Environmental Protection Department

Operations and Regulatory Affairs Division

UCRL-AR-144362-07

Lawrence Livermore National Laboratory
Site 300
Annual Storm Water Monitoring Report
for Waste Discharge Requirements 97-03-DWQ

July 2007

Richard Brown

Water Guidance and Monitoring Group

Lawrence Livermore National Laboratory

University of California, Livermore, California 94551

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LLNL Site 300
Annual Storm Water Monitoring Report
For WDR 97-03-DWQ

REGIONAL BOARD INFORMATION

REGION 5S: CENTRAL VALLEY REGION, SACRAMENTO
Pamela Creedon, Executive Officer
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Rancho Cordova, CA 95670-6114
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GENERAL INFORMATION

A. ***Facility ID No:*** **5S39I015973**

B. *Operator:*
UC Regents

Contact Person:
William A. Bookless
Lawrence Livermore National Laboratory
P.O. Box 808, L-668
Livermore, CA 94551
(925) 422-3343

C. *Facility/Site:*
Site 300

Contact Person:
John Scott
Lawrence Livermore National Laboratory
P.O. Box 808, L-871
Livermore, CA 94551
(925) 423-5026

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

Regulated Activity SIC Codes: SIC Code 4953: Hazardous Waste Treatment (sector K) and Landfill and Land Application Sites (sector L)

State of California
STATE WATER RESOURCES CONTROL BOARD

2006–2007

ANNUAL REPORT

FOR
STORM WATER DISCHARGES ASSOCIATED
WITH INDUSTRIAL ACTIVITIES

Reporting Period July 1, 2006 through June 30, 2007

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:* **5S39I015973**

Facility Business Name: UC Regents LLNL

Contact Person: John E. Scott - Manager

Physical Address: Corral Hollow Road

e-mail: scott14@llnl.gov

City: Tracy

State: CA Zip: 95376 Phone: (925) 423-5217

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

B. Facility Operator Information:

Operator Name: University of California Regents

Contact Person: William A. Bookless

Mailing Address: PO Box 808, Mail Stop L-668

e-mail: bookless1@llnl.gov

City: Livermore

State: CA Zip: 94551 Phone: (925) 422-3343

C. Facility Billing Information:

Operator Name: UC LLNL

Contact Person: Sandra Mathews

Mailing Address: PO Box 808, Mail Stop L-627

e-mail: mathews6@llnl.gov

City: Livermore

State: CA Zip: 94551 Phone: (925) 423-6679

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? ___5___ (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

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

   Date facility's drainage areas were last evaluated ___05/30/2007__

6. Were all samples collected during the first hour of discharge? ☐ YES ☒ NO (see 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**

       _____ 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**

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.

   LLNL conducted observations for storm water discharges.

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

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 boundries
   - 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 N/A
   - 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
   - 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
- 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) (See Attachment 2)

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

   Sampling and analyses were conducted; laboratory analytical reports are maintained by LLNL and are available on request.

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: William A. Bookless

Signature: William Bookless Date: 6/27/07

Title: Associate Director for Safety and Environmental Protection

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/stormwtr/contact.html

Attachment 1

EXPLANATIONS

EXPLANATIONS:

E. *SAMPLING AND ANALYSIS RESULTS*

1. There was only 1 storm event that generated runoff during Site 300 working hours to be sampled in this wet season. That storm event began on February 22, 2007. No second storm event generating runoff occurred during the wet season that was separated from that storm by 3 working days or that generated runoff during working hours. (See Table 1.)

3. Two additional sample locations, labeled CARW2 and GEOCRK (see map in **Attachment 3**), represent the receiving water upstream and downstream, respectively, of Site 300.

4. Locations labeled N829 and NPT6 (see map in **Attachment 3**) 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 location. It is estimated roughly from the intensity of the rainfall that runoff may have begun around 6 am (before Site 300 working hours) on February 22, 2007, at most locations. LLNL captures the runoff as soon as possible.

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:*

    LLNL has reported the analytical results on the **Form 1**. The analytical reports and chains of custody are maintained by LLNL and are available upon request.

F. QUARTERLY VISUAL OBSERVATIONS

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

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

Table 2 includes unplanned nonroutine releases not observed during inspections.

G. MONTHLY WET SEASON VISUAL OBSERVATIONS

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

Although monthly wet season visual observations are reported on **Form 4**, actual storm water discharge occurred only during February 2007 during regular working hours. (See **Table 1** attached for daily rainfall.)

Table 1. Daily rainfall totals (in cm) at Site 300 weather station, October 2006 – May 2007.

Date	Total (cm)	Description
10/01/06	0.18	Off hours weekend (Sunday) rain, insufficient to produce runoff
10/04/06	0.076	Insufficient to produce runoff
10/05/06	0.10	Insufficient to produce runoff
11/01/06	0.25	Insufficient to produce runoff
11/02/06	0.20	Insufficient to produce runoff
11/03/06	0.051	Off hours (Friday) rain, insufficient to produce runoff
11/11/06	0.58	Insufficient to produce runoff
11/13/06	1.78	Insufficient to produce runoff during working hours; runoff probable after working hours
11/14/06	0.23	Insufficient to produce runoff
11/22/06	0.076	Off hours holiday rain, insufficient to produce runoff
11/26/06	0.56	Off hours weekend (Sun.) rain, insufficient to produce runoff
11/27/06	0.076	Insufficient to produce runoff
12/09/06	0.71	Off hours weekend (Sat.) rain
12/10/06	0.30	Off hours weekend (Sun.) rain, insufficient to produce runoff
12/12/06	2.23	Insufficient to produce runoff during working hours; runoff probable before working hours
12/13/06	0.025	Insufficient to produce runoff
12/15/06	0.025	Off hours (weekend) rain, insufficient to produce runoff
12/21/06	0.79	Insufficient to produce runoff
12/22/06	0.025	Insufficient to produce runoff
12/26/06	0.13	Off hours holiday rain, insufficient to produce runoff
12/27/06	0.46	Off hours rain, insufficient to produce runoff
01/04/07	0.13	Insufficient to produce runoff during working hours
01/16/07	0.23	Insufficient to produce runoff during working hours
01/17/07	0.025	Insufficient to produce runoff during working hours
01/27/07	0.20	Off hours weekend (Saturday) rain, insufficient to produce runoff
01/28/07	0.076	Off hours weekend (Sunday) rain, insufficient to produce runoff
01/29/07	0.051	Insufficient to produce runoff during working hours
02/07/07	0.025	Insufficient to produce runoff during working hours
02/08/07	0.13	Insufficient to produce runoff during working hours
02/09/07	1.04	Off hours Friday rain
02/10/07	0.91	Off hours weekend (Saturday) rain
02/11/07	0.20	Off hours weekend (Sunday) rain, insufficient to produce runoff
02/12/07	0.41	Insufficient to produce runoff during working hours
02/22/07	0.99	First storm samples collected in the morning for analyses
02/23/07	0.076	Off hours Friday rain, insufficient to produce runoff
02/25/07	0.91	Off hours weekend (Sunday) rain
02/26/07	1.27	Could not sample, less than three working days since last runoff

Table 1. Daily rainfall totals (in cm) at Site 300 weather station, October 2006 – May 2007. (Cont.)

Date	Total (cm)	Description
02/27/07	0.94	Could not sample, less than three working days since last runoff
03/20/07	0.58	Insufficient to produce runoff during working hours
03/21/07	0.025	Insufficient to produce runoff during working hours
03/26/07	0.81	Insufficient to produce runoff during working hours
04/11/07	0.076	Insufficient to produce runoff during working hours
04/14/07	1.22	Off hours weekend (Saturday) rain
04/15/07	0.025	Off hours weekend (Sunday) rain, insufficient to produce runoff
04/22/07	0.30	Off hours weekend (Sunday) rain, insufficient to produce runoff
05/02/07	0.05	Insufficient to produce runoff during working hours
05/03/07	0.025	Insufficient to produce runoff during working hours
05/04/07	0.23	Off hours Friday rain, insufficient to produce runoff

Table 2. Summary of non-routine releases June 2006–May 2007.

