U325</u> : Repair/replace deteriorated section of pipe that connects cooling tower overflow basin to sanitary sewer. <u>U193</u> : Re-epoxy exposed fiberglass in secondary containment structures at sewer diversion facility.

Table A-3. Record of Dry Season Observations				Discharge Observations		
Location	Inspector	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Grease?	Observations	Description
ALPE	Karl Brunckhorst	28-Jun-10	9:04 AM	Leaves, sticks, paper, plastic		
ALPO	Karl Brunckhorst	28-Jun-10	9:00 AM	Leaves, sticks, paper, plastic		Soil disturbing activities taking place around sample location
ASS2	Karl Brunckhorst	28-Jun-10	8:40 AM	Leaves, sticks		
ASW	Karl Brunckhorst	28-Jun-10	8:47 AM	Leaves, sticks, paper, plastic		ERD's Treatment Facility "A" is discharging, no corrective action needed
AVE. K	Karl Brunckhorst	28-Jun-10	8:30 AM	Leaves, sticks, paper, plastic		
B111	Karl Brunckhorst	28-Jun-10	8:43 AM	Leaves, sticks		
B-191/HEAF	Karl Brunckhorst	28-Jun-10	9:23 AM		Clean	
B194	Karl Brunckhorst	28-Jun-10	9:19 AM		Clean	
B341	Karl Brunckhorst	28-Jun-10	9:11 AM	Leaves, sticks		No work activity going on
B391	Karl Brunckhorst	28-Jun-10	9:15 AM	Leaves, sticks		
B551W	Karl Brunckhorst	28-Jun-10	9:08 AM	Leaves, sticks		
GRNE	Karl Brunckhorst	28-Jun-10	8:55 AM	Leaves, sticks, paper, plastic		Uncovered soil stockpile near sample location
LABOR ONLY Lot F-2	Karl Brunckhorst	28-Jun-10	8:34 AM	Paper		Evidence of rinsing activities where non-hazardous materials are being removed within containment area, no corrective action needed
WPDC	Karl Brunckhorst	28-Jun-10	8:52 AM	Leaves, sticks		Lake Haussmann & ERD Treatment Facility "B" discharging, no corrective action needed
ALPE	Karl Brunckhorst	20-Sep-10	1:40 PM	Leaves, sticks		
ALPO	Karl Brunckhorst	20-Sep-10	1:38 PM	Leaves, sticks, paper, plastic		Grading and soil disturbing activities observed near sample location
ASS2	Karl Brunckhorst	20-Sep-10	1:20 PM	Leaves, sticks		

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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
ASW	Karl Brunckhorst	20-Sep-10	1:29 PM	Leaves, sticks		ERD's Treatment Facility "A" is discharging, no corrective action needed
AVE. K	Karl Brunckhorst	20-Sep-10	1:45 PM	Leaves, sticks, paper, plastic, cans		
B111	Karl Brunckhorst	20-Sep-10	1:24 PM	Leaves, sticks		
B191/HEAF	Karl Brunckhorst	20-Sep-10	1:59 PM		Clean	
B194	Karl Brunckhorst	20-Sep-10	1:56 PM	Sticks, paper		
B341	Karl Brunckhorst	20-Sep-10	1:50 PM	Leaves, sticks, plastic		
B391	Karl Brunckhorst	20-Sep-10	1:53 PM	Leaves, sticks, plastic		
B551W	Karl Brunckhorst	20-Sep-10	1:48 PM	Leaves, sticks		
GRNE	Karl Brunckhorst	20-Sep-10	1:36 PM	Leaves, sticks, paper, plastic, styrofoam		
LABOR ONLY Lot F-2	Karl Brunckhorst	20-Sep-10	1:43 PM	Leaves, sticks		Evidence of rinsing activities where non-hazardous materials are being removed within containment area, no corrective action needed
WPDC	Karl Brunckhorst	20-Sep-10	1:32 PM	Leaves, sticks, paper		Lake Haussmann and ERD's Treatment Facility "B" is discharging, no corrective action needed

