Environmental Functional Area

Water, Air, Monitoring & Analysis

UCRL-AR-144362-11

Lawrence Livermore National Laboratory Experimental Test Site

Annual Storm Water Monitoring Report for Waste Discharge Requirements 97-03-DWQ

July 2011

M. A. Revelli

This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

Lawrence Livermore National Laboratory Experimental Test Site Annual Storm Water Monitoring Report for Waste Discharge Requirements 97-03-DWQ

REGIONAL BOARD INFORMATION

REGION 5: CENTRAL VALLEY REGION, SACRAMENTO
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GENERAL INFORMATION

A. Facility ID No.: 5S39I021179

B. Operation:
Lawrence Livermore
National Security, LLC

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

C. Facility/Site:
Site 300

Contact Person
John E. Scott
Lawrence Livermore National Laboratory
P.O. Box 808, L-871
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Facility SIC Codes:

SIC Code 8733, Non-Commercial Research Organizations
SIC Code 9711, National Security
SIC Code 4953, Hazardous Waste Treatment (sector K)
and Landfill and Land Application Sites (sector L)

Lawrence Livermore National Laboratory Experimental Test Site
Annual Storm Water Monitoring Report for Waste Discharge Requirements 97-03-DWQ
July 2011

State of California
STATE WATER RESOURCES CONTROL BOARD

2010-2011
ANNUAL REPORT
FOR
STORM WATER DISCHARGES ASSOCIATED
WITH INDUSTRIAL ACTIVITIES

Reporting Period July 1, 2010 through June 30, 2011

An annual report is required to be submitted to your local Regional Water Quality Control Board (Regional Board) by July 1 of each year. This document must be certified and signed, under penalty of perjury, by the appropriate official of your company. Many of the Annual Report questions require an explanation. Please provide explanations on a separate sheet as an attachment. **Retain a copy of the completed Annual Report for your records.**

Please circle or highlight any information contained in Items A, B, and C below that is new or revised so we can update our records. Please remember that a Notice of Termination and new Notice of Intent are required whenever a facility operation is relocated or changes ownership.

If you have any questions, please contact your Regional Board Industrial Storm Water Permit Contact. The names, telephone numbers and e-mail addresses of the Regional Board contacts, as well as the Regional Board office addresses can be found at http://www.waterboards.ca.gov/stormwtr/contact.html. To find your Regional Board information, match the first digit of your WDID number with the corresponding number that appears in parenthesis on the first line of each Regional Board office.

GENERAL INFORMATION:

A. Facility Information:

Facility WDID No: **5S39I021179**

Facility Business Name: Lawrence Livermore National Laboratory
Physical Address: Corral Hollow Road
City: Tracy State: CA Zip: 95376

Contact Person: John E. Scott - Site Manager
e-mail: scott14@llnl.gov
Phone: (925) 423-5026

Standard Industrial Classification (SIC) Code(s): Facility SIC Codes 8733, Non-Commercial Research Organizations, and SIC Code 9711, National Security; and Regulated SIC Code 4953 Hazardous Waste Treatment (sector K) and Landfill and Land Application Sites (sector L)

B. Facility Operator Information:

Operator Name: Lawrence Livermore National Security, LLC
Mailing Address: P.O. Box 808, Mail Stop L-510
City: LivermoreState: CA Zip: 94551

Contact Person: Reginald F. Gaylord
e-mail: gaylord1@llnl.gov
Phone: (925) 423-1875

C. Facility Billing Information:

Operator Name: Lawrence Livermore National Laboratory
Mailing Address: P.O. Box 808, Mail Stop L-626
City: Livermore State: CA Zip: 94551

Contact Person: Bruce Schultz
e-mail: schultz16@llnl.gov
Phone: (925) 423-3978

Lawrence Livermore National Laboratory Experimental Test Site
Annual Storm Water Monitoring Report for Waste Discharge Requirements 97-03-DWQ,
National Pollutant Discharge Elimination System Permit No. CAS000001
July 2011

SPECIFIC INFORMATION

MONITORING AND REPORTING PROGRAM

D. SAMPLING AND ANALYSIS EXEMPTIONS AND REDUCTIONS

1. For the reporting period, was your facility exempt from collecting and analyzing samples from **two** storm events in accordance with sections B.12 or 15 of the General Permit?

   ☐ **YES** Go to Item D.2 ☒ **NO** Go to Section E

2. Indicate the reason your facility is exempt from collecting and analyzing samples from **two** storm events. Attach a copy of the first page of the appropriate certification if you check boxes ii, iii, iv, or v.

   i. ☐ Participating in an Approved Group Monitoring Plan **Group Name:** _____

   ii. ☐ Submitted **No Exposure Certification (NEC)** Date Submitted**:** ___/___/___

   Re-evaluation Date**:** ___/___/___

   Does facility continue to satisfy NEC conditions? ☐ YES ☐ NO

   iii. ☐ Submitted **Sampling Reduction Certification (SRC)** Date Submitted**:** ___/___/___

   Re-evaluation Date**:** ___/___/___

   Does facility continue to satisfy SRC conditions? ☐ YES ☐ NO

   iv. ☐ Received Regional Board Certification Certification Date**:** ___/___/___

   v. ☐ Received Local Agency Certification Certification Date**:** ___/___/___

3. If you checked boxes i or iii above, were you scheduled to sample **one** storm event during the reporting year?

   ☐ **YES** Go to Section E ☐ **NO** Go to Section F

4. If you checked boxes ii, iv, or v, go to Section F.

E. SAMPLING AND ANALYSIS RESULTS

1. How many storm events did you sample? 1

   If less than 2, **attach explanation** (if you checked item D.2.i or iii. above, only attach explanation if you answer "0").

2. Did you collect storm water samples from the first storm of the wet season that produced a discharge during scheduled facility operating hours? (Section B.5 of the General Permit)

   ☒ **YES** ☐ **NO** **attach explanation** **(Please note that if you do not sample the first storm event, you are still required to sample 2 storm events)**

3. How many storm water discharge locations are at your facility? 6 (See explanation.)

4. For each storm event sampled, did you collect and analyze a sample from each of the facility's' storm water discharge locations? ☐ YES, go to Item E.6 ☒ NO

   See explanation.

5. Was sample collection or analysis reduced in accordance with Section B.7.d of the General Permit? ☐ YES ☒ NO, **attach explanation**

   If "YES", **attach documentation** supporting your determination that two or more drainage areas are substantially identical.

   Date facility's drainage areas were last evaluated ___/___/_____

6. Were all samples collected during the first hour of discharge? ☐ YES ☒ NO, **attach explanation**

7. Was all storm water sampling preceded by three (3) working days without a storm water discharge? ☒ YES ☐ NO, **attach explanation**

8. Were there any discharges of storm water that had been temporarily stored or contained? (such as from a pond) ☐ YES ☒ NO, go to Item E.10

9. Did you collect and analyze samples of temporarily stored or contained storm water discharges from two storm events? (or one storm event if you checked item D.2.i or iii. above) ☐ YES ☐ NO, **attach explanation**

10. Section B.5. of the General Permit requires you to analyze storm water samples for pH, Total Suspended Solids (TSS), Specific Conductance (SC), Total Organic Carbon (TOC) or Oil and Grease (O&G), other pollutants likely to be present in storm water discharges in significant quantities, and analytical parameters listed in Table D of the General Permit.

    a. Does Table D contain any additional parameters related to your facility's SIC code(s)? ☒ YES ☐ NO, Go to Item E.11

    b. Did you analyze all storm water samples for the applicable parameters listed in Table D? ☒ YES ☐ NO

    c. If you did not analyze all storm water samples for the applicable Table D parameters, check one of the following reasons:

    _____ In prior sampling years, the parameter(s) have not been detected in significant quantities from two consecutive sampling events. **Attach explanation – Delete PCB's for 2011/2012 Wet Season**

    _____ The parameter(s) is not likely to be present in storm water discharges and authorized non-storm water discharges in significant quantities based upon the facility operator's evaluation. **Attach explanation**

    _____ Other. **Attach explanation**

11. For each storm event sampled, attach a copy of the laboratory analytical reports and report the sampling and analysis results using **Form 1** or its equivalent. The following must be provided for each sample collected:

    - Date and time of sample collection
    - Name and title of sampler
    - Parameters tested
    - Name of analytical testing laboratory
    - Discharge location identification
    - Testing results
    - Test methods used
    - Test detection limits
    - Date of testing
    - Copies of the laboratory analytical results

    See explanation.

F. QUARTERLY VISUAL OBSERVATIONS

1. **Authorized Non-Storm Water Discharges**

Section B.3.b of the General Permit requires quarterly visual observations of all authorized non-storm water discharges and their sources.

a. Do authorized non-storm water discharges occur at your facility?

☐ **YES** ☒ **NO** Go to Item F.2

b. Indicate whether you visually observed all authorized non-storm water discharges and their sources during the quarters when they were discharged. **Attach an explanation for any "NO" answers**. Indicate "N/A" for quarters without any authorized non-storm water discharges.

July-September ☐ **YES** ☐ **NO** ☐ **N/A** October-December ☐ **YES** ☐ **NO** ☐ **N/A**

January-March ☐ **YES** ☐ **NO** ☐ **N/A** April-June ☐ **YES** ☐ **NO** ☐ **N/A**

c. Use **Form 2** to report quarterly visual observations of authorized non-storm water discharges or provide the following information:

i. name of each authorized non-storm water discharge
ii. date and time of observation
iii. source and location of each authorized non-storm water discharge
iv. characteristics of the discharge at its source and impacted drainage area/discharge location
v. name, title, and signature of observer
vi. **any** new or revised BMPs necessary to reduce or prevent pollutants in authorized non-storm water discharges. Provide new or revised BMP implementation date.

2. **Unauthorized Non-Storm Water Discharges**

Section B.3.a of the General Permit requires quarterly visual observations of all drainage areas to detect the presence of unauthorized non-storm water discharges and their sources.

a. Indicate whether you visually observed all drainage areas to detect the presence of unauthorized non- storm water discharges and their sources. **Attach an explanation for any "NO" answers**.

July-September ☒ **YES** ☐ **NO** October-December ☒ **YES** ☐ **NO**

January-March ☒ **YES** ☐ **NO** April-June ☒ **YES** ☐ **NO**

b. Based upon the quarterly visual observations, were any unauthorized non-storm water discharges detected?

☐ **YES** ☒ **NO** Go to Item F.2.d

c. Have each of the unauthorized non-storm water discharges been eliminated or permitted?

☐ **YES** ☐ **NO** **Attach explanation**

See explanation.

d. Use **Form 3** to report quarterly unauthorized non-storm water discharge visual observations or provide the following information:

i. name of each unauthorized non-storm water discharge
ii. date and time of observation
iii. source and location of each unauthorized non-storm water discharge
iv. characteristics of the discharge at its source and impacted drainage area/discharge location
v. name, title, and signature of observer
vi. **any** corrective actions necessary to eliminate the source of each unauthorized non-storm water discharge and to clean impacted drainage areas. Provide date unauthorized non-storm water discharge(s) was eliminated or scheduled to be eliminated.