Date of Incident	Location	Description of non-routine releases at sources
8/22/06	Percolation pit at Building 827A	Site 300 personnel noticed the cooling tower percolation pit at Building 827A (B827A) was overflowing. The puddle was 20-feet wide and several inches deep. A berm created when a new monitoring well was installed prevented the water from flowing into a surface water drainage course. The cooling towers were turned off to see if the puddle reduced in size. The problem causing the percolation pit to overflow was rectified. Samples of the discharge were collected and analyzed with pH results of 8.08 and TDS of 679 mg/L, well within the previously determined discharge limits.
10/17/06	North of main gate	A maximum of 6 gallons of 30-weight oil was released on Route 3, approximately 500 yards north of the main gate. Two containers (a 5-gallon and a 1-gallon) fell off the back of a maintenance truck. The release was on the asphalt, and dirt from the side of the road was placed around the spill to provide immediate containment. LLNL personnel subsequently brought absorbent and cleaned the spilled area. All oil and absorbent was cleaned up and properly managed.
11/15/06	Tank 1	Drinking water Tank 1 overflowed releasing an estimated 6,500 gallons of potable water. All the water soaked into the ground and did not reach a surface water drainage course. The release is estimated to have begun around 11:50 am and was discovered around 12:40 pm.
1/13–15/07	Buildings 812A, 843A, 867, 871, 8711, 872, 873, 874, and 875; and Well 6	Due to freezing conditions at Site 300 over the weekend of January 13–15, 2007, several minor drinking water releases occurred when pipes broke. No water left the site or reached a surface water drainage course. Building (or well)/Gallons released: B812A/10, B843A/10, B867/200, B871/20, T8711/200, B872/200, B873/50, B874/20, B875/10; and Well 6/100
3/6/07	B854	A six-inch drinking water main near B854 broke, releasing an estimated 5,000 gallons to ground. The water flowed in a southeasterly direction and soaked into the ground. No water reached a surface water drainage course.

Attachment 2

Forms 1 through 5

Form 1- Sampling & Analysis Result for the First Storm Event 2006–07 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): Karl Brunckhorst, Crystal Foster

DESCRIBE DISCHARGE LOCATION	DATE/TIME OF SAMPLE COLLECTION	TIME DISCHARGE STARTED	ANALYTICAL RESULTS For First Storm Event						
			BASIC PARAMETERS				OTHER PARAMETERS		
			pH	TSS	SC	TOC	COD	Ammonia Nitrogen (as N)	Cyanide
N883	2/22/07 08:20 AM [x] PM [ ]	Ongoing AM [X] PM [ ]	6.75	8.2	17	5.1	<25	0.28	<0.02
GEOCRK (in creek, downstream)	2/22/07 10:15 AM [X] PM [ ]	Ongoing AM [X] PM [ ]	8.42	<3.3	2,240	5.9	25	0.053	<0.02
CARW2 (in creek, upstream)	2/22/07 09:50 AM [X] PM [ ]	Ongoing AM [X] PM [ ]	7.70	630	403	7.9	110	0.24	<0.02
NPT7	2/22/07 08:50 AM [X] PM [ ]	Ongoing AM [X] PM [ ]	7.73	18	68	2.2	190	0.038	<0.02
NLIN2	2/22/07 09:10 AM [X] PM [ ]	Ongoing AM [X] PM [ ]	8.33	110	818	5.3	30	0.13	<0.02
TEST REPORTING UNITS:			**pH Units**	**mg/L**	**µmhos/cm**	**mg/L**	**mg O/L**	**mg/L**	**mg/L**
TEST METHOD DETECTION LIMIT:			0.05	2.5	1.0	1.0	25	0.020	0.020
TEST METHOD USED:			E150.1	E160.2	E120.1	E415.1	E410.4	E350.1	E335.3
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 TOC - Total Organic Carbon
COD - Chemical Oxygen Demand NA - not applicable E - EPA Method

Form 1- Sampling & Analysis Result for the First Storm Event 2006–07 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): Karl Brunckhorst, Crystal Foster

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event								
	OTHER PARAMETERS: Metals								
	Arsenic	Beryllium	Cadmium	Iron	Lead	Magnesium	Mercury	Selenium	Silver
N883	<0.002	<0.0002	<0.0005	0.94	<0.005	0.53	<0.0002	<0.002	<0.001
GEOCRK (in creek, downstream)	<0.002	<0.0002	<0.0005	<0.1	<0.005	61	<0.0002	<0.002	<0.001
CARW2 (in creek, upstream)	0.02	0.00077	<0.0005	38	0.016	22	<0.0002	<0.002	<0.001
NPT7	<0.002	<0.0002	<0.0005	1	<0.005	0.71	<0.0002	<0.002	<0.001
NLIN2	0.023	0.00038	<0.0005	9.2	<0.005	29	<0.0002	0.0025	<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	0.0008	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. Listed limits are for location GEOCRK.

Form 1- Sampling & Analysis Result for the First Storm Event 2006–07 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): Karl Brunckhorst, Crystal Foster

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event					
	OTHER PARAMETERS: Radioactive					
	Gross Alpha	Gross Beta	Tritium	U234*	U235*	U238*
N883	0.006±0.021	0.048±0.025	0.083±1.9	0.37±0.44	0.37±0.52	0.81±0.59
GEOCRK (in creek, downstream)	0.0±0.16	0.335±0.10	0.168±1.924	71.4±8.5	3.6±1.2	58.5±7.0
CARW2 (in creek, upstream)	0.286±0.11	0.799±0.17	1.27±2.0	26.9±3.3	1.5±0.59	26.5±3.3
NPT7	0.013±0.018	0.070±0.041	0.844±1.9	2.4±1.0	0.0±0.52	2.3±0.89
NLIN2	0.110±0.070	0.323±0.070	0.503±1.9	107±11	4.33±0.93	81±8.9
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):	Eberline	Eberline	Eberline	Eberline	Eberline	Eberline

E - EPA Method

* Please 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 2006–07 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): Karl Brunckhorst, Crystal Foster

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event						
	OTHER PARAMETERS: Dioxins & Furans						
	1,2,3,4,6,7,8-HpCDD	Total HpCDD	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	Total HpCDF	1,2,3,4,7,8-HxCDF	Total-PentaCDD
CARW2** (in creek, upstream)	0.0174	0.0297	<0.011	<0.00096	0.0102	0.0013	0.0064
NLIN2**	0.0087	0.0155	<0.0039	<0.0012	0.0056	<0.001	<0.0029
GEOCRK** (in creek, downstream)	<0.00096	<0.00096	<0.0012	<0.0008	<0.0012	<0.00099	<0.0023
TEST REPORTING UNITS:	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
TEST METHOD DETECTION LIMIT***:	0.00096	0.00096	0.0012	0.0008	0.0012	0.00099	0.0023
TEST METHOD USED:	E8290	E8290	E8290	E8290	E8290	E8290	E8290
ANALYZED BY (SELF/LAB):	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia

E - EPA Method

** - Polychlorinated biphenyl (PCB) monitoring results were all "not detected" from locations CARW2, NLIN2 and GEOCRK. Method detection limits ranged from 0.10 to 0.56 μg/L.

*** Test method detection limits vary. Listed limits are for location GEOCRK.

**** Maxxam Analytics is a subcontractor to Sequioa Analytical.

Form 1- Sampling & Analysis Result for the First Storm Event 2006–07 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
- 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): Karl Brunckhorst, Crystal Foster

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event						
	OTHER PARAMETERS: Dioxins & Furans (cont.)						
	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDD	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDD
CARW2** (in creek, upstream)	<0.001	0.002	<0.0011	0.00262	<0.0014	<0.0013	0.0905
NLIN2**	<0.001	0.0087	<0.0011	<0.00091	<0.0014	<0.0013	0.0762
GEOCRK** (in creek, downstream)	<0.0011	<0.00094	<0.0009	<0.00096	<0.0012	<0.0011	0.0025
TEST REPORTING UNITS:	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
TEST METHOD DETECTION LIMIT***:	0.0011	0.00094	0.0009	0.00096	0.0012	0.0011	0.0011
TEST METHOD USED:	E8290	E8290	E8290	E8290	E8290	E8290	E8290
ANALYZED BY (SELF/LAB):	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia

E - EPA Method

** Polychlorinated biphenyl (PCB) monitoring results were all "not detected" from locations CARW2, NLIN2 and GEOCRK. Method detection limits ranged from 0.10 to 0.56 μg/L.

*** Test method detection limits vary. Listed limits are for location GEOCRK.

**** Maxxam Analytics is a subcontractor to Sequioa Analytical.

Form 1- Sampling & Analysis Result for the First Storm Event 2006–07 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 appropriate
- 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): Karl Brunckhorst, Crystal Foster

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event						
	OTHER PARAMETERS: Dioxins & Furans (concluded)						
	Total HexaCDD	Total HexaCDF	Total PentaCDF	OCDF	2,3,7,8-TCDD	2,3,7,8-TCDF	Total-TCDF
CARW2** (in creek, upstream)	0.0103	0.0056	<0.017	0.0127	<0.0017	<0.0028	0.0091
NLIN2**	<0.0026	<0.0012	<0.0078	0.0117	<0.0031	<0.0022	<0.0022
GEOCRK** (in creek, downstream)	<0.0015	<0.001	<0.0041	<0.0015	<0.0024	<0.0021	<0.0021
TEST REPORTING UNITS:	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
TEST METHOD DETECTION LIMIT***:	0.0015	0.001	0.0041	0.0015	0.0024	0.0021	0.0021
TEST METHOD USED:	E8290	E8290	E8290	E8290	E8290	E8290	E8290
ANALYZED BY (SELF/LAB):	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia	Maxxam****/Sequoia

E - EPA Method

** Polychlorinated biphenyl (PCB) monitoring results were all "not detected" from locations CARW2, NLIN2 and GEOCRK. Method detection limits ranged from 0.10 to 0.56 μg/L.