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Table A-4. Record of Wet Season Observations				Discharge Observations			
Location	Inspector	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Turbidity	Runoff	Comments
ALPE	Karl Brunckhorst	29-Oct-10	2:58 PM	Leaves, sticks, paper	No	No Runoff	
ALPO	Karl Brunckhorst	29-Oct-10	2:56 PM	Leaves, sticks, paper, plastic	No	No Runoff	
ASS2	Karl Brunckhorst	29-Oct-10	3:02 PM	Leaves, sticks	No	No Runoff	
ASW	Karl Brunckhorst	29-Oct-10	3:06 PM	Leaves, sticks	No	No Runoff	ERD's Treatment Facility "A" discharging
GRNE	Karl Brunckhorst	29-Oct-10	2:54 PM	Leaves, sticks, paper, plastic	No	No Runoff	
WPDC	Karl Brunckhorst	29-Oct-10	2:50 PM	Leaves, sticks	Low	No Runoff	ERD Treatment Facility "B" and Lake Haussmann discharging
ALPE	Crystal Rosene	23-Nov-10	8:30 AM	Leaves, sticks	Moderate	Significant	Non-Qualifying storm event
ALPO	Crystal Rosene	23-Nov-10	8:27 AM	Leaves, sticks, paper, plastic	No	No Runoff	Non-Qualifying storm event
ASS2	Crystal Rosene	23-Nov-10	8:43 AM	Leaves, sticks	Moderate	Insignificant	Non-Qualifying storm event
ASW	Crystal Rosene	23-Nov-10	8:50 AM	Leaves, sticks	Low	Insignificant	ERD's Treatment Facility "A" discharging. Non-Qualifying storm event
GRNE	Crystal Rosene	23-Nov-10	8:25 AM	Leaves, sticks	No	No Runoff	Non-Qualifying storm event
WPDC	Crystal Rosene	23-Nov-10	8:20 AM	Leaves, sticks	Low	Insignificant	Lake Haussmann & ERD Treatment Facility "B" discharging. Non-Qualifying storm event
ALPE	Karl Brunckhorst	8-Dec-10	9:25 AM	Leaves, sticks, paper	Low	Insignificant	
ALPO	Karl Brunckhorst	8-Dec-10	9:27 AM	Leaves, sticks, paper	No	No Runoff	
ASS2	Karl Brunckhorst	8-Dec-10	9:34 AM	Leaves, sticks	No	No Runoff	
ASW	Karl Brunckhorst	8-Dec-10	9:40 AM	Leaves, sticks	Low	No Runoff	ERD's Treatment Facility "A" discharging
GRNE	Karl Brunckhorst	8-Dec-10	9:30 AM	Leaves, sticks, paper	No	No Runoff	
WPDC	Karl Brunckhorst	8-Dec-10	9:44 AM	Leaves, sticks	Low	No Runoff	Lake Haussmann & ERD Treatment Facility "B" discharging

Table A-4. Record of Wet Season Observations				Discharge Observations			
Location	Inspector	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Turbidity	Runoff	Comments
ALPE	Karl Brunckhorst	31-Jan-11	10:29 AM	Leaves, sticks, plastic	No	No Runoff	
ALPO	Karl Brunckhorst	31-Jan-11	10:27 AM	Leaves, sticks, paper	No	No Runoff	
ASS2	Karl Brunckhorst	31-Jan-11	10:39 AM	Leaves, sticks	No	No Runoff	
ASW	Karl Brunckhorst	31-Jan-11	10:42 AM	Leaves, sticks	Low	No Runoff	ERD's Treatment Facility "A" discharging
GRNE	Karl Brunckhorst	31-Jan-11	10:24 AM	Leaves, sticks, plastic	No	No Runoff	
WPDC	Karl Brunckhorst	31-Jan-11	10:19 AM	Leaves, sticks	Low	No Runoff	Lake Haussmann & ERD Treatment Facility "B" discharging
ALPE	Karl Brunckhorst	16-Feb-11	9:20 AM	Leaves, sticks	High	Significant	
ALPO	Karl Brunckhorst	16-Feb-11	9:30 AM	Leaves, sticks	No	No Runoff	
ASW	Crystal Rosene	16-Feb-11	10:15 AM	Leaves, sticks, paper, bottles, plastic	Moderate	Significant	ERD's Treatment Facility "A" discharging
ASS2	Crystal Rosene	16-Feb-11	9:45 AM	Leaves, sticks	Moderate	Significant	
GRNE	Karl Brunckhorst	16-Feb-11	9:55 AM	Leaves, sticks	Low	Significant	
WPDC	Crystal Rosene	16-Feb-11	10:45 AM	Leaves, sticks	Low	Significant	Lake Haussmann & ERD Treatment Facility "B" discharging
ALPE	Bob Williams	25-Feb-11	7:57 AM	Leaves, sticks	Moderate	Significant	
ALPO	Bob Williams	25-Feb-11	8:18 AM	Leaves, sticks, paper, plastic	Moderate	Significant	
ASW	Karl Brunckhorst	25-Feb-11	8:40 AM	Leaves, sticks	Moderate	Significant	ERD's Treatment Facility "A" discharging
ASS2	Karl Brunckhorst	25-Feb-11	7:50 AM		Moderate	Significant	
GRNE	Bob Williams	25-Feb-11	8:42 AM	Leaves, sticks, paper, plastic	Moderate	Significant	
WPDC	Karl Brunckhorst	25-Feb-11	9:00 AM	Leaves , sticks	Moderate	Significant	Lake Haussmann & ERD Treatment Facility "B" discharging
ALPE	Karl Brunckhorst	18-Mar-11	1:44 PM	Leaves, sticks	High	Significant	
ALPO	Karl Brunckhorst	18-Mar-11	1:42 PM	Leaves, sticks, paper	No	No Runoff	