G. MONTHLY WET SEASON VISUAL OBSERVATIONS

Section B.4.a of the General Permit requires you to conduct monthly visual observations of storm water discharges at all storm water discharge locations during the wet season. These observations shall occur during the first hour of discharge or, in the case of temporarily stored or contained storm water, at the time of discharge.

1. Indicate below whether monthly visual observations of storm water discharges occurred at all discharge locations. **Attach an explanation for any "NO" answers**. Include in this explanation whether any eligible storm events occurred during scheduled facility operating hours that did not result in a storm water discharge, and provide the date, time, name and title of the person who observed that there was no storm water discharge.

	YES	NO		YES	NO
October	☒	☐	February	☒	☐
November	☒	☐	March	☒	☐
December	☒	☐	April	☒	☐
January	☒	☐	May	☒	☐

LLNL conducted monthly wet season visual observations for storm water discharges (see explanation).

2. Report monthly wet season visual observations using **Form 4** or provide the following information:

   a. date, time, and location of observation
   b. name and title of observer
   c. characteristics of the discharge (i.e., odor, color, etc.) and source of any pollutants observed
   d. **any** new or revised BMPs necessary to reduce or prevent pollutants in storm water discharges. Provide new or revised BMP implementation date.

ANNUAL COMPREHENSIVE SITE COMPLIANCE EVALUATION (ACSCE)

H. ACSCE CHECKLIST

Section A.9 of the General Permit requires the facility operator to conduct one ACSCE in each reporting period (July 1-June 30). Evaluations must be conducted within 8-16 months of each other. The SWPPP and monitoring program shall be revised and implemented, as necessary, within 90 days of the evaluation. The checklist below includes the minimum steps necessary to complete a ACSCE. Indicate whether you have performed each step below. **Attach an explanation for any "NO" answers.**

1. Have you inspected all potential pollutant sources and industrial activities areas? ☒ YES ☐ NO
   The following areas should be inspected:

   - areas where spills and leaks have occurred during the last year
   - outdoor wash and rinse areas
   - process/manufacturing areas
   - loading, unloading, and transfer areas
   - waste storage/disposal areas
   - dust/particulate generating areas
   - erosion areas
   - building repair, remodeling, and construction
   - material storage areas
   - vehicle/equipment storage areas
   - truck parking and access areas
   - rooftop equipment areas
   - vehicle fueling/maintenance areas
   - non-storm water discharge generating areas

2. Have you reviewed your SWPPP to assure that its BMPs address existing potential pollutant sources and industrial activities areas? ☒ YES ☐ NO

3. Have you inspected the entire facility to verify that the SWPPP's site map is up-to-date? The following site map items should be verified: ☒ YES ☐ NO

   - facility boundaries
   - outline of all storm water drainage areas
   - areas impacted by run-on
   - storm water discharges locations
   - storm water collection and conveyance system
   - structural control measures such as catch basins, berms, containment areas, oil/water separators, etc

4. Have you reviewed all General Permit compliance records generated since the last annual evaluation? ☒ YES ☐ NO

   The following records should be reviewed:

   - quarterly authorized non-storm water discharge visual observations
   - monthly storm water discharge visual observation
   - records of spills/leaks and associated clean-up/response activities
   - quarterly unauthorized non-storm water discharge visual observations
   - Sampling and Analysis records
   - preventative maintenance inspection and maintenance records

5. Have you reviewed the major elements of the SWPPP to assure compliance with the General Permit? ☒ YES ☐ NO

   The following SWPPP items should be reviewed:

   - pollution prevention team
   - list of significant materials
   - description of potential pollutant sources
   - assessment of potential pollutant sources
   - identification and description of the BMPs to be implemented for each potential pollutant source

6. Have you reviewed your SWPPP to assure that a) the BMPs are adequate in reducing or preventing pollutants in storm water discharges and authorized non-storm water discharges, and b) the BMPs are being implemented? ☒ YES ☐ NO

   The following BMP categories should be reviewed:

   - good housekeeping practices
   - spill response
   - employee training
   - erosion control
   - quality assurance
   - preventative maintenance
   - material handling and storage practices
   - waste handling/storage erosion control
   - structural BMPs

7. Has all material handling equipment and equipment needed to implement the SWPPP been inspected? ☒ YES ☐ NO

I. ACSCE EVALUATION REPORT

The facility operator is required to provide an evaluation report that includes:

- identification of personnel performing the evaluation
- the date(s) of the evaluation
- necessary SWPPP revisions
- schedule for implementing SWPPP revisions
- any incidents of non-compliance and the corrective actions taken

Use **Form 5** to report the results of your evaluation or develop an equivalent form.

J. ACSCE CERTIFICATION

The facility operator is required to certify compliance with the Industrial Activities Storm Water General Permit. To certify compliance, both the SWPPP and Monitoring Program must be up to date and be fully implemented.

Based upon your ACSCE, do you certify compliance with the Industrial Activities Storm Water General Permit? ☒ YES ☐ NO

If you answered "NO" **attach an explanation** to the ACSCE Evaluation Report why you are not in compliance with the Industrial Activities Storm Water General Permit.

ATTACHMENT SUMMARY

Answer the questions below to help you determine what should be attached to this annual report. Answer NA (Not Applicable) to questions 2-4 if you are not required to provide those attachments.

1. Have you attached Forms 1,2,3,4, and 5 or their equivalent? ☒ YES (Mandatory)

2. If you conducted sampling and analysis, have you attached the laboratory analytical reports? ☒ YES ☐ NO ☐ NA

   Copies of the analytical reports are provided in the Supplement submitted with this report. The original laboratory reports are maintained in LLNL's data management system.

3. If you checked box II, III, IV, or V in item D.2 of this Annual Report, have you attached the first page of the appropriate certifications? ☐ YES ☐ NO ☒ NA

4. Have you attached an explanation for each "NO" answer in items E.1, E.2, E.5-E.7, E.9, E.10.c, F.1.b, F.2.a, F.2.c, G.1, H.1-H.7, or J? ☒ YES ☐ NO ☐ NA

ANNUAL REPORT CERTIFICATION

I am duly authorized to sign reports required by the INDUSTRIAL ACTIVITIES STORM WATER GENERAL PERMIT (see Standard Provision C.9) and I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those person directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Printed Name: Reginald F. Gaylord

Signature: Reg F. Gayll Date: June 28, 2011

Title: Acting Director, Environment, Safety & Health

DESCRIPTION OF BASIC ANALYTICAL PARAMETERS

The Industrial Activities Storm Water General Permit (General Permit) requires you to analyze storm water samples for at least four parameters. These are pH, Total Suspended Solids (TSS), Specific Conductance (SC),and Total Organic Carbon (TOC). Oil and Grease (O&G) may be substituted for TOC. In addition, you must monitor for any other pollutants which you believe to be present in your storm water discharge as a result of industrial activity and analytical parameters listed in Table D of the General Permit. There are no numeric limitations for the parameters you test for.

The four parameters which the General Permit requires to be tested are considered *indicator* parameters. In other words, regardless of what type of facility you operate, these parameters are nonspecific and general enough to usually provide some indication whether pollutants are present in your storm water discharge. The following briefly explains what each of these parameters mean:

pH is a numeric measure of the hydrogen-ion concentration. The neutral, or acceptable, range is within 6.5 to 8.5. At values less than 6.5, the water is considered acidic; above 8.5 it is considered alkaline or basic. An example of an acidic substance is vinegar, and a alkaline or basic substance is liquid antacid. Pure rainfall tends to have a pH of a little less than 7. There may be sources of materials or industrial activities which could increase or decrease the pH of your storm water discharge. If the pH levels of your storm water discharge are high or low, you should conduct a thorough evaluation of all potential pollutant sources at your site.

Total Suspended Solids (TSS) is a measure of the undissolved solids that are present in your storm water discharge. Sources of TSS include sediment from erosion of exposed land, and dirt from impervious (i.e. paved) areas. Sediment by itself can be very toxic to aquatic life because it covers feeding and breeding grounds, and can smother organisms living on the bottom of a water body. Toxic chemicals and other pollutants also adhere to sediment particles. This provides a medium by which toxic or other pollutants end up in our water ways and ultimately in human and aquatic life. TSS levels vary in runoff from undisturbed land. It has been shown that TSS levels increase significantly due to land development.

Specific Conductance (SC) is a numerical expression of the ability of the water to carry an electric current. SC can be used to assess the degree of mineralization, salinity, or estimate the total dissolved solids concentration of a water sample. Because of air pollution, most rain water has a SC a little above zero. A high SC could affect the usability of waters for drinking, irrigation, and other commercial or industrial use.

Total Organic Carbon (TOC) is a measure of the total organic matter present in water. (All organic matter contains carbon) This test is sensitive and able to detect small concentrations of organic matter. Organic matter is naturally occurring in animals, plants, and man. Organic matter may also be man made (so called synthetic organics). Synthetic organics include pesticides, fuels, solvents, and paints. Natural organic matter utilizes the oxygen in a receiving water to biodegrade. Too much organic matter could place a significant oxygen demand on the water, and possibly impact its quality. Synthetic organics either do not biodegrade or biodegrade very slowly. Synthetic organics are a source of toxic chemicals that can have adverse affects at very low concentrations. Some of these chemicals bioaccumulate in aquatic life. If your levels of TOC are high, you should evaluate all sources of natural or synthetic organics you may use at your site.

Oil and Grease (O&G) is a measure of the amount of oil and grease present in your storm water discharge. At very low concentrations, O&G can cause a sheen (that floating "rainbow") on the surface of water (1 qt. of oil can pollute 250,000 gallons of water). O&G can adversely affect aquatic life and create unsightly floating material and film on water, thus making it undrinkable. Sources of O&G include maintenance shops, vehicles, machines and roadways.

If you have any questions regarding whether or not your constituent concentrations are too high, please contact your local Regional Board office. The United States Environmental Protection Agency (USEPA) has published stormwater discharge benchmarks for a number of parameters. These benchmarks may be helpful when evaluating whether additional BMPs are appropriate. These benchmarks can be accessed at our website at http://www.waterboards.ca.gov. It is contained in the Sampling and Analysis Reduction Certification.

See Storm Water Contacts at

http://www.waterboards.ca.gov/water_issues/programs/stormwater/contact.shtml

Attachment 1

Explanations
Figure 1 and Tables 1, 2 & 3

Explanations

E. SAMPLING AND ANALYSIS RESULTS

1. There was only one qualifying storm event at Site 300 that generated runoff to be sampled during the 2010-2011 wet season; that storm event occurred on March 24, 2011. Qualifying storms must generate runoff during Site 300 working hours (Monday thru Thursday between 7:00am and 5:30pm) and be separated from other runoff events by at least 3 working days. Runoff at Site 300 is typically associated with ≥0.25 inches of rainfall in a 24-hour period. No second qualifying storm event generating runoff occurred during the wet season that was separated from other runoff by at least 3 working days and that generated runoff during working hours. **Table 1** lists the dates and rainfall totals for all 2010-2011 wet season events that generated ≥0.20 inches of precipitation, as measured at the Site 300 weather station, and a description of the rainfall event.