*** Test method detection limits vary. Listed limits are for location GEOCRK.

**** Maxxam Analytics is a subcontractor to Sequioa Analytical.

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

- 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: ___/___/___	**Observers Name:** _____ **Title:** _____ **Signature:** _____	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER?** ☐ **YES** ☒ **NO** If **YES**, complete reverse side of this form.
QUARTER: **OCT.-DEC.** DATE: ___/___/___	**Observers Name:** _____ **Title:** _____ **Signature:** _____	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER?** ☐ **YES** ☒ **NO** If **YES**, complete reverse side of this form.
QUARTER: **JAN.-MARCH** DATE: ___/___/___	**Observers Name:** _____ **Title:** _____ **Signature:** _____	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER?** ☐ **YES** ☒ **NO** If **YES**, complete reverse side of this form.
QUARTER: **APRIL-JUNE** DATE: ___/___/___	**Observers Name:** _____ **Title:** _____ **Signature:** _____	**WERE ANY AUTHORIZED NSWDs DISCHARGED DURING THIS QUARTER?** ☐ **YES** ☒ **NO** If **YES**, complete reverse side of this form.

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

- 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** 9/19/06 (Sampling times available for individual locations.)	**Observers Name:** Karl Brunckhorst, **Title:** Scientific Technologist	**WERE UNAUTHORIZED NSWDs OBSERVED?** ☐YES ☒ NO **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NSWDs?** ☐ YES ☒ NO	If **YES** to either question, complete reverse side.
QUARTER: **OCT. - DEC.** **DATE/TIME OF OBSERVATIONS** 11/28/06 (Sampling times available for individual locations.)	**Observers Name:** Karl Brunckhorst **Title:** Scientific Technologist	**WERE UNAUTHORIZED NSWDs OBSERVED?** ☐YES ☒NO **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NSWDs?** ☐ YES ☒NO	If **YES** to either question, complete reverse side.
QUARTER: **JAN. - MARCH** **DATE/TIME OF OBSERVATIONS** 2/22/07 (Sampling times available for individual locations.)	**Observers Name:** Karl Brunckhorst, Crystal Foster **Title:** Scientific Technologists	**WERE UNAUTHORIZED NSWDs OBSERVED?** ☐YES ☒NO **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NSWDs?** ☐ YES ☒NO	If **YES** to either question, complete reverse side.
QUARTER: **APRIL - JUNE** **DATE/TIME OF OBSERVATIONS** 4/30/07 (Sampling times available for individual locations.)	**Observers Name:** Karl Brunckhorst **Title:** Scientific Technologist	**WERE UNAUTHORIZED NSWDs OBSERVED?** ☐YES ☒NO **WERE THERE INDICATIONS OF PRIOR UNAUTHORIZED NSWDs?** ☐ YES ☒NO	If **YES** to either question, complete reverse side.

Note: There is an abandoned refrigerator in the off-site downstream location, known as GEOCRK, within Corral Hollow Creek. (This is not on LLNL's property.)

Form 4 - Monthly Observations of Storm Water Discharges, 2006–07

- 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.
- Discharge 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 not storm water.

Observation Date:	**October 31 2006**	Drainage Location Description	#1 - N883		#2 - GEOCRK*		#3 - NLIN2*		#4 - NPT6	
		Observation Time		P.M.		P.M.		P.M.		P.M.
Observer's Name(s):	**Karl Brunckhorst**	**from 9:24 to 10:35 am**	9:35	A.M.	10:35	A.M.	9:46	A.M.	9:29	A.M.
		Time Discharge Began	**Based on the low rainfall and on the observations made, there was likely no storm water discharge in October.**							
		(none)								
Title:	**Scientific Technologist**	Were Pollutants Observed**		Yes		Yes		Yes		Yes
		(If yes, complete reverse side)		No	X	No	X	No	X	No	X
Observation Date:	**November 28 2006**	Drainage Location Description	#1 - N883		#2 - GEOCRK*		#3 - NLIN2*		#4 - NPT6	
		Observation Time	1:34	P.M.	2:10	P.M.	3:42	P.M.	1:26	P.M.
Observer's Name(s):	**Karl Brunckhorst**	**from 1:21 to 3:42 pm**		A.M.		A.M.		A.M.		A.M.
		Time Discharge Began	**Based on the low rainfall and on the observations made, there was likely no storm water discharge in November.**							
Title:	**Scientific Technologist**	**(none)**								
		Were Pollutants Observed**		Yes		Yes		Yes		Yes
		(If yes, complete reverse side)		No	X	No	X	No	X	No	X
Observation Date:	**December 21 2006**	Drainage Location Description	#1 - N883		#2 - GEOCRK*		#3 - NLIN2*		#4 - NPT6	
		Observation Time		P.M.		P.M.		P.M.		P.M.
Observer's Name(s):	**Karl Brunckhorst**	**from 9:05 to 10:06 am**	9:22	A.M.	10:06	A.M.	9:33	A.M.	9:08	A.M.
		Time Discharge Began	**Based on the low rainfall during working hours and on the observations made, there was no storm water discharge during working hours in December.**							
		(none)								
Title:	**Scientific Technologist**	Were Pollutants Observed**		Yes		Yes		Yes		Yes
		(If yes, complete reverse side)		No	X	No	X	No	X	No	X

*Note: Locations GEOCRK & NLIN2 generally have flow from springs located upstream of each location.
**When there is runoff in these open channels (GEOCRK & NLIN2), there is some turbidity because of moblized sediments but no visual contamination. Leaves, sticks and other debris are common in all the channels.

Form 4 - Monthly Observations of Storm Water Discharges, 2006–07 (cont.)

- 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.
- Discharge 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 not storm water.

Observation Date:	**October 31 2006**	Drainage Location Description	#5 - N829		#6 - CARW2		#7 - NPT7	
		Observation Time		P.M.		P.M.		P.M.
Observer's Name(s):	**Karl Brunckhorst**	**from 9:24 to 10:35 am**	9:30	A.M.	9:24	A.M.	10:10	A.M.
		Time Discharge Began	**Based on the low rainfall and on the observations made, there was likely no storm water discharge in October.**					
		(none)						
Title:	**Scientific Technologist**	Were Pollutants Observed*		Yes		Yes		Yes
		(If yes, complete reverse side)		No		No		No
Observation Date:	**November 28 2006**	Drainage Location Description	#5 - N829		#6 - CARW2**		#7 - NPT7	
		Observation Time	1:29	P.M.	1:21	P.M.	1:58	P.M.
Observer's Name(s):	**Karl Brunckhorst**	**from 1:21 to 3:42 pm**		A.M.		A.M.		A.M.
		Time Discharge Began	**Based on the low rainfall and on the observations made, there was likely no storm water discharge in November.**					
		(none)						
Title:	**Scientific Technologist**	Were Pollutants Observed*		Yes		Yes		Yes
		(If yes, complete reverse side)		No		No		No
Observation Date:	**December 21 2006**	Drainage Location Description			#6 - CARW2**			
		Observation Time		P.M.		P.M.		P.M.
Observer's Name(s):	**Karl Brunckhorst**	**from 9:05 to 10:06 am**	9:12	A.M.	9:05	A.M.	9:46	A.M.
		Time Discharge Began	**Based on the low rainfall during working hours and on the observations made, there was no storm water discharge during working hours in December.**					
		(none)						
Title:	**Scientific Technologist**	Were Pollutants Observed*		Yes		Yes		Yes
		(If yes, complete reverse side)		No		No		No

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

Form 4 - Monthly Observations of Storm Water Discharges, 2006–07 (cont.)

- 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.
- Discharge 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 not storm water.