Table A-4. Record of Wet Season Observations					Discharge Observations			
Location	Inspector	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Turbidity	Runoff	Comments	
ASS2	Karl Brunckhorst	18-Mar-11	1:33 PM	Leaves, sticks	Moderate	Significant		
ASW	Karl Brunckhorst	18-Mar-11	1:36 PM	Leaves, sticks	Moderate	Significant	ERD's Treatment Facility "A" discharging	
GRNE	Karl Brunckhorst	18-Mar-11	1:41 PM	Leaves, sticks	Low	Significant		
WPDC	Karl Brunckhorst	18-Mar-11	1:39 PM	Leaves, sticks	Moderate	Significant	Lake Haussmann & ERD Treatment Facility "B" discharging	
ALPE	Karl Brunckhorst	29-Apr-11	10:48 AM	Leaves, sticks	No	No Runoff		
ALPO	Karl Brunckhorst	29-Apr-11	10:45 AM	Leaves, sticks, paper	No	No Runoff		
ASS2	Karl Brunckhorst	29-Apr-11	10:28 AM	Leaves, sticks	No	No Runoff		
ASW	Karl Brunckhorst	29-Apr-11	10:34 AM	Leaves, sticks	Low	No Runoff	ERD's Treatment Facility "A" discharging	
GRNE	Karl Brunckhorst	29-Apr-11	10:42 AM	Leaves, sticks	No	No Runoff		
WPDC	Karl Brunckhorst	29-Apr-11	10:37 AM	Leaves, sticks	Low	No Runoff	Lake Haussmann & ERD Treatment Facility "B" discharging	

Table A-5. Storm water quality data for February 16, 2011.

