The Boeing Company
Santa Susana Field Laboratory
5800 Woolsey Canyon Road
Canoga Park, CA 91304-1148

via FedEx

February 27, 2012
SHEA - 111832

Regional Water Quality Control Board
Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Attention: Information Technology Unit

Gentlemen:

**Subject: 2011 Annual NPDES Discharge Monitoring Report - The Boeing Company, Santa Susana Site, Ventura County, California**
Compliance File CI-6027 and NPDES No. CA0001309

The Boeing Company (Boeing) hereby submits this annual discharge monitoring report (DMR) for the Santa Susana Field Laboratory (Santa Susana Site or SSFL) for the period of January 1, 2011 through December 31, 2011. This DMR is provided for all outfalls authorized by National Pollutant Discharge Elimination System (NPDES) Permit No. CA0001309. The Los Angeles Regional Water Quality Control Board (Regional Board) issued a revised permit on June 3, 2010, with an effective date of July 19, 2010. The revised permit remains effective and the implemented Order (Order R4-2010-0090) and permit expire on April 10, 2014.

This annual DMR provides information and data, including summary tables of surface water sample analytical results, rainfall summaries, liquid waste shipment summaries, and analytical laboratory Quality Assurance/Quality Control (QA/QC) procedures and certifications. A compact disc with the report tables, figures and attachments is being submitted along with this DMR. This document will also be made available electronically at:

www.boeing.com/aboutus/environment/santa_susana/ents/monitoring_reports.html

Additionally, hard copies of this report are available at the following: California State University at Northridge Library; Simi Valley Library; and the Platt Branch, Los Angeles Library.

## REPORT CONTENTS

This annual DMR summarizes analytical data collected from the permitted outfalls during 2011. Additionally, this report summarizes activities related to the Storm Water Pollution Prevention Plan (SWPPP) and Best Management Practices (BMPs). Data for this report have been summarized in tabular form. Therefore, in addition to the report text, this DMR includes the following:

- Santa Susana facility map showing the outfall locations (Figure 1)
- Summary of 2011 Annual Rainfall (Table 1)
- Summary of 2011 Liquid Waste Shipments (Table 2)
- Summary of 2011 Permit Limit Exceedances (Table 3)
- Outfall-specific Summary Tables and Charts of Analytical Results (Sections 1 through 9)
- Arroyo Simi (Receiving Water) Summary Tables and Charts of Analytical Results (Section 10)
- Summary of Reasonable Potential Analysis (RPA) (Section 11)
- Storm Water Pollution Prevention Plan Annual Evaluation (Section 12)
- Analytical Laboratory QA/QC Procedures and Certifications (Section 13)

## OVERVIEW OF THE 2011 REPORTING PERIOD AT SANTA SUSANA

This section presents an overview of the efforts Boeing has made and continues to make improvements to achieve compliance with the site NPDES permit. It provides an overview of SWPPP and BMPs that have been implemented to minimize impacts to surface water and the potential for surface water permit limit exceedances.

## SITE-WIDE SWPPP PLAN AND BMP ACTIVITIES FOR 2011

During 2011, Boeing continued to implement site-wide SWPPPs. Boeing conducted pre- and post-storm season, and monthly inspections as required by the site-wide SWPPP to identify and mitigate any on-site conditions identified that may affect the quality of storm water runoff from the Santa Susana Site in accordance with the State of California General Industrial Storm Water Permit (No. CAS000001) (General Permit) SWPPP requirements.

Site-wide BMP activities also include inspection of Solid Waste Management Units (SWMUs). Per SWPPP requirements, SWMU inspections were completed three times a year during the months of January, April and September. Site-wide activities also include the inspection of outfalls and outfall perimeters and inspection of the Storm Water pumping and conveyance system. Inspection of specific BMP activities at each outfall location may include: inspections of erosion and sediment control BMPs, flume and sample box condition, flow meter calibrations, surface water catchment or sedimentation basin condition, liner integrity, filter media condition, system pump and conveyance condition, and retention tank inspection. General maintenance and housekeeping of outfalls may include removal of sediment, removal of leaf litter, filter media replacement, liner repair or replacement, implementation of additional BMPs, and weed abatement.