Observation Date:	**January 31 2007**	Drainage Location Description	#1 - N883		#2 - GEOCRK*		#3 - NLIN2*		#4 - NPT6		
		Observation Time	2:17	P.M.	3:28	P.M.	3:02	P.M.	2:10	P.M.	
Observer's Name(s):	**Karl Brunckhorst**	**from 2:04 to 3:28 pm**		A.M.		A.M.		A.M.		A.M.	
		Time Discharge Began	**Based on the low rainfall and on the observations made, there was no storm water discharge in January.**								
Title:	**Scientific Technologist**	**(none)**									
		Were Pollutants Observed		Yes		Yes		Yes		Yes	
		(If yes, complete reverse side)		No	X	No	X	No	X	No	X
Observation Date:	**February 22 2007**	Drainage Location Description	#1 - N883		#2 - GEOCRK*		#3 - NLIN2*		#4 - NPT6		
		Observation Time		P.M.		P.M.		P.M.		P.M.	
Observer's Name(s):	**Karl Brunckhorst, Crystal Foster**	**from 8:20 to 10:30 am**	8:20	A.M.	10:15	A.M.	9:10	A.M.	10:00	A.M.	
Title:	**Scientific Technologists**	Time Discharge Began **from approx. 6:00 am**	**Discharge estimated from approx. 6:00 to 10:45 am**								
		Were Pollutants Observed**		Yes		Yes		Yes		Yes	
		(If yes, complete reverse side)		No	X	No	X	No	X	No	X
Observation Date:	**March 29 2007**	Drainage Location Description	#1 - N883		#2 - GEOCRK*		#3 - NLIN2*		#4 - NPT6		
		Observation Time		P.M.		P.M.		P.M.		P.M.	
Observer's Name(s):	**Karl Brunckhorst**	**from 8:50 to 9:52 AM**	9:03	A.M.	9:52	A.M.	9:15	A.M.	8:57	A.M.	
		Time Discharge Began	**Based on the low rainfall and on the observations made, there was no storm water discharge in March.**								
Title(s):	**Scientific Technologist**	**(none)**									
		Were Pollutants Observed		Yes		Yes		Yes		Yes	
		(If yes, complete reverse side)		No	X	No	X	No	X	No	X
Observation Date:	**April 30 2007**	Drainage Location Description	#1 - N883		#2 - GEOCRK*		#3 - NLIN2*		#4 - NPT6		
		Observation Time	2:10 PM	P.M.	3:29 PM	P.M.	2:34 PM	P.M.	2:02 PM	P.M.	
Observer's Name(s):	**Karl Brunckhorst**	**from 1:57 to 3:29 pm**		A.M.		A.M.		A.M.		A.M.	
		Time Discharge Began	**Based on the low rainfall during working hours and on the observations made, there was no storm water discharge during working hours in April.**								
Title:	**Scientific Technologist**	**(none)**									
		Were Pollutants Observed		Yes		Yes		Yes		Yes	
		(If yes, complete reverse side)		No	X	No	X	No	X	No	X

*Note: Locations GEOCRK & NLIN2 generally have flow from springs located upstream of each location.

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

Form 4 - Monthly Observations of Storm Water Discharges, 2006–07 (cont.)

- 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.
- Discharge 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 not storm water.

Observation Date:	**January 31 2007**	Drainage Location Description	#5 - N829		#6 - CARW2*		#7 - NPT7	
		Observation Time	2:13	P.M.	2:04	P.M.	2:41	P.M.
Observer's Name(s):	**Karl Brunckhorst**	**from 2:04 to 3:28 pm**		A.M.		A.M.		A.M.
		Time Discharge Began	**Based on the low rainfall and on the observations made, there was no storm water discharge in January.**					
Title:	**Scientific Technologist**	**(none)**						
		Were Pollutants Observed**		Yes		Yes		Yes
		(If yes, complete reverse side)		No	X	No	X	No	X
Observation Date:	**February 22 2007**	Drainage Location Description	#5 - N829		#6 - CARW2*		#7 - NPT7	
		Observation Time		P.M.		P.M.		P.M.
Observer's Name(s):	**Karl Brunckhorst, Crystal Foster**	**from 8:20 to 10:30 am**	10:30	A.M.	9:50	A.M.	8:50	A.M.
		Time Discharge Began	**Discharge estimated from approx. 6:00 to 10:45 am**					
Title:	**Scientific Technologists**	**from approx. 6:00 am**						
		Were Pollutants Observed**		Yes		Yes		Yes
		(If yes, complete reverse side)		No	X	No	X	No	X
Observation Date:	**March 29 2007**	Drainage Location Description	#5 - N829		#6 - CARW2*		#7 - NPT7	
		Observation Time		P.M.		P.M.		P.M.
Observer's Name(s):	**Karl Brunckhorst**	**from 8:50 to 9:52 AM**	9:00	A.M.	8:50	A.M.	9:25	A.M.
		Time Discharge Began	**Based on the low rainfall and on the observations made, there was no storm water discharge in March.**					
Title(s):	**Scientific Technologist**	**(none)**						
		Were Pollutants Observed**		Yes		Yes		Yes
		(If yes, complete reverse side)		No	X	No	X	No	X
Observation Date:	**April 30 2007**	Drainage Location Description	#5 - N829		#6 - CARW2*		#7 - NPT7	
		Observation Time	2:06 PM	P.M.	1:57 PM	P.M.	3:02 PM	P.M.
Observer's Name(s):	**Karl Brunckhorst**	**from 1:57 to 3:29 pm**		A.M.		A.M.		A.M.
		Time Discharge Began	**Based on the low rainfall during working hours and on the observations made, there was no storm water discharge during working hours in April.**					
Title:	**Scientific Technologist**	**(none)**						
		Were Pollutants Observed**		Yes		Yes		Yes
		(If yes, complete reverse side)		No	X	No	X	No	X

*Location CARW2 is offsite & upstream of LLNL's Site 300 and carries a load of sediments during significant storm events.

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

Form 4 - Monthly Observations of Storm Water Discharges, 2006–07 (concluded)

- 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.
- Discharge 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 not storm water.

Observation Date:	**May 30 2007**	Drainage Location Description	#1 - N883		#2 - GEOCRK*		#3 - NLIN2*		#4 - NPT6	
		Observation Time	3:21	P.M.	4:10	P.M.	3:37	P.M.	3:08	P.M.
Observer's Name(s):	**Karl Brunckhorst**	**from 3:03 to 4:10 pm**								
		Time Discharge Began	**Based on the low rainfall and on the observations made, there was no storm water discharge in May.**							
		(none)								
Title:	**Scientific Technologist**	Were Pollutants Observed**	Yes		Yes		Yes		Yes	
		(If yes, complete reverse side)	No	x	No	x	No	x	No	X

*Note: Locations GEOCRK & NLIN2 generally have flow from springs located upstream of each location.

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

Observation Date:	**May 30 2007**	Drainage Location Description	#5 - N829		#6 - CARW2		#7 - NPT7	
		Observation Time	3:13	P.M.	3:03	P.M.		P.M.
Observer's Name(s):	**Karl Brunckhorst**	**from 3:03 to 4:10 pm**		A.M.		A.M.		A.M.
		Time Discharge Began	**Based on the low rainfall and on the observations made, there was no storm water discharge in May.**					
		(none)						
Title:	**Scientific Technologist**	Were Pollutants Observed*	Yes		Yes		Yes	
		(If yes, complete reverse side)	No	X	No	X	No	X

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

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

EVALUATION DATE: Oct 2006 - April 2007 **NOTE:** Specific BMP inspections records are available upon request

SIGNATURE: Signed inspection records are maintained and available upon request.

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
Chemistry, Materials and Life Sciences	NO	NO	
Defense and Nuclear Technologies	NO	NO	
Directors Office	NO	NO	
Engineering	NO	NO	

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

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
Laboratory Services	NO	NO	
Safety and Environmental Protection	NO	NO	
Safeguards and Security	NO	NO	

Attachment 3

Letter from the Central Valley Regional Water Quality Control Board to the Lawrence Livermore National Laboratory (LLNL) and LLNL's Response to Request for Information Regarding Storm Water Sampling and Analysis Results Reported for LLNL's Experimental Test Site (Site 300)

California Regional Water Quality Control Board

Central Valley Region

Karl E. Longley, ScD, P.E., Chair

Linda Adams
Secretary for Environmental Protection

Sacramento Main Office
11020 Sun Center Drive #200, Rancho Cordova, California 95670-6114
Phone (916) 464-3291 • FAX (916) 464-4645
http://www.waterboards.ca.gov/centralvalley

Arnold Schwarzenegger
Governor

April 2, 2007

RB 4/18
Action: Goodwin 4/25
WAB

Bill B

APR 18 2007
BY: 6/08

Dennis K Fisher
UC Regents
PO Box 808
Livermore, CA 94551

STORM WATER SAMPLING AND ANALYSIS RESULTS.

We have reviewed your 2005-2006 Storm Water Annual Report for the UC Regents Lawrence Livermore facility at Corral Hollow Road, Tracy, CA 95376 (WDID No.5S39I015973).

The Industrial Storm Water General Permit (Permit) requires dischargers to implement best management practices (BMPs) using best available pollutant control technology (BAT) and best conventional pollutant control technology (BCT) to reduce or eliminate the discharge of pollutants. Our review of analytical data provided in Table 1 of your annual report indicates that storm water runoff from your facility exceeded US EPA benchmark values for certain parameters. The enclosed Table B contains US EPA benchmark values for common storm water pollutants.

These high levels of pollutants in your storm water samples indicate that the current BMPs implemented at your site are not sufficient to reduce pollutant concentrations below benchmark levels. Therefore, you must:

1. Identify sources of pollutants at your facility which contribute to the exceedance,
2. Review current BMPs, and
3. Modify your existing BMPs or implement new BMPs to reduce or eliminate the discharge of pollutants in order to comply with the Permit.