DESCRIBE DISCHARGE LOCATION	DATE/TIME OF SAMPLE COLLECTION	TIME DISCHARGE STARTED	ANALYTICAL RESULTS For First Storm Event							
			BASIC PARAMETERS				OTHER PARAMETERS			
			pH	TSS	O&G	TOC	DO	Aluminum	Arsenic	
WPDC (ALP Effluent)	2/16/11	Ongoing	7.89	7.3	<5	6.1	12	0.6	<0.002	
	10:45 AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>									
GRNE (ALP Influent)	2/16/11	Ongoing	7.36	18	<5	3.9	12	N/A	N/A	
	9:55 AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>									
ALPO (ALP Influent)	2/16/11	No Flow	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	AM <input type="checkbox"/> PM <input type="checkbox"/>									
ALPE (ALP Influent)	2/16/11	Ongoing	7.66	910	5.1	7.1	11	N/A	N/A	
	9:20 AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>									
TEST REPORTING UNITS:			pH Units	mg/L	mg/L	mg/L	mg O/L	mg/L	mg/L	
TEST METHOD USED:			SM-4500HB	SM-2540D	E1664HEM	SM-5310C	SM-4500OG	E200.7	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-5. Storm water quality data for February 16, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event						
	OTHER PARAMETERS						
	Barium	Beryllium	Boron	Bromacil	Cadmium	Chemical Oxygen Demand	
WPDC (ALP Effluent)	0.06	<0.0002	0.35	1.8	0.001	29	
GRNE (ALP Influent)	N/A	<0.0002	N/A	36	<0.0002	25	
ALPO (ALP Influent)	N/A	N/A	N/A	N/A	N/A	N/A	
ALPE (Influent)	N/A	0.00085	N/A	8.4	0.00032	190	
TEST REPORTING UNITS:	mg/L	mg/L	mg/L	ug/L	mg/L	mg O/L	
TEST METHOD USED:	E210.2	E210.2	E213.2	E525.2	E213.2	E410.4	
ANALYZED BY (SELF/LAB):	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-5. Storm water quality data for February 16, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event										
	OTHER PARAMETERS										
	Chromium	Copper	Diazinon	Diuron	Glyphosate	Hexavalent Chromium	Lead	Mercury			
WPDC (ALP Effluent)	0.0046	0.0037	<0.2	<1	29	0.0017	<0.005	<0.0002			
GRNE (ALP Influent)	N/A	0.0063	<0.2	<1	280	<0.002	<0.005	<0.0002			
ALPO (ALP Influent)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			
ALPE (ALP Influent)	N/A	0.057	<0.2	<1	<20	<0.002	0.035	<0.0002			
TEST REPORTING UNITS:	mg/L	mg/L	ug/L	ug/L	ug/L	mg/L	mg/L	mg/L			
TEST METHOD USED:	E200.8	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	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-5. Storm water quality data for February 16, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS									
	For First Storm Event									
	OTHER PARAMETERS									
	Nickel	Nitrate (as NO3)	Ortho-Phosphate	Pentachloro-phenol	Pyrene	Simazine	Total Dissolved Solids	Zinc		
WPDC (ALP Effluent)	0.0029	7	0.29	<1	<0.1	<0.3	210	0.044		
GRNE (ALP Influent)	N/A	23	0.57	<1	<0.1	<0.3	96	0.1		
ALPO (ALP Influent)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
ALPE (Influent)	N/A	3.5	0.34	<1	<0.1	<0.3	69	0.26		
TEST REPORTING UNITS:	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L	mg/L	mg/L		
TEST METHOD USED:	E200.8	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	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-5. Storm water quality data for February 16, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event			
	OTHER PARAMETERS			
	Gross alpha	Gross beta	Tritium	Plutonium 239+240
WPDC (ALP Effluent)	0.0129 ± 0.0302	0.1191 ± 0.0629	7.10 ± 3.04	0.00043 ± 0.00097
GRNE (ALP Influent)	0.0514 ± 0.0492	0.1302 ± 0.0566	1.11 ± 2.25	N/A
ALPO (ALP Influent)	N/A	N/A	N/A	N/A
ALPE (Influent)	0.4995 ± 0.1484	0.8362 ± 0.1661	-0.17 ± 2.18	N/A
TEST REPORTING UNITS:	Bq/L	Bq/L	Bq/L	Bq/L
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-5. Storm water quality data for February 16, 2011.

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)	2/16/11	Ongoing							
	10:10 AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>	AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>	7.92	15.	<5	6.5		11	
ASS2 (Arroyo Seco Influent)	2/16/11	Ongoing							
	9:45 AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>	AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>	6.6	73.	<5	6.3		11	
TEST REPORTING UNITS:			pH Units	mg/L	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	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

*Lawrence Livermore National Laboratory Livermore Site
Annual Storm Water Monitoring Report for Waste Discharge Requirements 95-174
August 2011*