3. **Figure 1** shows the six storm water sample locations. Two additional sample locations, labeled CARW2 and GEOCRK, represent the off-site receiving water upstream and downstream, respectively, of the Experimental Test Site (Site 300).

4. & 5. Locations labeled N829 and NPT6 (see **Figure 1**) were not sampled because they did not discharge offsite. These drainages would discharge offsite only during excessive storm events, greater than the 1997-1998 El Nino season.

6. Normally, it is not possible to determine exactly when flow begins at each runoff sampling location. For the 3/24/11 storm, measurable rainfall was recorded between 10:00 am and 8:00 pm. Lawrence Livermore National Laboratory (LLNL) samples the runoff as soon as possible.

10. **Section B.5 of the General Permit**

c. Historical activities at the B-850 area of Site 300 (Dibley et al., 2008) led to inclusion of PCBs as a possible pollutant likely to be present in runoff from this operations area. PCBs along with other constituents were identified as soil contaminants from past disposal practices of electrical transformers. As the site is currently managed under CERCLA, a removal action was initiated and completed to remove and immobilize PCB contaminated soils at the site.

LLNL has sampled qualifying storm runoff (up to two times per year) since January 2006 through March 2011, for PCBs in runoff at NLIN2 (a location down stream of the possibly contaminated, B-850 operations area), CARW2 (an off-site location, up stream of Site 300), and GEOCRK (an off-site location, down stream of Site 300). None of these samples, analyzed by EPA Method E8082A with a typical reporting limit of <0.5 μg/L, have shown any detection of PCBs (PCB 1016, PCB 1221, PCB 1232, PCB 1242, PCB 1248, PCB 1254, or PCB 1260).

Remediation of this area was completed in Fall 2009. Two subsequent sampling events (2/9/10 & 3/24/11) showed no detection of PCBs; hence, in accordance with Section B.5 of the General Permit, LLNL intends to discontinue sampling for PCBs in future storm water samples from these Site 300 locations.

Dibley, V.R., L. Ferry, M. Taffet, G. Carli, and E. Friedrich, (2008), *Engineering Evaluation/Cost Analysis for PCB-, Dioxin, and Furan-contaminated Soil at the Building 850 Firing Table, Lawrence Livermore National Laboratory Site 300*, Lawrence Livermore National Laboratory, Livermore, California (UCRL-AR-233862).

11. LLNL has reported the analytical results on **Form 1**. Results that exceeded EPA Benchmarks are discussed in **Attachment 3**. Copies of the analytical reports and chains of custody are provided in a **Supplement** submitted with this report. The original laboratory reports are maintained in LLNL's data management system.

F. QUARTERLY VISUAL OBSERVATIONS

2. Unauthorized Non-Storm Water Discharges

c. **Table 2** includes all unplanned non-routine releases that were not observed during visual inspections but are documented as part of the LLNL's spill response procedures. Of the eight unplanned non-routine releases reported in **Table 2**, only one (6/20/10) resulted in a discharge to the Site 300 storm water drainage system.

G. MONTHLY WET SEASON VISUAL OBSERVATIONS

1. Monthly wet season visual observations are reported on **Form 4**. These include observations from March 24, 2011, the date of the only eligible storm event that occurred during scheduled facility operating hours. Copies of the LLNL Observation Forms are provided in the **Supplement** submitted with this report. See **Table 1** and **Table 3** for rainfall totals.

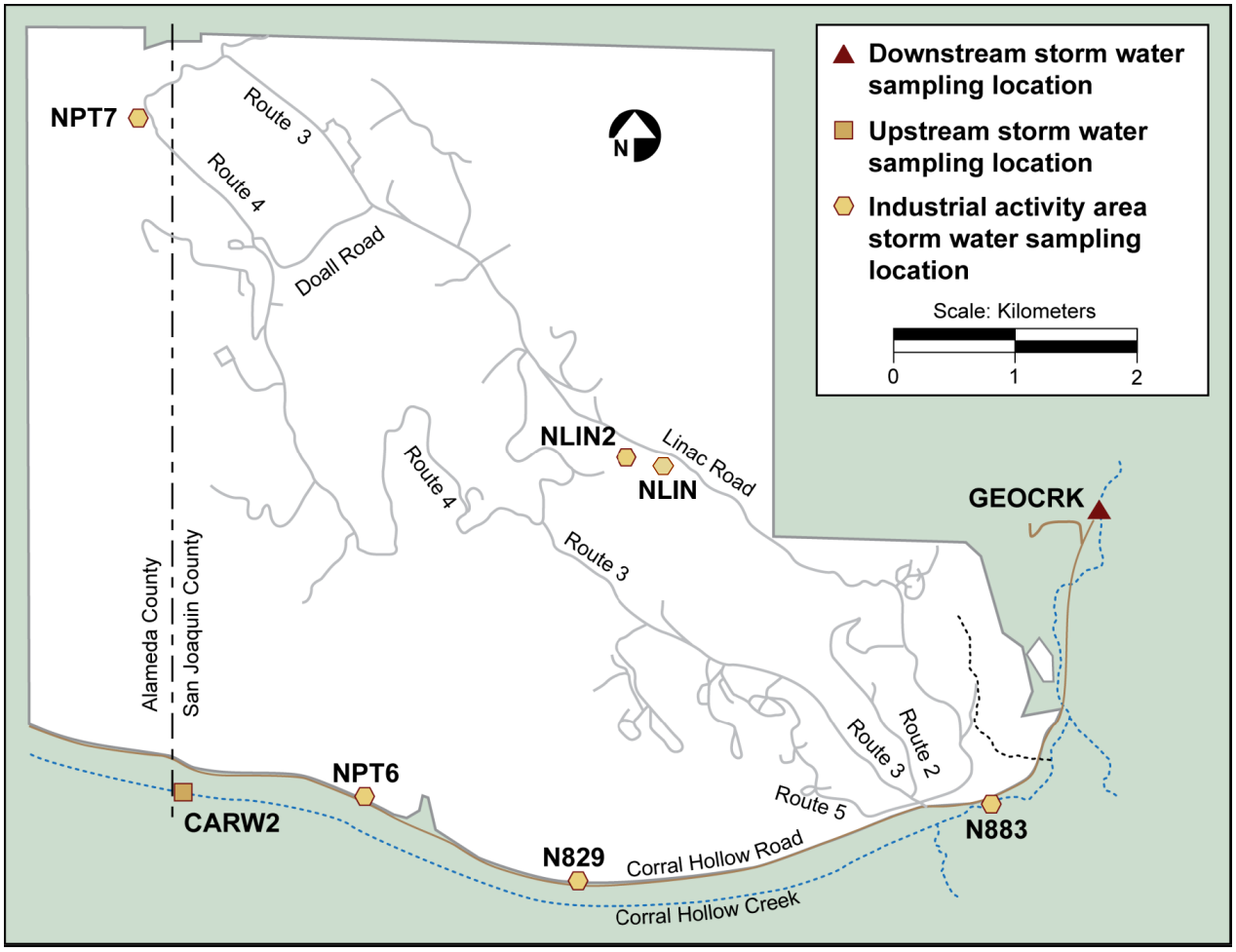

Figure 1. Storm water sampling locations at Site 300.

Table 1. Daily rainfall totals (for days with >0.2 inches precipitation) at Site 300 weather station and description of rainfall event, October 2010 through May 2011.

Date	Precipitation Daily Total (Inches)	Day of Week	Description of Event	
10/17/10	0.28	Sunday		
10/24/10	0.20	Sunday		
10/30/10	0.21	Saturday		
11/7/10	0.27	Sunday		
11/19/10	0.25	Friday		
11/20/10	0.73	Saturday		
11/21/10	0.20	Sunday		
11/23/10	0.22	Tuesday		<3 days w/o run-off
12/8/10	0.31	Wednesday	<0.2 by 5pm	
12/14/10	0.29	Tuesday	<0.1 by 5pm	
12/17/10	0.35	Friday		
12/19/10	0.70	Sunday		
12/22/10	0.42	Wednesday	<0.2 by 5pm	<3 days w/o run-off
12/28/10	0.28	Tuesday	S-300 Holiday Closure	
12/29/10	0.24	Wednesday	S-300 Holiday Closure	<3 days w/o run-off
2/16/11	0.62	Wednesday	>0.4 by 5am	
2/17/11	0.38	Thursday		<3 days w/o run-off
2/18/11	0.90	Friday		
2/19/11	0.30	Saturday		
2/25/11	0.38	Friday		
3/6/11	0.44	Sunday		
3/18/11	0.42	Friday		
3/19/11	0.53	Saturday		
3/20/11	0.22	Sunday		
3/24/11	0.75	Thursday	SAMPLE	
4/7/11	0.30	Thursday	<0.1 by 5pm	
5/15/11	0.23	Sunday		

Table 2. Summary of non-routine releases, June 2010 through May 2011.

Date	Location	Description
6/20/010	B-818	A broken water line, near B-818, released approximately 90,000 gallons of potable water to ground. Site 300 Maintenance personnel responded and shut off the water supply to the line. The drinking water source is treated, chlorinated ground water from a distribution system that serves B-818 and B-823. The water traveled south from the break, and much of it infiltrated into the soil or was contained in an on-site sediment basin. Based on residual water observed in the area, it was estimated that less than 500 gallons left the Site 300 boundary. Although it was not possible to dechlorinate the water while responding to this line break, given the travel path and contact, very little detectable chlorine would be left in the water by the time it reached Corral Hollow Creek. Furthermore, any water leaving the site and crossing Corral Hollow Road would have had to flow approximately a quarter of a mile over relatively flat, dry land consisting of soil and vegetation before reaching Corral Hollow Creek; hence, it is not likely that this discharge actually reached Corral Hollow Creek, the potential receiving water. This release was reported to the CVRWQCB in the 2Q/10 Monitoring Report (R5-2008-0081).
8/24/10	B-807	A line broke on hydraulic equipment, resulting in a hydraulic oil release to asphalt of approximately 3 gallons. Absorbent was used to clean up the release and was managed as waste.
9/30/10	B-882	A water leak from a six-inch potable water line was observed near B-882. LLNL staff responded and shut off the water line. Approximately 3,000 to 4,000 gallons of potable water ponded and soaked into the parking lot/corporation yard area. No water flowed into surface waterways or off-site and there were no signs of erosion. The area of the water line where the leak occurred was excavated and repaired.
1/2/11	B-827E	A level sensor switch, which had corroded from the hard water, failed to detect that a condensate system water tank was full. As a result, make-up water used in the condensate system continued to be added, overflowing the water tank. LLNL staff shut down the water, repaired the switch, and put the system back into operation. Approximately 500 gallons of clean water ran down the earthen berm and onto the soil, where it was absorbed before reaching any waterways.
4/6/11	B-889	A two-inch irrigation water line leaked near B-889. The water flow rate was approximately ten gallons per minute and approximately 300 gallons of water were released. A visual inspection identified standing water in the three storm drain basins near B-889 and a small amount of water in the gutter adjacent to the release area; however, no flowing or standing water was observed in the storm drain basin outside the main gate to Site 300. The water in a B-889 storm drain basin was tested for residual chlorine, and the test results were a non-detect. There was no evidence the water flowed beyond Site 300 boundaries.
4/9/11	B-818A	A leak from a water line near B-818A released less than 500 gallons to the ground. The water came to the surface from the failed underground line, flowed into the dirt and soaked back into the ground while traveling approximately 50 feet. No water reached a storm drain and the water did not flow beyond Site 300 boundaries.
4/14/11	B-851	Approximately five to ten gallons of hydraulic fluid were released from a front loader. The fluid trailed from the B-851 entrance gate and up to the firing table, a distance of approx 200 yards. All the fluid, absorbent, and contaminated gravel was collected in a 30 gallon drum for appropriate disposal as waste.
5/4/11	B-836D	There was a release of potable water inside B-836D. The water flowed into a floor drain and an estimated 70 gallons of water was discharged to ground outside of the building. The discharge was stopped and all the water soaked in before reaching surface waterways. The building drain will be checked to determine if capping is the appropriate corrective action.