During 2011, Boeing continued to implement the individual SWPPPs. As part of the implementation of the SWPPPs, BMP inspections were completed to identify and mitigate any on-site conditions identified that may affect the quality of storm water runoff from the Santa Susana Site. BMP inspections were completed in accordance with the State of California General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order NO. 2009-0009-DWQ; NPDES NO. CAS000002 (General Construction Permit) SWPPP requirements. During the rainy season, inspections were conducted before and after qualifying rain events, and during extended rainfall lasting longer than 24 hours as required by the General Permit. During the non-rainy season, inspections are conducted quarterly.

Construction, demolition and Interim Source Removal Action (ISRA) activities are included in the General Construction Permit SWPPP requirements. Efforts to plan and implement BMPs for pre- and post-soil disturbance activities for demolition and ISRA areas are discussed in Table C and summarized further in sections below. The demolition and ISRA areas include both the areas of disturbed soil from recent demolition, soil removal, or remediation activities, and areas that are post-remediation or post-demolition, and now in restoration.

***Site-wide planting of Native Vegetation and Restoration***

In accordance with the Surface Water Expert Panel (Expert Panel) recommendations, Boeing planted new vegetation across the Santa Susana Site. Plantings included over 900 plants within the Outfall 009 watershed. The native plants installed consisted of Mule fat, Elderberry, Creeping Wild Rye, Mugwort, and Coyote Brush. Irrigation lines were also installed to ensure these native species become established.

In addition to the reinstatement of native plant species, Boeing is committed to the restoration and rehabilitation of soil disturbance areas. Upon completion of any soil disturbance, proper sediment and erosion control BMPs are implemented, including the application of hydromulch and hydroseed to enhance re-growth of native plants and act as a dust suppressor in disturbed soil areas.

***Demolition and BMP Plan Related Activities***

Boeing is committed to restoring the site to its natural habitat and rehabilitating previously active areas that have been demolished.

In 2011, demolition of structural features in Area I at the former Component Testing Lab (CTL)-V, the former Canyon facility, and the former CTL-III facility and spillway was completed. Demolition occurred at eight Groundwater Treatment Units (GTUs) in Areas I, II, and III. Additionally, asphalt was removed from the former Building 324 parking lot, the Lower Parking Lot Soil Stockpile area (Lower Lot) and the parking lot across from the Hydrogen Lab in Area III. Demolition activities included the removal of concrete and metal structures, concrete slabs, debris containing metal and rebar, piping associated with utility conveyance, and asphalt road cover. All debris, metal, concrete, and asphalt was segregated upon removal and transported to a waste or recycling facility per the waste management plan and in accordance with all local, state, and federal regulations. The following activities comprised the planning and implementation of BMPs pre- and post-demolition:

- Pre-demolition BMP strategy planning was performed;
- Tracking controls such as truck stabilizers or rumble plates at the entrance/exit were installed;
- A water truck was used for dust and wind erosion;
- All segregated materials were stockpiled and covered;
- Segregated debris and material were hauled offsite per the waste management plan; and
- Post-demolition BMPs, including hydromulch and hydroseed application, were implemented.

In accordance with the NPDES permit and General Construction Permit SWPPP requirements, all work performed requires implementation of BMP plans and practices. These BMPs were implemented in order to reasonably control erosion, sedimentation, and turbidity, and to continue to protect the surface waters and respective drainages. In addition, BMPs such as the application of hydromulch and hydroseed were implemented to enhance restoration. Per

General Construction Permit SWPPP requirements, regular inspection schedules were completed to maintain quality and ensure compliance.