Table A-5. Storm water quality data for February 16, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event			
	OTHER PARAMETERS			
	Beryllium	Bromacil	Cadmium	Chemical Oxygen Demand
ASW (Arroyo Seco Effluent)	<0.0002	<0.5	<0.0002	<25
ASS2 (Arroyo Seco Influent)	<0.0002	<0.5	<0.0002	38.
TEST REPORTING UNITS:	mg/L	ug/L	mg/L	mg O/L
TEST METHOD USED:	E210.2	E525.2	E213.2	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-5. Storm water quality data for February 16, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event							
	OTHER PARAMETERS							
	Copper	Diazinon	Diuron	Glyphosate	Hexavalent Chromium	Lead	Mercury	
ASW (Arroyo Seco Effluent)	0.0064	<0.2	<1.1	28.	0.004	<0.005	<0.0002	
ASS2 (Arroyo Seco Influent)	0.01	<0.2	<1.1	<20	<0.002	0.0062	<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	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-5. Storm water quality data for February 16, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event									
	OTHER PARAMETERS									
	Nitrate (asNO3)	Ortho-Phosphate	Pentachloro-phenol	Pyrene	Simazine	Total Dissolved Solids	Zinc			
ASW (Arroyo Seco Effluent)	12.	0.38	<1	<0.1	<0.3	220.	0.065			
ASS2 (Arroyo Seco Influent)	2.3	0.4	<1	<0.1	<0.3	29.	0.1			
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-5. Storm water quality data for February 16, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event			
	OTHER PARAMETERS			
	Gross alpha	Gross beta	Tritium	Plutonium 239+240
ASW (Arroyo Seco Effluent)	0.1628 ± 0.0821	0.1795 ± 0.0696	0.87 ± 2.30	0.00075 ± 0.00094
ASS2 (Arroyo Seco Inflow)	0.0777 ± 0.0525	0.2864 ± 0.0858	1.51 ± 2.40	N/A
TEST REPORTING UNITS:	Bq/L	Bq/L	Bq/L	Bq/L
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.

- 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 February 25, 2011.

DESCRIBE DISCHARGE LOCATION	DATE/TIME OF SAMPLE COLLECTION	TIME DISCHARGE STARTED	ANALYTICAL RESULTS For Second Storm Event							
			BASIC PARAMETERS				OTHER PARAMETERS			
			pH	TSS	O&G	TOC	DO	Aluminum	Arsenic	
WPDC (ALP Effluent)	2/25/11	Ongoing	7.59	10	<6	5.2	11	N/A	N/A	
	9:00 AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>	AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>								
GRNE (ALP Influent)	2/25/11	Ongoing	7.26	37	<5	3	11	N/A	N/A	
	8:42 AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>	AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>								
ALPO (ALP Influent)	2/25/11	Ongoing	7.84	4	<5	8.9	11	N/A	N/A	
	8:18 AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>	AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>								
ALPE (ALP Influent)	2/25/11	Ongoing	7.8	32	<5	14	9.9	N/A	N/A	
	7:57 AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>	AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>								
TEST REPORTING UNITS:			pH Units	mg/L	mg/L	mg/L	mg O/L	mg/L	mg/L	
TEST METHOD USED:			SM-4500HB	SM-2540D	E1664HEM	SM-5310C	SM-4500OG	E200.7	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
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 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 February 25, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event						
	OTHER PARAMETERS						
	Barium	Beryllium	Boron	Bromacil	Cadmium	Chemical Oxygen Demand	
WPDC (ALP Effluent)	N/A	<0.0002	N/A	1.5	<0.0002	46	
GRNE (ALP Influent)	N/A	<0.0002	N/A	24	<0.0002	<25	
ALPO (ALP Influent)	N/A	<0.0002	N/A	7.4	<0.0002	25	
ALPE (Influent)	N/A	<0.0002	N/A	<0.5	<0.0002	100	
TEST REPORTING UNITS:	mg/L	mg/L	mg/L	ug/L	mg/L	mg O/L	
TEST METHOD USED:	E210.2	E210.2	E213.2	E525.2	E213.2	E410.4	
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-6. Storm water quality data for February 25, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event									
	OTHER PARAMETERS									
	Chromium	Copper	Diazinon	Diuron	Glyphosate	Hexavalent Chromium	Lead	Mercury		
WPDC (ALP Effluent)	N/A	0.0045	<0.2	<1	<20	<0.002	<0.005	<0.0002		
GRNE (ALP Influent)	N/A	0.0066	<0.2	<1	82	<0.002	<0.005	<0.0002		
ALPO (ALP Influent)	N/A	0.0062	<0.2	3.6	<20	<0.002	<0.005	<0.0002		
ALPE (ALP Influent)	N/A	0.0096	<0.2	<1	<20	<0.002	<0.005	<0.0002		
TEST REPORTING UNITS:	mg/L	mg/L	ug/L	ug/L	ug/L	mg/L	mg/L	mg/L		
TEST METHOD USED:	E200.8	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	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 February 25, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS									
	For Second Storm Event									
	OTHER PARAMETERS									
	Nickel	Nitrate (as NO3)	Ortho-Phosphate	Pentachloro-phenol	Pyrene	Simazine	Total Dissolved Solids	Zinc		
WPDC (ALP Effluent)	N/A	3.2	0.26	<1	<0.1	<0.3	96	0.059		
GRNE (ALP Influent)	N/A	6.8	0.53	<1	<0.1	<0.3	53	0.067		
ALPO (ALP Influent)	N/A	7.6	0.72	<1	<0.1	<0.3	360	0.014		
ALPE (Influent)	N/A	3.9	1.7	<1	<0.1	<0.3	630	0.035		
TEST REPORTING UNITS:	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L	mg/L	mg/L		
TEST METHOD USED:	E200.8	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	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 February 25, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event			
	OTHER PARAMETERS			
	Gross alpha	Gross beta	Tritium	Plutonium 239+240
WPDC (ALP Effluent)	0.0029 ± 0.0214	0.0803 ± 0.0488	5.88 ± 3.20	- 0.00038 ± 0.00086
GRNE (ALP Influent)	0.0544 ± 0.0444	0.0759 ± 0.0455	1.45 ± 2.24	N/A
ALPO (ALP Influent)	0.0999 ± 0.0718	0.1510 ± 0.0629	1.27 ± 2.12	N/A
ALPE (Influent)	0.0440 ± 0.0470	0.2945 ± 0.0833	2.82 ± 2.33	N/A
TEST REPORTING UNITS:	Bq/L	Bq/L	Bq/L	Bq/L
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 February 25, 2011.