Table 3. Monthly rainfall totals (inches) at Site 300 weather station, June 2010 through May 2011.

Date	**Monthly Total** (in.)
June 2010	0.00
July 2010	0.00
August 2010	0.01
September 2010	0.00
October 2010	1.07
November 2010	1.68
December 2010	3.13
January 2011	0.87
February 2011	2.68
March 2011	2.73
April 2011	0.36
May 2011	0.34
Water Year TOTAL	12.87

Attachment 2

Forms 1 through 5

Form 1- Sampling & Analysis Result for the First Storm Event 2010-11 Annual Report

- If analytical results are less than the detection limit (or non detectable), show the value as less than the numerical value of the detection limit (example: <.05)
- If you did not analyze for a required parameter, do not report "0". Instead, leave the appropriate box blank.
- When analysis is done using portable analysis (such as portable pH meters, SC meters, etc.), indicate "PA" in the appropriate test method used box.
- Make additional copies of this form as necessary.

NAME OF PERSON COLLECTING SAMPLE(S): Bob Williams, Gary Bear, Karl Brunckhorst, Crystal Rosene

DESCRIBE DISCHARGE LOCATION	DATE/TIME OF SAMPLE COLLECTION	TIME DISCHARGE STARTED	ANALYTICAL RESULTS For First Storm Event									
			BASIC PARAMETERS					OTHER PARAMETERS				
			pH	TSS	SC	O & G	COD	Total Hardness	Ammonia Nitrogen (as N)	Cyanide	HMX	RDX
N883	3/24/11 AM ☐ 1:41 PM ☒	Ongoing AM ☐ PM ☒	6.62	6.9	9.39	<5	<25	N/S	<0.1	<0.005	N/S	N/S
NPT7	3/24/11 AM ☐ 2:00 PM ☒	Ongoing AM ☐ PM ☒	7.76	16	68.4	<5	<25	N/S	<0.1	<0.005	N/S	N/S
NLIN2	3/24/11 AM ☐ 2:15 PM ☒	Ongoing AM ☐ PM ☒	8.04	1200	358	<5	120	240	0.24	<0.005	<0.8	<0.8
NLIN	3/24/11 AM ☐ 2:40 PM ☒	Ongoing AM ☐ PM ☒	8.15	63	867	<5	<25	280	<0.1	<0.005	<0.67	<0.67
CARW2 (Off-Site; in creek, upstream)	3/24/11 AM ☐ 2:53 PM ☒	Ongoing AM ☐ PM ☒	8.07	1100	512	<5	54	300	0.15	<0.005	<0.8	<0.8
GEOCRK (Off-Site; in creek, downstream)	3/24/11 AM ☐ 2:12 PM ☒	Ongoing AM ☐ PM ☒	8.33	4.6	692	<5	<25	250	<0.1	<0.005	<0.83	<0.83
TEST REPORTING UNITS:			**pH Units**	**mg/L**	**uS/cm**	**mg/L**	**mg O/L**	**mg/L**	**mg/L**	**mg/L**	**ug/L**	**ug/L**
TEST METHOD DETECTION LIMIT:*			0.05	1.0	1.0	5.0	25	0.5	0.1	0.005	1.0	1.0
TEST METHOD USED:			SM-4500HB	SM-2540D	E120.1	SM-5310C	E410.4	SM2320B	E350.1	E335.4	E8330	E8330
ANALYZED BY (SELF/LAB):			BC Labs	BC Labs	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 COD - Chemical Oxygen Demand
N/S - Not Sampled NA - Not Applicable E - EPA Method SM - Standard Method
* Test method detection limits may vary slightly by location. Listed limits are for the laboratory control "Method Blank" sample.

Form 1- Sampling & Analysis Result for the First Storm Event 2010–11 Annual Report (cont.)

- If analytical results are less than the detection limit (or non detectable), show the value as less than the numerical value of the detection limit (example: <.05)
- If you did not analyze for a required parameter, do not report "0". Instead, leave the appropriate box blank.
- When analysis is done using portable analysis (such as portable pH meters, SC meters, etc.), indicate "PA" in the appropriate test method used box.
- Make additional copies of this form as necessary.

NAME OF PERSON COLLECTING SAMPLE(S): Bob Williams, Gary Bear, Karl Brunckhorst, Crystal Rosene

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event								
	OTHER PARAMETERS: Metals								
	Arsenic	Beryllium	Cadmium	Iron	Lead	Magnesium	Mercury	Selenium	Silver
N883	<0.002	<0.0008	<0.0005	0.12	<0.005	<0.5	<0.0002	<0.002	<0.001
NPT7	<0.002	<0.0008	<0.0005	4.3	<0.005	2.5	<0.0002	<0.002	<0.001
NLIN2	0.02	0.0024	0.0013	64	0.02	31	<0.0002	0.0026	<0.001
NLIN	0.025	<0.0008	<0.0005	3	<0.005	33	<0.0002	0.004	<0.001
CARW2 (Off-Site; in creek, upstream)	0.018	0.0017	0.00076	58	0.02	35	<0.0002	0.002	<0.001
GEOCRK (Off-Site; in creek, downstream)	<0.002	<0.0008	<0.0005	0.79	<0.005	27	<0.0002	<0.002	<0.001
TEST REPORTING UNITS:	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
TEST METHOD DETECTION LIMIT*:	0.002	0.0002	0.0005	0.10	0.001	0.50	0.0002	0.002	0.001
TEST METHOD USED:	E200.8	E210.2	E200.8	E200.7	E200.8	E200.7	E245.1	E200.8	E200.8
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

E - EPA Method.

* Test method detection limits may vary slightly by location. Listed limits are for the laboratory control "Method Blank" sample.

Form 1- Sampling & Analysis Result for the First Storm Event 2010–11 Annual Report (cont.)

- If analytical results are less than the detection limit (or non detectable), show the value as less than the numerical value of the detection limit (example: <.05)
- If you did not analyze for a required parameter, do not report "0". Instead, leave the appropriate box blank.
- When analysis is done using portable analysis (such as portable pH meters, SC meters, etc.), indicate "PA" in the appropriate test method used box.
- Make additional copies of this form as necessary.

NAME OF PERSON COLLECTING SAMPLE(S): Bob Williams, Gary Bear, Karl Brunckhorst, Crystal Rosene

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event					
	OTHER PARAMETERS: Radioactive					
	Gross Alpha	Gross Beta	Tritium	U234*	U235*	U238*
N883	0.062 ± 0.050	0.157 ± 0.061	1.417 ± 2.383	-0.04 ± 0.74	0.63 ± 0.80	0.71 ± 0.81
NPT7	0.040 ± 0.043	0.130 ± 0.056	0.599 ± 2.320	4.1 ± 1.9	0.90 ± 1.03	4.96 ± 1.91
NLIN2	0.330 ± 0.114	0.574 ± 0.121	0.298 ± 2.272	133.2 ± 22.5	5.62 ± 3.12	193.51 ± 31.12
NLIN	0.245 ± 0.097	0.300 ± 0.077	-0.058 ± 2.165	155.8 ± 24.0	5.92 ± 2.21	119.88 ± 18.91
CARW2 (Off-Site; in creek, upstream)	0.474 ± 0.153	0.834 ± 0.169	-1.484 ± 1.965	59.2 ± 11.2	2.41 ± 2.19	59.57 ± 11.80
GEOCRK (Off-Site; in creek, downstream)	0.061 ± 0.057	0.217 ± 0.073	0.459 ± 2.213	24.5 ± 5.0	1.05 ± 0.85	24.31 ± 4.99
TEST REPORTING UNITS:	**Bq/L**	**Bq/L**	**Bq/L**	**mBq/L**	**mBq/L**	**mBq/L**
TEST METHOD DETECTION LIMIT:	0.074 Bq/L (2 pCi/L)	0.11 Bq/L (3 pCi/L)	3.7 Bq/L (100 pCi/L)	3.7 mBq/L (0.1 pCi/L)	3.7 mBq/L (0.1 pCi/L)	3.7 mBq/L (0.1 pCi/L)
TEST METHOD USED:	E900	E900	E906	ALPHA SPEC	ALPHA SPEC	ALPHA SPEC
ANALYZED BY (SELF/LAB):	GEL Lab	GEL Lab	GEL Lab	GEL Lab	GEL Lab	GEL Lab

E - EPA Method.

* Note that concentrations (or activities) of uranium (U) isotopes are expressed as mBq/L = Bq/1000L (1 pCi = 37 mBq).

Form 1- Sampling & Analysis Result for the First Storm Event 2010–11 Annual Report (cont.)

- If analytical results are less than the detection limit (or non detectable), show the value as less than the numerical value of the detection limit (example: <.05)
- If you did not analyze for a required parameter, do not report "0". Instead, leave the appropriate box blank.
- When analysis is done using portable analysis (such as portable pH meters, SC meters, etc.), indicate "PA" in the appropriate test method used box.
- Make additional copies of this form as necessary.

NAME OF PERSON COLLECTING SAMPLE(S): Bob Williams, Gary Bear, Karl Brunckhorst, Crystal Rosene

DESCRIBE DISCHARGE LOCATION	**ANALYTICAL RESULTS For First Storm Event**						
	OTHER PARAMETERS: Dioxins & Furans						
	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD
NLIN2**	<0.58	0.91	<1.3	4.29	4.66	99	840
NLIN	<0.61	<0.66	<0.69	<0.62	<0.62	9.75	85
CARW2** (Off-Site; in creek, upstream)	<0.63	<0.58	<0.64	<0.57	0.78	9.01	64.8
GEOCRK** (Off-Site; in creek, downstream)	<0.65	<0.8	<0.69	<0.62	<0.62	1.04	3.2
TEST REPORTING UNITS:	**pg/L**	**pg/L**	**pg/L**	**pg/L**	**pg/L**	**pg/L**	**pg/L**
TEST METHOD DETECTION LIMIT***	0.52	0.82	0.58	0.52	0.52	0.74	1.7
TEST METHOD USED:	E8290	E8290	E8290	E8290	E8290	E8290	E8290
ANALYZED BY (SELF/LAB):	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs

E - EPA Method

** Polychlorinated biphenyl (PCB) monitoring results were all "not detected" from locations NLIN2, CARW2, and GEOCRK.

Analyses were performed using method E8020A with a method detection limit of 0.10 µg/L.