Also, you must modify your existing Storm Water Pollution Prevention Plan (SWPPP) as well as the Monitoring Plan to reflect these improved BMP practices. A complete SWPPP and Monitoring Program are required to be on site and available to operating personnel and inspectors.

In order to demonstrate that you are taking the appropriate actions, we require that you submit to our office, by **1 June 2007**, a response to the three items listed above. The response must include a narrative description of the corrective measures that will be implemented to address your facility's exceedences of the US EPA benchmark values. While exceeding benchmark values is not a violation of the Permit, failure to respond to the exceedances by reviewing BMP

operation and improving BMPs is a violation of the Permit. Also, failure to take steps to reduce pollutant discharges is a violation of the Permit. Under Section 13385 of the California Water Code, the Regional Board may impose administrative civil liabilities for violations of the Permit.

Should you have any questions regarding your benchmark limits or the response required to be submitted, please contact Jatin Khandwala at (916) 464-4647.

WILLIAM J. MARSHALL, Chief
Storm Water Section

Attachment: Table B – Bench Mark Values

TABLE B

U.S. EPA Multi-Sector Permit

Parameter Benchmark Values[1][2]

Parameter Name	Benchmark Value
Biochemical Oxygen Demand(5)	30 mg/L
Chemical Oxygen Demand	120 mg/L
Total Suspended Solids	100 mg/L
Oil and Grease	15 mg/L
Nitrate + Nitrite Nitrogen	0.68 mg/L
Total Phosphorus	2.0 mg/L
pH	6.0-9.0 s.u.
Acrylonitrile (c)	7.55 mg/L
Aluminum, Total (pH 6.5-9)	0.75 mg/L
Ammonia	19 mg/L
Antimony, Total	0.636 mg/L
Arsenic, Total (c)	0.16854 mg/L
Benzene	0.01 mg/L
Beryllium, Total (c)	0.13 mg/L
Butylbenzyl Phthalate	3 mg/L
Cadium, Total (H)	0.0159 mg/L
Chloride	860 mg/L
Copper, Total (H)	0.0636 mg/L
Dimethyl Phthalate	1.0 mg/L
Ethylbenzene	3.1 mg/L
Fluoranthene	0.042 mg/L
Fluoride	1.8 mg/L
Iron, Total	1.0 mg/L
Lead, Total (H)	0.0816 mg/L
Manganese	1.0 mg/L
Mercury, Total	0.0024 mg/L
Nickel, Total (H)	1.417 mg/L
PCB-1016 (c)	0.000127 mg/L
PCB-1221 (c)	0.10 mg/L
PCB-1232 (c)	0.000318 mg/L
PCB-1242 (c)	0.00020 mg/L
PCB-1248 (c)	0.002544 mg/L
PCB-1254 (c)	0.10 mg/L
PCB-1260 (c)	0.000477 mg/L
Phenols, Total	1.0 mg/L
Pyrene (PAH,c)	0.01 mg/L
Selenium, Total (*)	0.2385 mg/L
Silver, Total (H)	0.0318 mg/L
Toluene	10.0 mg/L
Trichloroethylene (c)	0.0027 mg/L
Zinc, Total (H)	0.117 mg/L
EC,	300 – 500 µmhos/cm
TOC	100 mg/L

[1] If storm water samples have been analyzed for parameters without Parameter Benchmark Values, contact your Regional Water Board.

[2] Regional Water Boards may adopt Parameter Benchmark Values that are different than those listed in this Table.

Lawrence Livermore National Laboratory

June 1, 2007

Mr. William Marshall, Chief
Storm Water Section
California Regional Water Quality Control Board
Central Valley Region
11020 Sun Center Drive, #200
Rancho Cordova, California 95670-6114

Subject: **Storm Water Sampling and Analysis Results at the Lawrence Livermore National Laboratory Experimental Test Site for 2005–2006**

Reference: Letter from William J. Marshall to Dennis K. Fisher, "Storm Water Sampling and Analysis Results," dated April 2, 2007

Dear Mr. Marshall:

This letter transmits our response to your request for information (letter dated April 2, 2007) regarding storm water sampling and analysis results reported in the 2005–2006 Storm Water Annual Report for the Lawrence Livermore National Laboratory Experimental Test Site.

If you have any further questions, please feel free to call Lily S. Baldwin at (925) 424-4961 or Sandy Mathews at (925) 423-6679.

Sincerely,

William A. Bookless
Associate Director
Safety and Environmental Protection

Attachment: Response to Request for Information Regarding Storm Water Sampling and Analysis Results reported for the Lawrence Livermore National Laboratory Experimental Test Site

cc w/attachment:
King, Karin (NNSA/LSO) L-293
Timm, Susan (CVRWQCB)

WGMG07:047:WAB:LSB:mdv

bcc w/attachment (PDF):

Baldwin, Lily
Blake, Rick
Brown, Richard
Campbell, Chris
Carter, Carrie (NNSA/LSO)
Chase, Dawn
Ferry, Leslie
Folks, Karen
Frahm, Eric
Goodwin, Stephanie
Graham, Keith
Grandfield, Charlene
Jackson, C. Susi
Lamarre, Albert
Mathews, Sandy
Mishra, Vijay (NNSA/LSO)
Paukert, Larry
Periera, Stan
Rauhut, Kathryn
Scott, John E.
EPD docs
File

This work was performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.

Response to Request for Information Regarding Storm Water Sampling and Analysis Results reported for the Lawrence Livermore National Laboratory Experimental Test Site

This report responds to a request for information (Marshall 2007) regarding storm water sampling and analysis results reported in the 2005-2006 Storm Water Annual Report for the Lawrence Livermore National Laboratory (LLNL) Experimental Test Site (Site 300). After a brief description of Site 300's environs and storm water monitoring program, the following sections summarize 2005-2006 storm water analytical data and compare them to both the EPA benchmark values and Site 300-specific threshold values; discuss the rationale for using the Site 300-specific threshold criteria; and discuss the Best Management Practices (BMPs) LLNL implements at Site 300.

Background

Site 300 is located in San Joaquin and Alameda Counties in the Altamont Hills of the Diablo Range. It occupies approximately 30.3 km^2 (11.8 mi^2) consisting of a series of steep hills and ridges oriented along a generally northwest-southeast trend, separated by intervening ravines. The elevation of Site 300 ranges from approximately 538 m (1750 ft) above sea level at the northwestern corner of the site to approximately 150 m (500 ft) in the southeast portion.

Site 300 is mostly undeveloped; only about 5 percent of the total site area is impervious. The most highly developed area of the site is along the southern boundary in the General Service Area. The site is networked by a series of paved roads to access remote buildings and unpaved fire trails that serve as firebreaks and access to undeveloped areas of the site. Underground and aboveground utilities serve the General Service Area and remote buildings.

Site 300 does not have an extensive constructed storm drain system. The drainage system consists of concrete-lined interceptor ditches (V-ditches), open lined ditches, rock lined ditches, unlined ditches, corrugated metal pipes, drain inlets, culverts, and culvert outlets. Culverts convey water under and around infrastructure features, such as roads and fences. Constructed drainage structures empty into natural ravines and swales.

Surface water at Site 300 consists of seasonal runoff, springs, natural and man-made pools, and a wastewater oxidation pond. The primary waterway in the Site 300 area is Corral Hollow Creek, an ephemeral stream that borders Site 300 to the south and southeast. There are no natural, continuously flowing streams present in the Site 300 area. Elk Ravine is the major drainage for most of Site 300; it extends from the northwest portion of the site to the east-central area. Elk Ravine drains the center of Site 300 into Corral Hallow Creek, which flows eastward toward the San Joaquin River Basin; however, there is no evidence that Corral Hollow Creek is connected to the San Joaquin River. Some smaller canyons in the northeast portion of Site 300 also drain to the north and east toward Tracy.

Recognizing that Site 300 is not a typical industrial facility, LLNL obtained in 1994 an individual permit for industrial activities and cooling tower blowdown discharges (Order No. 94-131; NPDES No. CA0081396). This permit and the Site 300 Storm Water Pollution Prevention Program (SWPPP) focused on the site-wide implementation of appropriate best management practices and the comprehensive monitoring of site runoff, rather than specific areas of industrial activity at Site 300. However, when LLNL eliminated cooling tower discharges to surface water drainage courses, Central Valley Regional Water Quality Control Board staff requested LLNL seek coverage in 2000 under the state general permit for industrial storm water discharges (State Water Resources Control Board Water Quality Order No. 97-03-DWQ; NPDES No. CAS000001) to streamline the permit renewal process.