***Outfalls 008/009 ISRA and BMP Plan Related Activities***

Pursuant to the December 3, 2008 Section 13304 Order issued by the Regional Board, Boeing and the National Aeronautics Space Administration (NASA) have been proceeding with ISRA activities in the Outfall 008 and 009 watersheds to address constituents that have exceeded NPDES permit limits/benchmarks. During 2011, Boeing, on behalf of Boeing and NASA, performed a number of activities related to the referenced Order. (Some activities were also conducted in coordination with the Expert Panel). ISRA-related activities included soil sampling; backfill and re-contouring of excavations; post-restoration topographic surveys; BMPs installation and monitoring; hydromulch and hydroseed application; native plants installation; SWPPP inspections; and performance monitoring. Additionally, Boeing regularly communicated with the appropriate agencies to delineate its planned approaches to ISRA activities and to present its results and supporting data pursuant to the December 3, 2008 Section 13304 Order. Boeing continues to submit monthly and quarterly progress reports to the Regional Board on the progress of the ISRA activities, including permit status. For a more detailed description of 2011 ISRA activities, please refer to the quarterly DMRs. ISRA related documents can be found electronically at:

http://www.boeing.com/aboutus/environment/santa_susana/isra.html

***Northern Drainage***

Boeing has actively worked to protect the Northern Drainage, following the Cleanup and Abatement Order (CAO) No. R4-2007-0054 clean-up activities performed under DTSC oversight. A Certification of Completion was issued by the DTSC on April 29, 2011 stating that the response actions required under the ISE/RA orders, Santa Susana Field Laboratory, Ventura County, California (CAD 093365435 and CA 18000090010) were successfully performed, the constituents of concern (COCs) have been removed, and remaining concentrations no longer posed an immediate risk to humans or environmental receptors (DTSC, 2011) Mitigation and restoration activities for the Northern Drainage are now being planned. The Restoration, Mitigation, and Monitoring Plan (RMMP) was submitted on October 5, 2011 to the Regional Board, DTSC, the California Department of Fish and Game (CDFG), and the United States Army Corps of Engineers (USACE), which provided a detailed summary and conceptual designs for restoration and stabilization of the banks and bottom of the Northern Drainage, as well as mitigation and monitoring for riparian plants removed during remediation. Boeing submitted permit applications, forms, and supporting information to CDFG and USACE in December 2011

and to the Regional Board in January 2012 for the Northern Drainage RMMP activities. Boeing will implement the CAO sampling protocol during the three storm events that follow the April 29, 2011 cleanup completion date, or for a period of two years from that date, whichever occurs first.

Boeing continues to perform BMP maintenance activities throughout the year as part of ongoing Northern Drainage responsibilities. Restoration and stabilization in the Northern Drainage at areas mentioned in the RMMP will commence subsequent to receiving approval from these agencies in early 2012. For a more detailed description of the activities implemented by Boeing in 2011 relative to the Northern Drainage, please refer to the quarterly DMRs.

***Outfalls 011 and 018 Storm Water Treatment Systems (SWTSs)***

In 2011, Outfall 011 and 018 SWTSs were installed to physically and chemically treat Storm Water. The physical process includes sand filters, bag filters, and granular activated carbon (GAC) vessels. The chemical process includes oxidation and rapid coagulation-flocculation reaction. Outfall 011 SWTS has a capacity of 700 gallons per minute (gpm) and Outfall 018 SWTS has a capacity of 1,000 gpm with future expansion to 2,000 gpm. The SWTSs are expected to reduce the concentration of the COCs listed in the NPDES permit limits present in Storm Water discharged to Outfalls 011 and 018, respectively.

Outfall 011 SWTS is located adjacent to R-1 Pond. Storm Water is transferred from Perimeter Pond to R-1 Pond for treatment. At Outfall 018, the SWTS extracts Storm Water from Silvernale Pond for treatment. Outfall 018 SWTS is one component of a larger Storm Water conveyance system that also treats Storm Water captured at Outfalls 003, 004, 005, 006, 007, 010, 012, and 013 on the SSFL site. Water from those outfalls is transferred via pumps through a network of pipelines to Silvernale Pond for treatment.