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)	2/25/11 8:40 AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>	Ongoing AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>	7.42	20.	<5	5.1	11
	2/25/11 7:50 AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>	Ongoing AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>	7.08	10.	<5.9	6.9	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

*Lawrence Livermore National Laboratory Livermore Site
Annual Storm Water Monitoring Report for Waste Discharge Requirements 95-174
August 2011*

Table A-6. Storm water quality data for February 25, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event			
	OTHER PARAMETERS			
	Beryllium	Bromacil	Cadmium	Chemical Oxygen Demand
ASW (Arroyo Seco Effluent)	<0.0002	<0.5	<0.0002	<25
ASS2 (Arroyo Seco Influent)	<0.0002	<0.5	<0.0002	<25
TEST REPORTING UNITS:	mg/L	ug/L	mg/L	mg O/L
TEST METHOD USED:	E210.2	E525.2	E213.2	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-6. Storm water quality data for February 25, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event							
	OTHER PARAMETERS							
	Copper	Diazinon	Diuron	Glyphosate	Hexavalent Chromium	Lead	Mercury	
ASW (Arroyo Seco Effluent)	0.0068	<0.2	<1	<20	<0.002	0.0051	<0.0002	
ASS2 (Arroyo Seco Influent)	0.0051	<0.2	<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

Table A-6. Storm water quality data for February 25, 2011.

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)	1.7	0.33	<1	<0.1	<0.3	46.	0.077			
ASS2 (Arroyo Seco Influent)	0.73	0.54	<1	<0.1	<0.3	49.	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 February 25, 2011.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event			
	OTHER PARAMETERS			
	Gross alpha	Gross beta	Tritium	Plutonium 239+240
ASW (Arroyo Seco Effluent)	0.0297 ± 0.0407	0.1395 ± 0.0692	1.41 ± 2.56	- 0.00018 ± 0.00078
ASS2 (Arroyo Seco Influent)	0.0110 ± 0.0351	0.0426 ± 0.0418	1.81 ± 2.21	N/A
TEST REPORTING UNITS:	Bq/L	Bq/L	Bq/L	Bq/L
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.

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



**Environmental Functional Area, Lawrence Livermore National Laboratory
P.O. Box 808, L-627, Livermore, California 94551**