Summary of Data

In 2005-2006, the Site 300 storm water monitoring program included five sampling locations (two off-site and three on-site), which received flow:

- An off-site location in Corral Hollow Creek downstream of all Site 300 discharges and a groundwater-fed spring. (GEOCRK)
- An off-site location in Corral Hollow Creek upstream of Site 300 which is unaffected by Site 300 storm water discharges. (CARW2)
- An on-site location in Elk Ravine to characterize a number of industrial storm water discharges that flow into Elk Ravine. This location is located just downstream of a spring and the associated wetland area. (NLIN2)
- An on-site location at a storm drain outfall to characterize a Resource Conservation and Recover Act (RCRA) permitted, one year storage facility. This facility is located in the General Service Area, which is a mostly paved area. (N883)
- An on-site location at a storm drain outfall to characterize surface water runoff collected from the diversion trench of a closed landfill. (NPT7)

Samples were collected at these five locations during two storms in the 2005-2006 wet season, January 17 and March 6, 2006. No discharge occurred from the remaining sampling locations during the 2005-2006 wet season. **Figure 1** illustrates each of the sampling locations at Site 300.

Your letter dated April 2, 2007 indicates that your review of LLNL's 2005-2006 report (Brown, 2006) shows storm water runoff from our facility exceeded the US EPA benchmark values of common storm water parameters. **Table 1** shows a comparison of the EPA benchmark values with the 2005-2006 storm water analytical results. Only parameters in the Site 300 monitoring program for which EPA benchmark values have been established are included in the table. The benchmark value for total suspended solids (TSS) was exceeded at the upstream location (CARW2), and two of the on-site locations (NPT7 and NLIN2). The benchmark value for Electrical Conductivity (EC) was exceeded at the upstream location (CARW2), an on-site location (NLIN2), and the downstream location (GEOCRK). The benchmark value for chemical oxygen demand

(COD) was exceeded at an on-site location (NLIN2). The benchmark value for total iron was exceeded in all locations except for the downstream location (GEOCRK).

Though some of the storm water monitoring results at Site 300 exceeded EPA benchmark values, LLNL believes that because of the unique rural characteristics at Site 300, storm water runoff quality is not comparable to a typical industrial facility and therefore the EPA benchmark values are not directly applicable. LLNL staff had understood Regional Board staff to be in concurrence, as evidenced by the individual permit originally issued to Site 300. Beginning in 2000, LLNL established site-specific threshold comparison criteria to identify out-of-the-ordinary data that merit further investigation to determine if concentrations of the monitored parameters are increasing in storm water discharge. LLNL staff believe that this site-specific approach is more in keeping with watershed management principles and provides a stronger tool to evaluate BMP effectiveness. **Table 2** shows the Site 300-specific threshold criteria first calculated in 2000 along with the EPA benchmark value for these parameters. In some cases, the site-specific thresholds are higher than the EPA benchmark values, but in other cases, the site-specific thresholds are lower.

Site 300-specific Threshold Critera and Evaluation Approach

LLNL compares storm water monitoring data to Site 300-specific threshold criteria to identify out-of-the-ordinary (low probability of occurrence) results (Campbell, 2001; Campbell and Mathews 2006). The threshold criteria are calculated using data from the downstream (GEOCRK) sampling location to obtain the more conservative value. Because contributing storm water discharge (volume) would have an additive impact to the receiving water quality (concentration) in Corral Hollow Creek, the threshold values calculated using downstream data is generally lower than threshold values calculated using data from the other sampling locations.

The Site 300-specific threshold criteria are based on statistical confidence intervals. An upper confidence level is calculated using a mean value (or log transformed mean if data is not normally distributed) with a test statistic (ranging from 1.8 to 2.1, depending on degrees of freedom) multiplied by the standard deviation. Using this approach, a value that exceeds the upper confidence limit may be considered to be in the upper 5% of recorded values.[1]

The threshold criteria were first applied during the 2000-2001 wet season and reported in *Environmental Report 2000* (Biermann et al., 2001) and *Lawrence Livermore National Laboratory Site 300 Annual Storm Water Monitoring Report for Waste Discharge Requirements 97-03-DWQ* (Campbell, 2001). The method requires that the threshold criteria be re-calculated every few years and is being recalculated for data prior to the 2007-2008 storm water monitoring year. However, the thresholds calculated in 2000 are used in the following discussion, since these are the thresholds that were used to evaluate 2005-2006 monitoring data.

[1] The statistical method LLNL uses to calculate threshold criteria for storm water is similar to the statistical method described in CCR, Title 23, Division 3, Chapter 15, Section 2550.7, which LLNL also uses to detect potential releases from a RCRA-closed landfill at Site 300.

Each year LLNL evaluates the storm water monitoring results relative to the threshold criteria and trends in the receiving water. The steps in this evaluation are illustrated in **Figure 2** and applied in the following discussion. **Table 3** shows the 2005-2006 storm water analytical results and the Site 300-specific threshold criteria; as with **Table 1**, only those parameters in the Site 300 monitoring program for which EPA benchmark values have been established are included in **Table 3**. The table shows that two parameters at Site 300 effluent locations exceeded the Site 300-specific threshold criteria.

COD at location NLIN2 on November 17, 2006

Just prior to the 2005-2006 wet season, LLNL moved this monitoring location to allow for safer access during inclement weather and to move the location outside of a locked security gate to eliminate sampling delays. While minor shifts in location would not affect most parameters, in this case, LLNL staff believe that organic material is being mobilized by runoff from a wetland area immediately upstream of the new sampling location. LLNL noted that the COD result at the downstream receiving water monitoring location (GEOCRK) during the January event did not appear to be affected by onsite surface water runoff from NLIN2. LLNL staff also noted that the COD result for NLIN2 in the subsequent storm event was below the threshold criteria. LLNL staff plan to continue trending this parameter.

Beryllium at location NLIN2 on March 6, 2006

LLNL staff compared the monitored concentration to the upstream (CARW2) and downstream (GEOCRK) receiving water monitoring locations in the March event and also looked at the results from the preceding January event. In March, the concentration at the upstream monitoring location (CARW2) was just above the limit of detection, and the value at the downstream monitoring location (GEOCRK) was below the limit of detection. In the January event, the concentration at the upstream monitoring location (CARW2) was just above site-specific threshold criteria, and the concentration at the downstream monitoring location (GEOCRK) was below the limit of detection. Based on this evaluation, it appeared to LLNL staff that the onsite concentration at NLIN2 in the March event was consistent with natural concentrations of this constituent, and did not adversely affect downstream runoff.

BMPs Implemented at Site 300

Based on LLNL's evaluation of the 2005-2006 monitoring data using the Site 300-specific threshold criteria, LLNL believes that the storm water monitoring results for 2005-2006 are within expected values and did not merit further investigation of potential sources at Site 300. Regardless, LLNL recognizes the importance of best management practices for water quality protection and implements best management practices throughout the site. For example, the parameters identified as exceeding benchmark values in 2005-2006 are associated with sediment transport, which is an important factor in the Corral Hollow Creek watershed. Soils in the watershed have a high potential for erosion, and other activities outside of the Site 300 boundaries (such as ranching and off-road vehicle recreation) in the watershed contribute sediment to the creek. Because of Site 300's unique rural features that are unlike typical industrial

facilities, LLNL understands the importance of erosion processes to water quality at Site 300.

In 2000, LLNL contracted an independent engineering firm to conduct a site-wide erosion assessment. The purpose of the assessment was to evaluate the causes of sedimentation, determine the erosion potential of the various geologic materials, map specific erosion gullies, assess the landslide potential, and recommend methods to stabilize erosion areas. The assessment identified a priority list of erosion and sedimentation mitigation projects. As funding allows, Site 300 has been able to implement at least one major erosion mitigation project in most years since 2000.

In addition, LLNL has also provided erosion control training to staff responsible for maintaining the Site 300 infrastructure. Recent advances in erosion control and sediment stabilization techniques are included in soil disturbing projects. Other elements of LLNL's compliance programs contribute to the ongoing assessment and prevention of erosion. Some of these programs include: conducting monthly, quarterly, or annual inspections of closed landfills; conducting annual subsidence monitoring; and, at the RCRA closed facilities where caps have been installed, conducting an independent engineers inspection of the caps. Cap repairs are made based on the results of the inspections and monitoring. Additionally, LLNL implements the requirements of the state general permit for construction storm water discharges (State Water Resources Control Board Water Quality Order No. 99-08-DWQ; NPDES No. CAS000002).

Summary

LLNL implements a robust storm water monitoring program that uses both Site 300-specific threshold criteria and annual trending to: evaluate the effectiveness of the storm water pollution prevention program; determine whether concentrations of constituents in Site 300 storm water runoff are increasing; and assess the water quality of the receiving water, Corral Hollow Creek. Furthermore, recognizing the unique conditions at Site 300 and the importance of erosion control in the watershed, LLNL has implemented an active erosion and sediment control program, mitigating chronic erosion prone areas, and implementing best management practices appropriate for the site.