*** Test method detection limits may vary slightly by location. Listed limits are for the laboratory control "Method Blank" sample.

**** Maxxam is a subcontractor to BC Labs.

Form 1- Sampling & Analysis Result for the First Storm Event 2010–11 Annual Report (cont.)

- If analytical results are less than the detection limit (or non detectable), show the value as less than the numerical value of the detection limit (example: <.05)
- If you did not analyze for a required parameter, do not report "0". Instead, leave the appropriate box blank.
- When analysis is done using portable analysis (such as portable pH meters, SC meters, etc.), indicate "PA" in the appropriate test method used box.

NAME OF PERSON COLLECTING SAMPLE(S): Bob Williams, Gary Bear, Karl Brunckhorst, Crystal Rosene

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event									
	OTHER PARAMETERS: Dioxins & Furans (cont.)									
	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	OCDF
NLIN2**	1.87	<0.67	2.69	3.40	1.58	<0.89	<0.69	29	2.13	130
NLIN	<0.63	<0.63	<1.9	<0.58	<0.56	<0.63	<0.7	<3.4	<0.65	12.9
CARW2** (Off-Site; in creek, upstream)	0.64	<0.64	<2.3	<0.57	<0.55	<0.62	<0.70	<5.4	<0.6	14.2
GEOCRK** (Off-Site; in creek, downstream)	<0.76	<0.71	2.22	<0.57	<0.55	<0.62	<0.7	<1.0	<0.68	<1.1
TEST REPORTING UNITS:	**pg/L**	**pg/L**	**pg/L**	**pg/L**	**pg/L**	**pg/L**	**pg/L**	**pg/L**	**pg/L**	**pg/L**
TEST METHOD DETECTION LIMIT***:	0.56	0.62	0.64	0.51	0.49	0.560	0.62	0.53	0.61	1.1
TEST METHOD USED:	E8290	E8290	E8290	E8290	E8290	E8290	E8290	E8290	E8290	E8290
ANALYZED BY (SELF/LAB):	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam**** / BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs

E - EPA Method

** Polychlorinated biphenyl (PCB) monitoring results were all "not detected" from locations NLIN2, CARW2, and GEOCRK. Analyses were performed using method E8020A with a method detection limit of 0.10 µg/L.

*** Test method detection limits may vary slightly by location. Listed limits are for the laboratory control "Method Blank" sample.

**** Maxxam is a subcontractor to BC Labs.

Form 1- Sampling & Analysis Result for the First Storm Event 2010–11 Annual Report (concluded)

- If analytical results are less than the detection limit (or non detectable), show the value as less than the numerical value of the detection limit (example: <.05)
- If you did not analyze for a required parameter, do not report "0". Instead, leave the appropriat box blank.
- When analysis is done using portable analysis (such as portable pH meters, SC meters, etc.), indicate "PA" in the appropriate test method used box.

NAME OF PERSON COLLECTING SAMPLE(S): Bob Williams, Gary Bear, Karl Brunckhorst, Crystal Rosene

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event							
	OTHER PARAMETERS: Dioxins & Furans (concluded)							
	Total TCDD	Total PeCDD	Total HxCDD	Total HpCDD	Total TCDF	Total PeCDF	Total HxCDF	Total HpCDF
NLIN2**	<2.0	0.91	30.5	165	6.89	5.77	29.5	65.3
NLIN	<1.9	<0.66	1.02	15.8	3.11	<1.9	1.8	5.63
CARW2** (Off-Site; in creek, upstream)	<2.4	<0.58	0.78	15.1	4.2	1.04	4.69	7.06
GEOCRK** (Off-Site; in creek, downstream)	<1.9	<0.8	<3.6	1.04	2.75	3.08	<0.61	<1.1
TEST REPORTING UNITS:	**pg/L**	**pg/L**	**pg/L**	**pg/L**	**pg/L**	**pg/L**	**pg/L**	**pg/L**
TEST METHOD DETECTION LIMIT***:	1.8	0.82	0.99	0.74	0.56	0.63	0.54	0.59
TEST METHOD USED:	E8290	E8290	E8290	E8290	E8290	E8290	E8290	E8290
ANALYZED BY (SELF/LAB):	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs	Maxxam****/ BC Labs

E - EPA Method

** Polychlorinated biphenyl (PCB) monitoring results were all "not detected" from locations NLIN2, CARW2, and GEOCRK. Analyses were performed using method E8020A with a method detection limit of 0.10 µg/L.

*** Test method detection limits may vary slightly by location. Listed limits are for the laboratory control "Method Blank" sample.

**** Maxxam is a subcontractor to BC Labs.

FORM 2-QUARTERLY VISUAL OBSERVATIONS OF AUTHORIZED NON-STORM WATER DISCHARGES (NSWDs)

SIDE A

- Quarterly dry weather visual observations are required of each authorized NSWD.
- Observe each authorized NSWD source, impacted drainage area, and discharge location.
- Authorized NSWDs must meet the conditions provided in Section D (pages 5-6), of the General Permit.
- Make additional copies of this form as necessary.

QUARTER: **JULY-SEPT.** DATE: 9 / 23 / 10	**Observers Name:** Karl Brunckhorst **Title: Scientific Technologist** Observations were made at the eight locations identified on Form 4.	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER?**	☐ **YES** ☒ **NO**	If **YES**, complete reverse side of this form.
QUARTER: **OCT.-DEC.** DATE: 10 / 28 / 10	**Observers Name:** Karl Brunckhorst **Title: Scientific Technologist** Observations were made at the eight locations identified on Form 4.	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER?**	☐ **YES** ☒ **NO**	If **YES**, complete reverse side of this form.
QUARTER: **JAN.-MARCH** DATE: 2 / 28 / 11	**Observers Name:** Karl Brunckhorst **Title: Scientific Technologist** Observations were made at the eight locations identified on Form 4.	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER?**	☐ **YES** ☒ **NO**	If **YES**, complete reverse side of this form.
QUARTER: **APRIL-JUNE** DATE: 5 / 24 / 11	**Observers Name:** Karl Brunckhorst **Title: Scientific Technologist** Observations were made at the eight locations identified on Form 4.	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER?**	☐ **YES** ☒ **NO**	If **YES**, complete reverse side of this form.

FORM 2-QUARTERLY VISUAL OBSERVATIONS OF AUTHORIZED NON-STORM WATER DISCHARGES (NSWDs)

SIDE B

DATE /TIME OF OBSERVATION	SOURCE AND LOCATION OF AUTHORIZED NSWD EXAMPLE: Air conditioner Units on Building C	NAME OF AUTHORIZED NSWD EXAMPLE: Air conditioner condensate	DESCRIBE AUTHORIZED NSWD CHARACTERISTICS Indicate whether authorized NSWD is clear, cloudy, or discolored, causing staining, contains floating objects or an oil sheen, has odors, etc.		DESCRIBE ANY REVISED OR NEW BMPs AND PROVIDE THEIR IMPLEMENTATION DATE
			At the NSWD Source	At the NSWD Drainage Area and Discharge Location	
__/__/__ __:__ ☐ AM ☐ PM					
__/__/__ __:__ ☐ AM ☐ PM					
__/__/__ __:__ ☐ AM ☐ PM					
__/__/__ __:__ ☐ AM ☐ PM					

FORM 3-QUARTERLY VISUAL OBSERVATIONS OF UNAUTHORIZED NON-STORM WATER DISCHARGES (NSWDs)

SIDE A

- Unauthorized NSWDs are discharges (such as wash or rinse waters) that do not meet the conditions provided in Section D (pages 5-6) of the General Permit.
- Quarterly visual observations are required to observe current and detect prior unauthorized NSWDs.
- Quarterly visual observations are required during dry weather and at all facility drainage areas.
- Each unauthorized NSWD source, impacted drainage area, and discharge location must be identified and observed.
- Unauthorized NSWDs that can not be eliminated within 90 days of observation must be reported to the Regional Board in accordance with Section A.10.e of the General Permit.
- Make additional copies of this form as necessary.

QUARTER: **JULY-SEPT.** **DATE/TIME OF OBSERVATIONS** 09/23/10 9:05 – 10:09 AM	**Observers Name:** Karl Brunckhorst **Title: Scientific Technologist** Observations were made at the eight locations identified on Form 4.	**WERE UNAUTHORIZED NSWDs OBSERVED?** **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NSWDs?**	**NO** **NO**	If **YES** to either question, complete reverse side.
QUARTER: **OCT.-DEC.** **DATE/TIME OF OBSERVATIONS** 10/28/10 1:33 – 2:20 PM	**Observers Name:** Karl Brunckhorst **Title: Scientific Technologist** Observations were made at the eight locations identified on Form 4.	**WERE UNAUTHORIZED NSWDs OBSERVED?** **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NSWDs?**	**NO** **NO**	If **YES** to either question, complete reverse side.
QUARTER: **JAN.-MARCH** **DATE/TIME OF OBSERVATIONS** 02/28/11 9:08 – 10:12 AM	**Observers Name:** Karl Brunckhorst **Title: Scientific Technologist** Observations were made at the eight locations identified on Form 4.	**WERE UNAUTHORIZED NSWDs OBSERVED?** **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NSWDs?**	**NO** **NO**	If **YES** to either question, complete reverse side.
QUARTER: **APRIL-JUNE** **DATE/TIME OF OBSERVATIONS** 05/24/11 08:37 – 10:55 AM	**Observers Name:** Karl Brunckhorst **Title: Scientific Technologist** Observations were made at the eight locations identified on Form 4.	**WERE UNAUTHORIZED NSWDs OBSERVED?** **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NSWDs?**	**NO** **NO**	If **YES** to either question, complete reverse side.

FORM 3 QUARTERLY VISUAL OBSERVATIONS OF UNAUTHORIZED NON-STORM WATER DISCHARGES (NSWDs)

SIDE B

OBSERVATION DATE (FROM REVERSE SIDE)	**NAME OF UNAUTHORIZED NSWD** EXAMPLE: Vehicle Wash Water	**SOURCE AND LOCATION OF UNAUTHORIZED NSWD** EXAMPLE: NW Corner of Parking Lot	**DESCRIBE UNAUTHORIZED NSWD CHARACTERISTICS** Indicate whether unauthorized NSWD is clear, cloudy, discolored, causing stains; contains floating objects or an oil sheen, has odors, etc.		**DESCRIBE CORRECTIVE ACTIONS TO ELIMINATE UNAUTHORIZED NSWD AND TO CLEAN IMPACTED DRAINAGE AREAS. PROVIDE UNAUTHORIZED NSWD ELIMINATION DATE.**
			AT THE UNAUTHORIZED NSWD SOURCE	**AT THE UNAUTHORIZED NSWD AREA AND DISCHARGE LOCATION**	
/ / _ __ : __ AM PM					
/ / __ : __ AM PM					
/ / __ : __ AM PM					
/ / __ : __ AM PM					

Lawrence Livermore National Laboratory Experimental Test Site
Annual Storm Water Monitoring Report for Waste Discharge Requirements 97-03-DWQ
July 2011

FORM 4-MONTHLY VISUAL OBSERVATIONS OF STORM WATER DISCHARGES

SIDE A

- Storm water discharge visual observations are required for at least one storm event per month between October 1 and May 31.
- Visual observations must be conducted during the first hour of discharge at all discharge locations.
- Discharges of temporarily stored or contained storm water must be observed at the time of discharge.
- Indicate "None" in the first column of this form if you did not conduct a monthly visual observation.
- Make additional copies of this form as necessary.
- Until a monthly visual observation is made, record any eligible storm events that do not result in a storm water discharge and note the date, time, name, and title of who observed there was no storm water discharge.

Observation Date: October 28 2010 Observers Name Karl Brunckhorst Title Scientific Technologist	Drainage Location Description	#1- CARW2	#2 - NPT6	#3 - N829	#4 - N883
	Observation Time	1: 33 P.M.	1: 35 P.M.	1: 37 P.M.	1: 50 P.M.
	Time Discharge Began	**There was no runoff during the inspection. Based on the low rainfall and observations made, there was likely no qualifying storm water runoff in October during hours of operation.**			
	Were Pollutants Observed * (If yes, complete reverse side)	No	No	No	No
Observation Date: November 23 2010 Observers Name: Gary Bear Title: Scientific Technologist	Drainage Location Description	#1- CARW2	#2 - NPT6	#3 - N829	#4 - N883
	Observation Time	10 : 16 A.M.	10 : 06 A.M.	10 : 34 A.M.	10 : 40 A.M.
	Time Discharge Began	**There was no significant runoff during the inspection. Based on the timing/duration of rainfall and observations made, there was likely no qualifying storm water runoff in November during hours of operation.**			
	Were Pollutants Observed * (If yes, complete reverse side)	No	No	No	No
Observation Date: December 09 2010 Observers Name: Karl Brunckhorst Title: Scientific Technologist	Drainage Location Description	#1- CARW2	#2 - NPT6	#3 - N829	#4 - N883
	Observation Time	10 : 22 A.M.	10 : 18 A.M.	10 : 28 A.M.	10 : 43 A.M.
	Time Discharge Began	**There was no runoff during the inspection. Based on the timing/duration of rainfall and observations made, there was likely no qualifying storm water runoff in December during hours of operation.**			
	Were Pollutants Observed * (If yes, complete reverse side)	No	No	No	No
Observation Date: January 27 2011 Observers Name: Karl Brunckhorst Title: Scientific Technologist	Drainage Location Description	#1- CARW2	#2 - NPT6	#3 - N829	#4 - N883
	Observation Time	9 : 30 A.M.	09 : 35 A.M.	09 : 41 A.M.	10 : 03 A.M.
	Time Discharge Began	**There was no runoff during the inspection. Based on the timing/duration of rainfall and observations made, there was likely no qualifying storm water runoff in January during hours of operation.**			
	Were Pollutants Observed * (If yes, complete reverse side)	No	No	No	No

* When there is runoff in these open channels (like CARW2), there is some turbidity because of mobilized sediments, but no visual contamination. Leaves, sticks, and other debris are common in all channels.

FORM 4-MONTHLY VISUAL OBSERVATIONS OF STORM WATER DISCHARGES

SIDE B

DATE/TIME OF OBSERVATION (From Reverse Side)	**DRAINAGE AREA DESCRIPTION** EXAMPLE: Discharge from material storage Area #2	**DESCRIBE STORM WATER DISCHARGE CHARACTERISTICS** Indicate whether storm water discharge is clear, cloudy, or discolored; causing staining; containing floating objects or an oil sheen, has odors, etc.	**IDENTIFY AND DESCRIBE SOURCE(S) OF POLLUTANTS** EXAMPLE: Oil sheen caused by oil dripped by trucks in vehicle maintenance area.	**DESCRIBE ANY REVISED OR NEW BMPs AND THEIR DATE OF IMPLEMENTATION**

FORM 4 (Continued)-MONTHLY VISUAL OBSERVATIONS OF STORM WATER DISCHARGES

SIDE A

- Storm water discharge visual observations are required for at least one storm event per month between October 1 and May 31.
- Visual observations must be conducted during the first hour of discharge at all discharge locations.
- Discharges of temporarily stored or contained storm water must be observed at the time of discharge.
- Indicate "None" in the first column of this form if you did not conduct a monthly visual observation.
- Make additional copies of this form as necessary.
- Until a monthly visual observation is made, record any eligible storm events that do not result in a storm water discharge and note the date, time, name, and title of who observed there was no storm water discharge.

Observation Date: February 28 2011 Observers Name: Karl Brunckhorst Title: Scientific Technologist	Drainage Location Description	#1- CARW2	#2 - NPT6	#3 - N829	#4 - N883
	Observation Time	9 : 08 A.M.	9 : 16 A.M.	9 : 19 A.M.	9 : 34 A.M.
	Time Discharge Began	There was ongoing ephemeral flow at sample locations CARW2 and GEOCRK. There was no runoff at NPT6, N829, N883, NLIN2, NLIN, or NPT7 during the time of the inspection. Based on the timing/duration of rainfall and observations made, there was likely no qualifying storm water runoff in February during hours of operation.			
	Were Pollutants Observed * (If yes, complete reverse side)	No	No	No	No
Observation Date: March 24 2011 Observers Name: Karl Brunckhorst/Gary Bear Title: Scientific Technologists	Drainage Location Description	#1- CARW2	#2 - NPT6	#3 - N829	#4 - N883
	Observation Time	2 : 53 P.M.	1 : 20 P.M.	1 : 24 P.M.	1 : 41 P.M.
	Time Discharge Began	There was significant runoff beginning at approx. 1:00 p.m. on March 24nd continuing through 6:00 p.m. March 24th at sample locations CARW2, N883, NPT7, NLIN2, NLIN, and GEOCRK. There was no runoff at NPT6 or N829.			
	Were Pollutants Observed * (If yes, complete reverse side)	Yes	No	No	No
Observation Date: April 21 2011 Observers Name: Karl Brunckhorst Title: Scientific Technologist	Drainage Location Description	#1- CARW2	#2 - NPT6	#3 - N829	#4 - N883
	Observation Time	8 : 32 A.M.	8 : 41 A.M.	8 : 43 A.M.	10 : 11 A.M.
	Time Discharge Began	There was insignificant runoff during the inspection. There was ephemeral flow at CARW2 and GEOCRK at the time of the inspection. Based on the timing/duration of rainfall and observations made, there was likely no qualifying storm water runoff in April during hours of operation.			
	Were Pollutants Observed * (If yes, complete reverse side)	No	No	No	No
Observation Date: May 24 2011 Observers Name: Karl Brunckhorst Title: Scientific Technologist	Drainage Location Description	#1- CARW2	#2 - NPT6	#3 - N829	#4 - N883
	Observation Time	8 : 37 A.M.	8 : 39 A.M.	8 : 41 A.M.	8 : 45 A.M.
	Time Discharge Began	There was no runoff during the inspection. There was insignificant rainfall in May.			
	Were Pollutants Observed * (If yes, complete reverse side)	No	No	No	No

* When there is runoff in these open channels (like CARW2), there is some turbidity because of mobilized sediments, but no visual contamination. Leaves, sticks, and other debris are common in all channels.

FORM 4 (Continued)-MONTHLY VISUAL OBSERVATIONS OF STORM WATER DISCHARGES **SIDE B**

DATE/TIME OF OBSERVATION (From Reverse Side)	**DRAINAGE AREA DESCRIPTION** EXAMPLE: Discharge from material storage Area #2	**DESCRIBE STORM WATER DISCHARGE CHARACTERISTICS** Indicate whether storm water discharge is clear, cloudy, or discolored; causing staining; containing floating objects or an oil sheen, has odors, etc.	**IDENTIFY AND DESCRIBE SOURCE(S) OF POLLUTANTS** EXAMPLE: Oil sheen caused by oil dripped by trucks in vehicle maintenance area.	**DESCRIBE ANY REVISED OR NEW BMPs AND THEIR DATE OF IMPLEMENTATION**
3 /24/11 2:53 PM	Upstream sample location CARW2	There was significant runoff at the time of the inspection and there was high turbidity in the runoff.	Source of turbidity is unknown.	Not applicable, this is an off site location.

FORM 4 (Continued)-MONTHLY VISUAL OBSERVATIONS OF STORM WATER DISCHARGES

SIDE A

- Storm water discharge visual observations are required for at least one storm event per month between October 1 and May 31.
- Visual observations must be conducted during the first hour of discharge at all discharge locations.
- Discharges of temporarily stored or contained storm water must be observed at the time of discharge
- Indicate "None" in the first column of this form if you did not conduct a monthly visual observation.
- Make additional copies of this form as necessary.
- Until a monthly visual observation is made, record any eligible storm events that do not result in a storm water discharge and note the date, time, name, and title of who observed there was no storm water discharge.

Observation Date: October 28 2010 Observers Name: Karl Brunckhorst Title: Scientific Technologist	Drainage Location Description	#5 – NPT7	#6 - NLIN	#7 - NLIN2*	#8 - GEOCRK*
	Observation Time	2: 20 P.M.	2: 08 P.M.	2: 02 P.M.	1: 45 P.M.
	Time Discharge Began	**There was no runoff during the inspection. Based on the low rainfall and observations made, there was likely no qualifying storm water runoff in October during hours of operation.**			
	Were Pollutants Observed ** (If yes, complete reverse side)	No	No	No	Yes
Observation Date: November 23 2010 Observers Name: Gary Bear Title: Scientific Technologist	Drainage Location Description	#5 – NPT7	#6 - NLIN	#7 - NLIN2*	#8 - GEOCRK*
	Observation Time	11 : 18 A.M.	11 : 36 A.M.	11 : 10 A.M.	9: 53 A.M.
	Time Discharge Began	**There was no significant runoff during the inspection. Based on the timing/duration of rainfall and observations made, there was likely no qualifying storm water runoff in November during hours of operation.**			
	Were Pollutants Observed ** (If yes, complete reverse side)	No	No	No	Yes
Observation Date: December 9 2010 Observers Name: Karl Brunckhorst Title: Scientific Technologist	Drainage Location Description	#5 – NPT7	#6 - NLIN	#7 - NLIN2*	#8 - GEOCRK*
	Observation Time	11 : 04 A.M.	11 : 15 A.M.	11 : 19 A.M.	10 : 33 A.M.
	Time Discharge Began	**There was no runoff during the inspection. Based on the timing/duration of rainfall and observations made, there was likely no qualifying storm water runoff in December during hours of operation.**			
	Were Pollutants Observed ** (If yes, complete reverse side)	No	No	No	Yes
Observation Date: January 27 2011 Observers Name: Karl Brunckhorst Title: Scientific Technologist	Drainage Location Description	#5 - NPT7	#6 - NLIN	#7 - NLIN2*	#8 - GEOCRK*
	Observation Time	10 : 28 A.M.	10 : 15 A.M.	10 : 20 A.M.	9 : 56 A.M
	Time Discharge Began	**There was no runoff during the inspection. Based on the timing/duration of rainfall and observations made, there was likely no qualifying storm water runoff in January during hours of operation.**			
	Were Pollutants Observed ** (If yes, complete reverse side)	No	No	No	Yes

* NLIN2 and GEOCRK generally have flow from springs located upstream of each location.