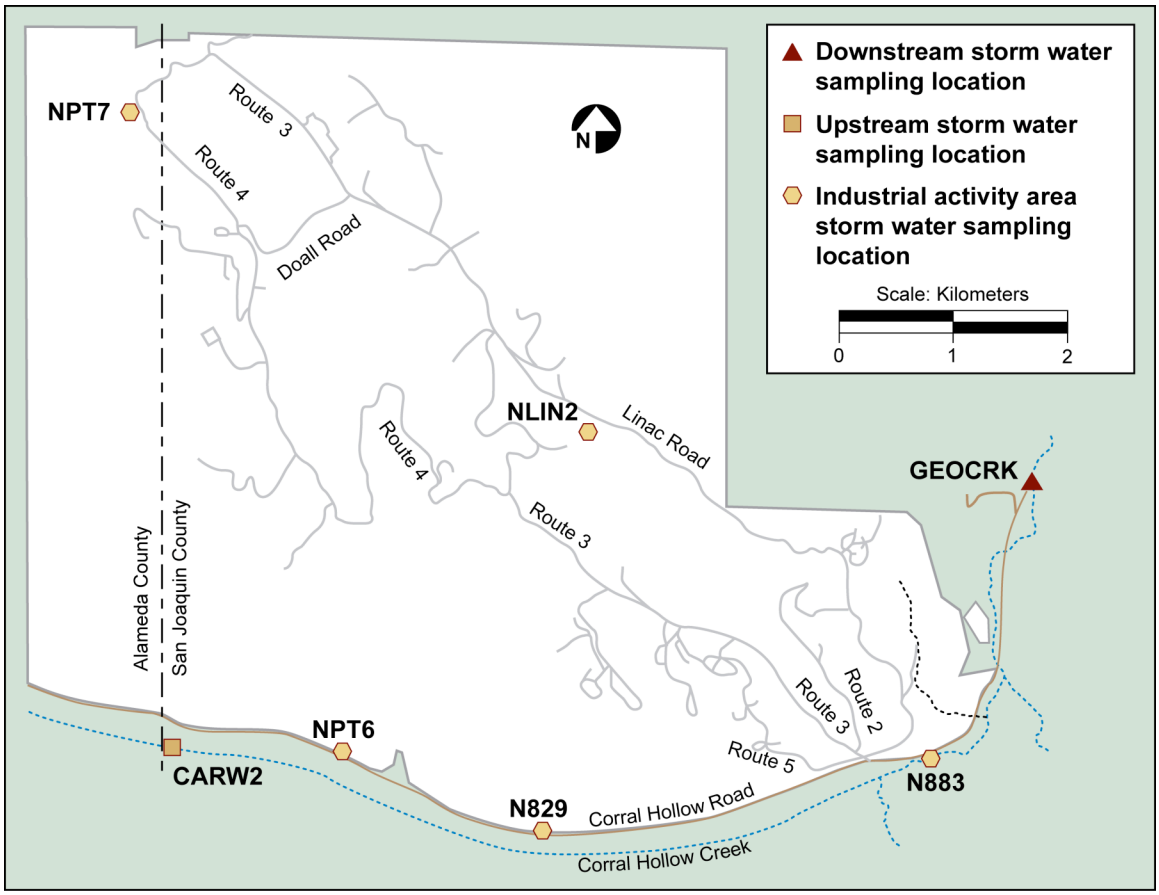

Figure 1. Storm water sampling locations at Site 300

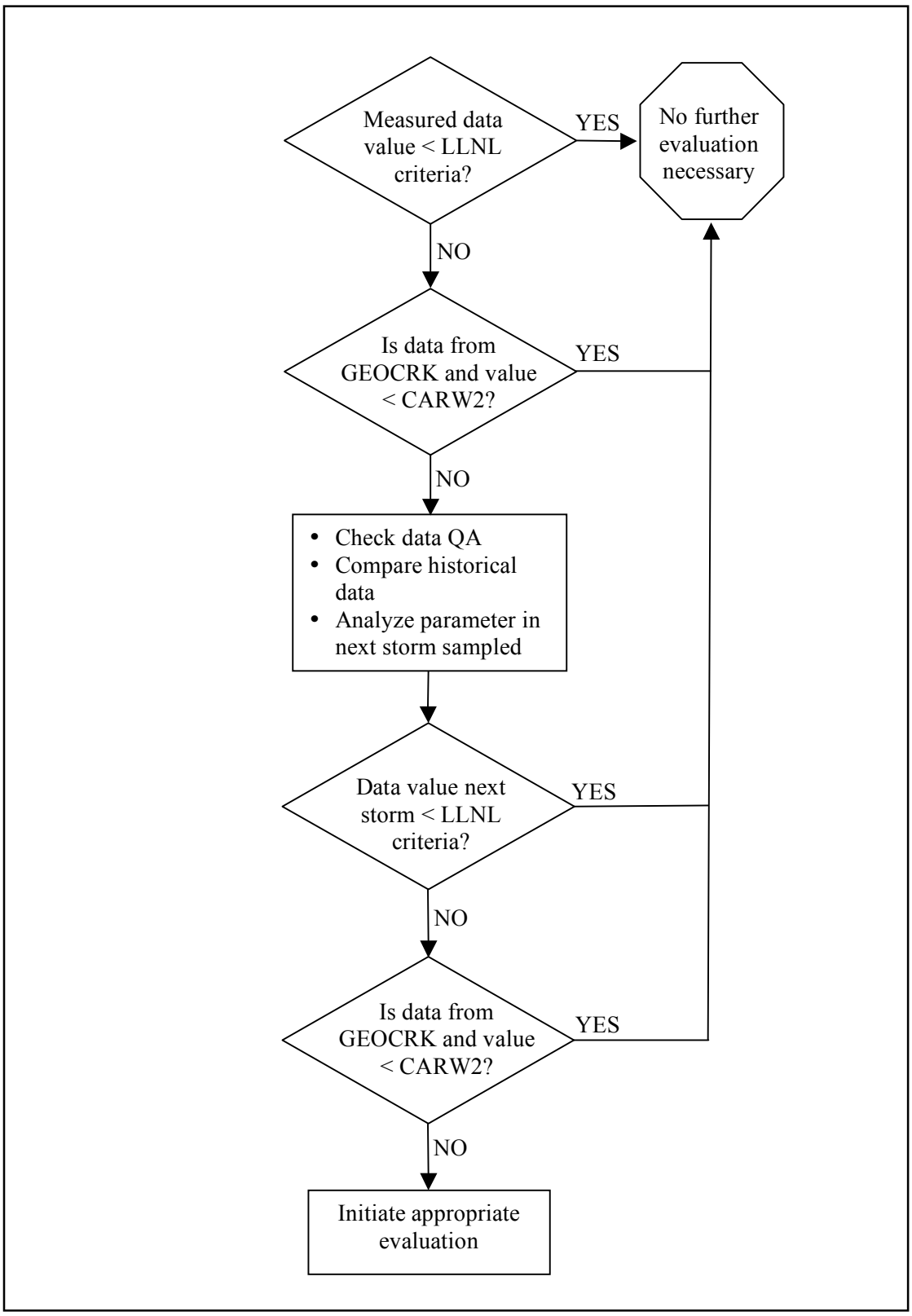

Figure 2. Steps for Evaluating Storm Water Monitoring Results at Site 300

Table 1. Site 300 storm water data compared to U.S. EPA Benchmark Values, 2005-2006