** When there is runoff in these open channels (NLIN2 and GEOCRK), there is some turbidity because of mobilized sediments but no visual contamination. Leaves, sticks, and other debris are common in all channels.

FORM 4-MONTHLY VISUAL OBSERVATIONS OF STORM WATER DISCHARGES

SIDE B

DATE/TIME OF OBSERVATION (From Reverse Side)	DRAINAGE AREA DESCRIPTION EXAMPLE: Discharge from material storage Area #2	DESCRIBE STORM WATER DISCHARGE CHARACTERISTICS Indicate whether storm water discharge is clear, cloudy, or discolored; causing staining; containing floating objects or an oil sheen, has odors, etc.	IDENTIFY AND DESCRIBE SOURCE(S) OF POLLUTANTS EXAMPLE: Oil sheen caused by oil dripped by trucks in vehicle maintenance area.	DESCRIBE ANY REVISED OR NEW BMPs AND THEIR DATE OF IMPLEMENTATION
10 / 28 / 10 1 : 45 PM	Downstream sample location GEOCRK	There was no runoff during the inspection. Water flows through the sample location from an upstream spring. Debris, including recently dumped items and an empty gas can, was observed in the creek bed at the time of the inspection.	Sample location is near Corral Hollow Creek where occasional roadside dumping occurs and roadside trash collects.	Not applicable, this is an off site location.
11 / 23 / 10 9 : 53 AM	Downstream sample location GEOCRK	There was no runoff during the inspection. Water flows through the sample location from an upstream spring. Debris, including recently dumped items and an empty gas can, was observed in the creek bed at the time of the inspection.	Sample location is near Corral Hollow Creek where occasional roadside dumping occurs and roadside trash collects.	Not applicable, this is an off site location.
12 / 09 / 10 10 : 33 AM	Downstream sample location GEOCRK	There was no runoff during the inspection. Water flows through the sample location from an upstream spring. Debris, including recently dumped items and an empty gas can, was observed in the creek bed at the time of the inspection.	Sample location is near Corral Hollow Creek where occasional roadside dumping occurs and roadside trash collects.	Not applicable, this is an off site location.
01 / 27 / 11 9 : 56 AM	Downstream sample location GEOCRK	There was no runoff during the inspection. Water flows through the sample location from an upstream spring. Debris, including recently dumped items, was observed in the creek bed at the time of the inspection. The gasoline can from prior inspections had been removed from creek bed.	Sample location is near Corral Hollow Creek where occasional roadside dumping occurs and roadside trash collects.	Not applicable, this is an off site location.

FORM 4 (Continued)-MONTHLY VISUAL OBSERVATIONS OF STORM WATER DISCHARGES

SIDE A

- Storm water discharge visual observations are required for at least one storm event per month between October 1 and May 31.
- Visual observations must be conducted during the first hour of discharge at all discharge locations.
- Discharges of temporarily stored or contained storm water must be observed at the time of discharge.
- Indicate "None" in the first column of this form if you did not conduct a monthly visual observation.
- Make additional copies of this form as necessary.
- Until a monthly visual observation is made, record any eligible storm events that do not result in a storm water discharge and note the date, time, name, and title of who observed there was no storm water discharge.

Observation Date: February 28 2011 Observers Name: Karl Bruncknorst Title: Scientific Technologist	Drainage Location Description	#5 - NPT7	#6 - NLIN	#7 - NLIN2*	#8 - GEOCRK*
	Observation Time	9 : 58 A.M.	10 : 12 A.M.	10 : 07 A.M.	9 : 27 A.M.
	Time Discharge Began	**There was ongoing ephemeral flow at sample locations CARW2 and GEOCRK. There was no runoff at NPT6, N829, N883, NLIN2, NLIN, or NPT7 during the time of the inspection. Based on the timing/duration of rainfall and observations made, there was likely no qualifying storm water runoff in February during hours of operation.**			
	Were Pollutants Observed ** (If yes, complete reverse side)	No	No	No	Yes
Observation Date: March 24 2011 Observers Name: Karl Bruncknorst/Gary Bear Title: Scientific Technologists	Drainage Location Description	#5 - NPT7	#6 - NLIN	#7 - NLIN2*	#8 - GEOCRK*
	Observation Time	2 : 00 P.M.	2 : 40 P.M.	2 : 15 P.M.	2 : 12 P.M.
	Time Discharge Began	**There was significant runoff beginning at approx. 1:00 p.m. on March 24nd continuing through 6:00 p.m. March 24th at sample locations CARW2, N883, NPT7, NLIN2, NLIN, and GEOCRK. There was no runoff at NPT6 or N829.**			
	Were Pollutants Observed ** (If yes, complete reverse side)	No	No	No	No
Observation Date: April 21 2011 Observers Name: Karl Bruncknorst Title: Scientific Technologist	Drainage Location Description	#5 - NPT7	#6 - NLIN	#7 - NLIN2*	#8 - GEOCRK*
	Observation Time	9 : 17 A.M.	9 : 03 A.M.	9 : 07 A.M.	10 : 27 A.M.
	Time Discharge Began	**There was insignificant runoff during the inspection. There was ephemeral flow at CARW2 and GEOCRK at the time of the inspection. Based on the timing/duration of rainfall and observations made, there was likely no qualifying storm water runoff in April during hours of operation.**			
	Were Pollutants Observed ** (If yes, complete reverse side)	No	No	No	No
Observation Date: May 24 2011 Observers Name: Karl Bruncknorst Title: Scientific Technologist	Drainage Location Description	#5 - NPT7	#6 - NLIN	#7 - NLIN2*	#8 - GEOCRK*
	Observation Time	10 : 15 A.M.	10 : 35 A.M.	10 : 32 A.M.	10 : 55 A.M.
	Time Discharge Began **	**There was no runoff during the inspection. There was insignificant rainfall in May.**			
	Were Pollutants Observed (If yes, complete reverse side)	No	No	No	No

* NLIN2 and GEOCRK generally have flow from springs located upstream of each location.

** When there is runoff in these open channels (NLIN2 and GEOCRK), there is some turbidity because of mobilized sediments but no visual contamination. Leaves, sticks, and other debris are common in all channels.

FORM 4 (Continued)-MONTHLY VISUAL OBSERVATIONS OF STORM WATER DISCHARGES **SIDE B**

DATE/TIME OF OBSERVATION (From Reverse Side)	**DRAINAGE AREA DESCRIPTION** EXAMPLE: Discharge from material storage Area #2	**DESCRIBE STORM WATER DISCHARGE CHARACTERISTICS** Indicate whether storm water discharge is clear, cloudy, or discolored; causing staining; containing floating objects or an oil sheen, has odors, etc.	**IDENTIFY AND DESCRIBE SOURCE(S) OF POLLUTANTS** EXAMPLE: Oil sheen caused by oil dripped by trucks in vehicle maintenance area.	**DESCRIBE ANY REVISED OR NEW BMPs AND THEIR DATE OF IMPLEMENTATION**
02 / 28 / 11 9 : 56 AM	Downstream sample location GEOCRK	There was ongoing ephemeral flow during the inspection. Water also flows through the sample location from an upstream spring. Debris, including recently dumped items, was observed in the creek bed at the time of the inspection. The gasoline can from prior inspections had been removed from creek bed.	Sample location is near Corral Hollow Creek where occasional roadside dumping occurs and roadside trash collects.	Not applicable, this is an off site location.

FORM 5-ANNUAL COMPREHENSIVE SITE COMPLIANCE EVALUATION POTENTIAL POLLUTANT SOURCE/INDUSTRIAL ACTIVITY BMP STATUS

EVALUATION DATE: **March 2011 - April 2011**

SIGNATURE: **Signed copies of the Annual Inspection Summary Certification Forms are provided in the Data Supplement**

NOTE: **Annual Facility Inspection Summary Forms are also provided in the Data Supplement**

PRINCIPAL DIRECTORATE RESPONSIBLE FOR POTENTIAL POLLUTANT SOURCE/INDUSTRIAL ACTIVITY	HAVE ANY BMPs NOT BEEN FULLY IMPLEMENTED?	ARE ADDITIONAL/ REVISED BMPs NECESSARY?	Describe deficiencies in BMPs or BMP implementation and Describe additional/revised BMPs or corrective actions and their date(s) of implementation
Directors Office	**NO**	**NO**	Areas of erosion (noted last year) were repaired in 2010, and the repairs have held successfully.
Science and Technology (Engineering Directorate)	**NO**	**NO**	
Weapons and Complex Integration	**NO**	**NO**	
Operations and Business	**NO**	**NO**	

Attachment 3

Explanation of Exceedances of EPA Benchmark Parameters

Compliance Approach, LLNL Site 300 Specific Threshold Criteria, and Discussion of Analytical Results

Explanation of Exceedances of EPA Benchmark Parameters

Compliance Approach, LLNL Site 300 Specific Threshold Criteria, and Discussion of Analytical Results

Site 300 is a remote experimental test site located in the Altamont Hills of the Diablo Range. It occupies approximately 7,000 acres, which consists of a series of steep hills and ridges oriented along a generally northwest-southeast trend, separated by intervening ravines. The elevation at Site 300 ranges from approximately 500 feet above sea level in the southeast portion of the site to 1,750 feet above sea level in the northwestern quadrant of the site. Approximately five percent of the 7,000 acres are developed. Storm water travels mostly through natural drainage courses and discharges into Corral Hollow Creek, which is along the southern and eastern boundary of the site. Corral Hollow Creek is an ephemeral stream that drains toward the San Joaquin basin. The creek terminates in an agricultural field east of Chrisman Road in Tracy. There is no visual evidence of a direct connection between Corral Hollow Creek and the San Joaquin River or any surface tributaries leading to the river. The river and its surface tributaries are more than 5 miles from the last visible portion of Corral Hollow Creek.

Though some of the storm water monitoring results at Site 300 exceed EPA benchmark values, the source of the constituents does not generally originate from the Site 300 industrial activities, rather from sediment transport through the natural drainage channels. LLNL believes that because of the unique rural characteristics at Site 300, storm water runoff quality is not comparable to the typical industrial facility and, therefore, the EPA benchmark values are not directly applicable. Beginning in 2000, LLNL established site-specific threshold comparison criteria to identify out-of-the-ordinary data that potentially would indicate inadequate best management practices (BMP) and would merit further investigation to determine if concentrations of the monitored parameters are increasing in storm water discharges. LLNL staff believes that this site-specific approach is in keeping with watershed management principles and provides a strong tool to evaluate BMP effectiveness.

As previously directed by the Regional Board, only results for samples collected from on-site discharge locations are reviewed in this report. LLNL also monitors an upstream receiving water location (CARW2), which is unaffected by Site 300 storm water discharges associated with industrial activities, and a downstream receiving water location (GEOCRK) on the Corral Hollow Creek (See **Figure 1** in **Attachment 1**). These two locations are important for understanding the background watershed water quality and local environment, which is consistent with EPA's use of benchmarks in relation to natural background pollutant levels in Section 6.2.1 of the 2008 Multi-Sector General Permit (MSGP).