Parameter Monitored	USEPA Benchmark (mg/L)	Location CARW2 (upstream)		Location N883 (on-site)		Location NPT7 (on-site)		Location NLIN2 (on-site)		Location GEOCRK (downstream)	
		17-Jan-02	6-Mar-02	17-Jan-02	6-Mar-02	17-Jan-02	6-Mar-02	17-Jan-02	6-Mar-02	17-Jan-02	6-Mar-02
Common Storm Water Pollutants required by General Permit											
Total Suspended Solids	100	1,000	110	25	17	240	380	330	1,700	5.2	<3.3
pH	6.0-9.0 pH units	8.46	8.63	7.19	6.60	7.85	8.61	8.30	7.92	8.49	8.50
TOC	100	7.1	4.9	8.7	6.5	2.0	5.2	4.4	5.8	7.8	4.6
Oil and Grease	15	<5	<5	<5	<5.6	<5	<5	<5	<5	<5	<5
EC (or SC)[a]	300-500 μmhos/cm	930	1,000	43	26	63	83	560	300	2,400	1,900
Additional Parameters Required for SIC 4953											
Ammonia	19	0.074	0.02	0.27	0.20	0.054	0.039	0.04	0.068	0.033	<0.02
Chemical Oxygen Demand	120	120	<25	69	<25	39	51	300	130	25	25
Arsenic, Total	0.16854	<0.002	0.0044	<0.002	<0.002	0.002	0.0033	0.015	0.010	<0.002	<0.002
Cadmium, Total	0.0159	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	0.0012	0.0006	0.0029	<0.0005	<0.0005
Iron, Total	1.0	67	7.9	1.4	0.56	17	31	15	64	0.39	<0.10
Lead, Total	0.0816	0.033	<0.005	0.0015	<0.005	0.0043	0.0071	0.0067	0.024	<0.001	<0.005
Mercury, Total	0.0024	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Selenium, Total	0.2385	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Silver, Total	0.0318	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Additional Parameters Monitored											
Beryllium	0.13	0.0019	0.0002	<0.0002	<0.0002	0.0005	0.0009	0.0006	0.0022	<0.0008	<0.0002
PCB-1016	0.000127	<0.00048	<0.0005	NA[b]	NA	NA	NA	<0.00048	<0.0005	<0.00048	<0.0005
PCB-1221	0.10	<0.00048	<0.0005	NA	NA	NA	NA	<0.00048	<0.0005	<0.00048	<0.0005
PCB-1232	0.000318	<0.00048	<0.0005	NA	NA	NA	NA	<0.00048	<0.0005	<0.00048	<0.0005
PCB-1242	0.0002	<0.00048	<0.0005	NA	NA	NA	NA	<0.00048	<0.0005	<0.00048	<0.0005
PCB-1248	0.002544	<0.00048	<0.0005	NA	NA	NA	NA	<0.00048	<0.0005	<0.00048	<0.0005
PCB-1254	0.10	<0.00048	<0.0005	NA	NA	NA	NA	<0.00048	<0.0005	<0.00048	<0.0005
PCB-1260	0.000477	<0.00048	<0.0005	NA	NA	NA	NA	<0.00048	<0.0005	<0.00048	<0.0005

Note: This table only included parameters with EPA Benchmark values.

a EC = Electrical conductivity; or SC = Specific conductance.

b NA = Parameter not analyzed at this location.

Table 2. USEPA benchmark values and Site 300-specific threshold criteria

Parameter	USEPA Benchmark (mg/L)	Site 300-Specific Threshold (mg/L)
Common Storm Water Pollutants required by General Permit		
Total Suspended Solids	100	1,700
pH	6.0-9.0 pH units	6.0-9.0
TOC	100	NC[a]
Oil and Grease	15	9
EC (or SC)[b]	300-500 μmhos/cm	NA[c]
Additional Parameters Required for SIC 4953		
Ammonia	19	NC
Chemical Oxygen Demand	120	200
Arsenic, Total	0.16854	NC
Cadmium, Total	0.0159	NC
Iron, Total	1.0	NC
Lead, Total	0.0816	0.030
Mercury, Total	0.0024	0.001
Selenium, Total	0.2385	NC
Silver, Total	0.0318	NC
Additional Parameters Monitored		
Beryllium	0.13	0.0016
PCB-1016	0.000127	NC
PCB-1221	0.10	NC
PCB-1232	0.000318	NC
PCB-1242	0.0002	NC
PCB-1248	0.002544	NC
PCB-1254	0.10	NC
PCB-1260	0.000477	NC

Note: This table only included parameters with EPA Benchmark values.

a NC = Threshold not calculated for this parameter in 2000 due to insufficient data. These parameters were not required to be anaylzed under the individual permit in affect at Site 300 until 2000.

b EC = Electrical conductivity; or SC = Specific conductance.

c NA = Threshold not caluculated for this parameter as groundwater discharges bias data high and reduce sensitivity to detect influences of storm water runoff.

Table 3. Site 300 storm water data compared to Site 300-specific threshold criteria, 2005-2006

Parameter	Site 300-Specific Threshold (mg/L)	Location CARW2 (upstream)		Location N883 (on-site)		Location NPT7 (on-site)		Location NLIN2 (on-site)		Location GEOCRK (downstream)	
		17-Jan-02	6-Mar-02	17-Jan-02	6-Mar-02	17-Jan-02	6-Mar-02	17-Jan-02	6-Mar-02	17-Jan-02	6-Mar-02
Common Storm Water Pollutants required by General Permit											
Total Suspended Solids	1,700	1,000	110	25	17	240	380	330	1,700	5.2	<3.3
pH	6.0-9.0	8.46	8.63	7.19	6.60	7.85	8.61	8.30	7.92	8.49	8.50
TOC	NC[a]	7.1	4.9	8.7	6.5	2.0	5.2	4.4	5.8	7.8	4.6
Oil and Grease	9	<5	<5	<5	<5.6	<5	<5	<5	<5	<5	<5
EC (or SC)[b]	NC	930	1,000	43	26	63	83	560	300	2,400	1,900
Additional Parameters Required for SIC 4953											
Ammonia	NC	0.074	0.02	0.27	0.20	0.054	0.039	0.04	0.068	0.033	<0.02
Chemical Oxygen Demand	200	120	<25	69	<25	39	51	300	130	25	25
Arsenic, Total	NC	<0.002	0.0044	<0.002	<0.002	0.002	0.0033	0.015	0.010	<0.002	<0.002
Cadmium, Total	NC	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	0.0012	0.0006	0.0029	<0.0005	<0.0005
Iron, Total	NC	67	7.9	1.4	0.56	17	31	15	64	0.39	<0.10
Lead, Total	0.030	0.033	<0.005	0.0015	<0.005	0.0043	0.0071	0.0067	0.024	<0.001	<0.005
Mercury, Total	0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Selenium, Total	NC	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Silver, Total	NC	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Additional Parameters Monitored											
Beryllium	0.0016	0.0019	0.0002	<0.0002	<0.0002	0.0005	0.0009	0.0006	0.0022	<0.0008	<0.0002
PCB-1016	NC	<0.00048	<0.0005	Na[c]	NA	NA	NA	<0.00048	<0.0005	<0.00048	<0.0005
PCB-1221	NC	<0.00048	<0.0005	NA	NA	NA	NA	<0.00048	<0.0005	<0.00048	<0.0005
PCB-1232	NC	<0.00048	<0.0005	NA	NA	NA	NA	<0.00048	<0.0005	<0.00048	<0.0005
PCB-1242	NC	<0.00048	<0.0005	NA	NA	NA	NA	<0.00048	<0.0005	<0.00048	<0.0005
PCB-1248	NC	<0.00048	<0.0005	NA	NA	NA	NA	<0.00048	<0.0005	<0.00048	<0.0005
PCB-1254	NC	<0.00048	<0.0005	NA	NA	NA	NA	<0.00048	<0.0005	<0.00048	<0.0005
PCB-1260	NC	<0.00048	<0.0005	NA	NA	NA	NA	<0.00048	<0.0005	<0.00048	<0.0005

Note: This table only included parameters with EPA Benchmark values.

[a] NC = Threshold not calculated for this parameter in 2000, primarily due to insufficient data.

[b] EC = Electrical conductivity; or SC = Specific conductance.

[c] NA = Parameter not analyzed at this location.

References

Biermann A. H., P. E. Althouse, N. A. Bertoldo, R. G. Blake, S. L. Brigdon, R. A. Brown, C. G. Campbell, E. Christofferson, L. M. Clark, K. J. Folks, G. M. Gallegos, A. R. Grayson, R. J. Harrach, J. M. Larson, D. H. MacQueen, S. Mathews, B. Nisbet, S. R. Peterson, M. J. Taffet, P. J. Tate, R. J. Vellinger, R. A. Williams (2001). *Environmental Report 2000.* Lawrence Livermore National Laboratory. Livermore CA. UCRL-50027-00. http://www.llnl.gov/saer

Brandstetter, E. R. (1998). *Storm Water Metals-Issues and Historical Trends, Lawrence Livermore National Laboratory*. National Water-Quality Monitoring Council Conference, Reno, NV, July 7-9, 1998, UCRL-JC-131155.

Brown, R. A. (2006) *Lawrence Livermore National Laboratory Site 300 Annual Storm Water Report for Waste Discharge Requirements 97-03-DWQ*. UCRL-AR-144362.

Campbell, C. G. (2001). *Lawrence Livermore National Laboratory Site 300 Annual Storm Water Report for Waste Discharge Requirements 97-03-DWQ*. UCRL-AR-144362.

Campbell, C. G. and S. Mathews. (2006). *Pesticides to Radioactivity: Industrial Storm Water Monitoring at a National Laboratory*. California Stormwater Quality Association 5/12/06. UCRL-PRES-221278.

Campbell, C. G. and S. Mathews. (2006). *An Approach to Industrial Stormwater Benchmarks: Establishing and Using Site-Specific Threshold Criteria at Lawrence Livermore National Laboratory*, CASQA Stormwater 2006 Conference, September 25-27, 2006. UCRL-CONF-224278.

Consolidated Engineering Laboratories (2000) *Preliminary Erosion Assessment, Lawrence Livermore National Laboratory, Site 300*.

Marshall, W. J. (2007) Letter to Dennis K. Fisher, April 2, 2007.

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