Storm water monitoring results at Site 300 that exceed EPA benchmark values

The Site 300 monitoring program currently includes six discharge sampling locations; four of which discharged storm water runoff in the 2010–2011 wet weather season:

- NLIN2 – An on-site location in Elk Ravine to characterize a storm water runoff from a number of industrial activities that have storm water discharges into Elk Ravine, which is located downstream from a ground water-fed spring and an associated wetland area;

- NLIN – Recently, LLNL has been able to implement sampling at the downstream location (NLIN) to compare with water quality at NLIN2, after the storm water flows through a constructed wetland BMP;
- N883 – An on-site location at a storm drain outfall, which characterizes runoff from the Resource Conservation and Recovery Act (RCRA) permitted container storage area, located in a mostly paved area; and
- NPT7 – An on-site location at the outfall from the drainage diversion structure to characterize storm water runoff from a closed landfill.

No runoff was observed to occur from two other routine sampling locations (NPT6 and N829). For the 2010–2011 wet season, the Site 300 storm water monitoring results at or above the EPA benchmark values are shown below in **Table 4**.

Table 4. Summary of Site 300 storm water monitoring results at or above EPA benchmark values.

			Storm Water Monitoring Location & Date		
	EPA Benchmark Value	**Units**	NLIN2	NLIN Downstream of NLIN2	NPT7
Analyte			3/24/11	3/24/11	3/24/11
TSS[(a)]	100.	mg/L	1200	[(d)]	[(d)]
Iron	1.0	mg/L	64	3.0	4.3
SC[(b)]	300-500	µmhos/cm	358 [(d)]	867	[(d)]
COD[(c)]	120	mg/L	120 [(d)]	[(d)]	[(d)]

[(a)] TSS = Total Suspended Solids.
[(b)] SC = Specific Conductance.
[(c)] COD = Chemical Oxygen Demand.
[(d)] Result did not exceed EPA benchmark value.

Sources of pollutants that contribute to the exceedances in Site 300 storm water

Iron and Total Suspended Solids

As noted in previous years, iron and total suspended solids (TSS) are from sediments moving through the natural drainage channels and are the result of erosion upstream and within the channels. For this reason, LLNL has not established a Site 300-specific threshold criteria for iron. However, iron is naturally occurring in soil as ferric oxides, and iron concentrations in storm water samples are correlated with the TSS values as demonstrated in **Figure 2** (below). This correlation suggests that the iron is sediment associated, as opposed to resulting from non-sediment sources (e.g., leaching from exposed materials).

While the TSS concentration in the sample collected on 3/24/11 from location NLIN2 (plotted as a circle in **Figure 2**) was above the EPA benchmark value, a sample collected at NLIN (a downstream location below a constructed wetland BMP) demonstrated that runoff was below the benchmark value prior to discharge from the site. In addition, a similar elevated TSS value was observed in the corresponding upstream sampling location CARW2 (1,100 mg/L), but both these values are below the Site 300-specific threshold value (1,700 mg/L).

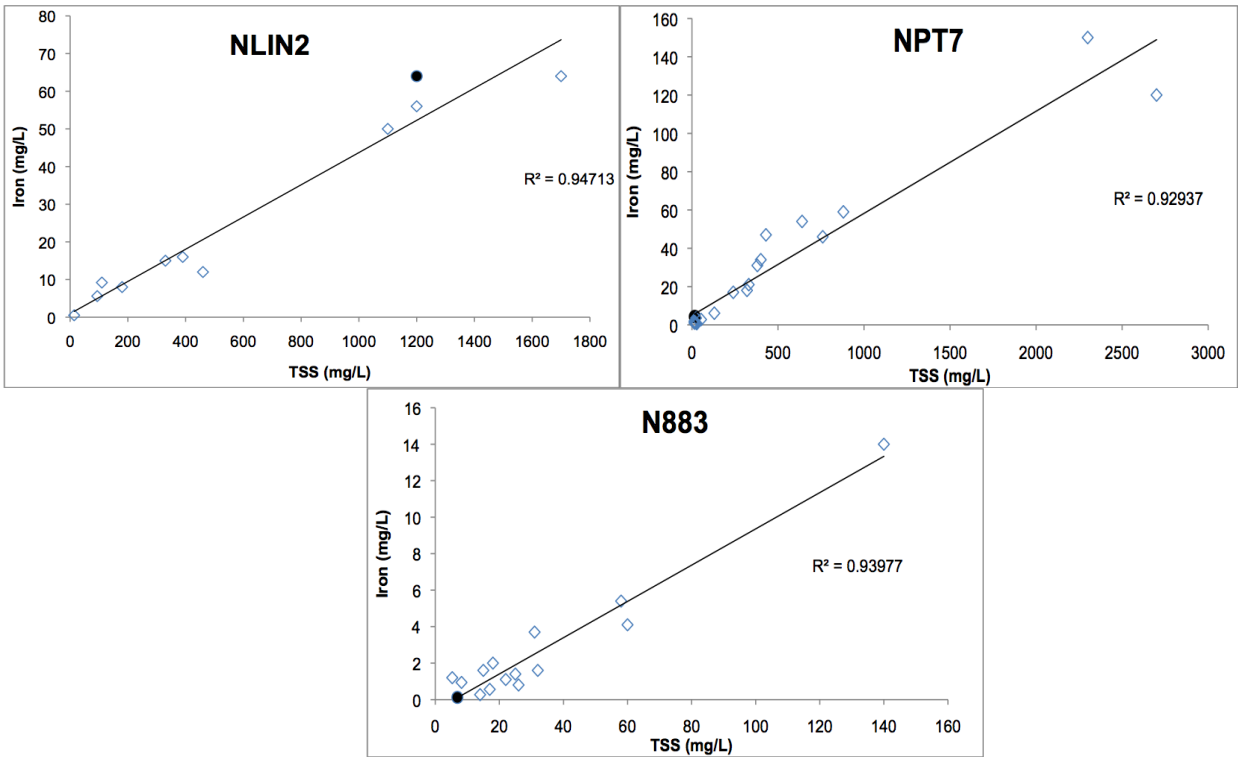

Figure 2. Demonstrated correlation between iron and TSS at LLNL S300 discharge locations. (Historical data plotted as diamonds; data from the 2010-2011 storm year plotted as a circle.)

Specific Conductance

The 2010–2011 storm water sample collected at NLIN2 showed a slightly elevated (358 µmhos/cm) specific conductance (SC), but within the range (300-500 µmhos/cm) of the EPA benchmark values for this parameter. The sample collected at NLIN, for comparison with NLIN2, showed an even greater SC value of 867 µmhos/cm. Historically, elevated specific conductance (SC) results have been reported for both these locations. These elevated SC values are attributed to a naturally occurring spring (Spring 6), upstream of these sampling locations. Specific conductance (SC) values, for the groundwater discharged from this spring, range from 700 – 870 µmhos/cm. This SC range is consistent with the SC results typically reported for storm water runoff samples from NLIN and NLIN2, and reflect a natural background SC from a groundwater source unrelated to any industrial activity at the site.

Chemical Oxygen Demand

Chemical oxygen demand (COD) ranges broadly and water quality samples vary with the intensity of the storms and the ability of the storm water to move sediment and organic debris. The COD value for the 3/24/11 storm sample at location NLIN2 is just at the EPA benchmark value (120 mg/L), while the COD value at location NLIN was below the analytical laboratory reporting limit (<25 mg/L). The elevated COD is likely related to the spring near NLIN2 and not industrial activity. In addition, the sample result at NLIN demonstrates that the COD was improved by the constructed wetland BMP prior to discharge from the site.

Review of current BMPs and modifications/additions to reduce or eliminate the discharge of pollutants

Based on LLNL's evaluation of the monitoring data and through comparison to the Site 300-specific threshold values, LLNL believes that the storm water monitoring results for 2010–2011 are within expected values and do not merit further investigation of potential sources at Site 300 or additional best management practices. However, LLNL recognizes the importance of implementing best management practices for water quality protection; hence, LLNL implements best management practices throughout the site, not only at industrial activities (as defined by SIC codes) on-site. The constituents exceeding EPA benchmark values are largely associated with sediment transport, which is a natural process in this steeply sloped Corral Hollow Creek watershed. LLNL continues to implement a program to address general housekeeping, and erosion and sediment transport issues throughout the site.

Ongoing BMP activities include:

- **TSS, Iron, and COD at NLIN2** – As mentioned above, sampling location NLIN2 is in the lower valley below the Elk Ravine watershed and includes discharges from areas unrelated to industrial activities. At the base of the watershed is a two-stage constructed wetland designed for wildlife habitat, with an additional function of sediment entrapment. The NLIN2 sampling location is currently upstream of this wetland due to safety concerns about access downstream during storms. The area previously included explosives storage, so limiting access to the vicinity during periods of lightening was a standard safety practice. The explosives storage area is now closed allowing LLNL sampling crews access to collect storm water samples downstream of the constructed wetland. Recently, LLNL has been able to implement sampling at the downstream location (NLIN) to compare water quality at NLIN2. The sampling results shown in **Table 3** demonstrate that the constructed wetland is an effective BMP for TSS, iron, and COD.

- **Iron and SC at NLIN** – Iron and SC were still above their respective benchmark values at NLIN, despite the constructed wetland BMP. However, the source of these constituents is consistent with natural background as described in the Multi-Sector General Permit – Section 6.2.1.2.

- **Iron at NPT7** – The location NPT7 drains runoff from the Pit 7 Complex to the north. The drained area includes a RCRA cap and adjacent hillslopes. Sediment sources are largely believed to be created by rodent burrows near the concrete surface water diversion channel for the RCRA cap. There is a sediment trap in the channel that is cleaned out as needed; routine annual clean-outs, prior to the rainy season, were initiated in 2010. In addition, LLNL will continue to inspect the pit cap on a quarterly basis. Results of pit cap inspections are reported to the Central Valley Regional Water Quality Control Board (CVRWQCB) in quarterly monitoring reports.

As LLNL continues to implement and maintain its storm water program, internal assessments of BMPs have identified some opportunities for improvement of additional controls. In particular, given the correlation between the iron detected at Pit 7 and TSS (See **Figure 2)**, LLNL will implement existing BMPs on a more frequent basis to control the sediment at NPT7. Specifically, LLNL will remove dirt from the Pit 7 concrete drainage channels as part of the quarterly pit cap inspection process. This should

reduce the amount of dirt that collects in the sediment trap, which is cleaned annually prior to the rainy season.

In addition, LLNL continues to pursue funding opportunities for priority erosion projects identified by Consolidated Engineering Laboratories in their preliminary erosion assessment of Site 300, prepared in CY2000, as well as evaluating recently developed erosion areas. For example, during the past year, major repairs along Route 2 (see **Figure 1**) were completed to address erosion issues associated with several culverts and gullies along that route. Some of these projects are upstream of the storm water sampling locations.

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