The following is a description of the Storm Water treatment process for both Outfall 011 and 018 SWTSs. Water is pumped from respective ponds and passed through the first chemical injection box (Box) 1 where one or a combination of the chemicals can be added before entering the Oxidation Contact Tanks (OCTs). The injected chemicals include potassium permanganate ($KMnO_4$), sodium hydroxide (NaOH), hydrochloric acid (HCl) and alum. The OCTs provide contact time for the $KMnO_4$ to oxidize constituents in the influent water. Effluent from the OCTs is routed to the ACTIFLO$^{TM}$ unit through a line where Box 2 houses injection ports for alum and HCl. Alum acts as the coagulant in the ACTIFLO process, destabilizing colloidal particles to form pin flocs. HCl is injected on an as-needed basis to optimize pH for coagulation

with alum. The chemicals are mixed by a flash mix pump which pulls OCT effluent prior to Box 2 and re-injects it through a nozzle before chemical injection. Once within the ACTIFLO unit, an anionic polymer is introduced as a flocculant aid into the flocculation maturation tank where micro-sand is also added for ballasted flocculation. ACTIFLO effluent is then routed to a buffer tank. Box 3 is located before the buffer tank and contains injection ports for $KMnO_4$ and NaOH. The buffer tank acts as an equalization basin and provides additional contact time if oxidation or pH adjustment is required. The filter feed pump transfers water from the buffer tank through a series of filtration stages. The effluent is routed through sand filtration, 1 micron bag filters, and finally GAC vessels. The GAC effluent passes through the last chemical injection box, Box 4, which contains ports for HCl and NaOH for controlling pH prior to discharge.

As part of the water treatment process at both Outfalls 011 and 018, SWTSs, solids are generated from the ACTIFLO unit and backwashing of the sand filters. The solids processing thickens, dewaters, and disposes the solids. Solids generated in the ACTIFLO unit and sand filter backwashing process are directed into a plate settler for thickening prior to being pumped into the solids weir tanks or solids mixer tank. Supernatant from the mixer tank is pumped into a solids weir tank to catalyze separation. Supernatant from the plate settler and solids weir tank is routed into a supernatant tank prior to being re-circulated back into the front of the system prior to Box 1. Settled solids are transferred from the solids weir tank into the solids mixer tank. The thickened solids generated at Outfall 011 SWTS are then transferred to Outfall 018 SWTS for further dewatering and eventual offsite disposal. The thickened solids accumulated in the Outfall 018 SWTS solids mixer tank are thoroughly mixed to create a homogenous mixture prior to the filter press. Solids dewatered in the filter press will be transported offsite for disposal. Filtrate from the filter press will collect in the filtrate tank, which is then pumped into the supernatant tank for treatment. All generated solids from the Outfall 011 and 018 SWTSs are analyzed for waste characterization, transported off site, and disposed of in accordance with all local, state and federal regulations.

Manganese removal below the permit limit of 50 micrograms per liter (µg/L) remained the most challenging part of the SWTS operation. This process consisted of (i) adding sufficient $KMnO_4$ to oxidize dissolved manganese and bring it out of solution, (ii) adjusting the pH to be above 8.0 to increase the kinetics of the oxidation of manganese, and (iii) removing additional manganese via a coating of manganese oxides that formed on the sand beds (which acts in the same way as an ion exchange system for manganese). Additionally, meeting this manganese permit limit required all processes to occur concurrently. Further measurements of total manganese in the SWTS effluent demonstrate that the limit was met when the latter process was complete.

During 2011, Boeing completed a number of activities related to the installation of the Outfall 011 and 018 SWTSs. Boeing installed, at both outfalls, system equipment (e.g., tanks, pumps, ACTIFLO™ unit); piping and valves; flow meters, air compressors, and appurtenances; chemical skid units and secondary chemical injection boxes; and instrumentation (e.g., analyzer panels, pH meters, turbidity meters). Boeing also installed at both outfalls an electrical grounding system, electrical wires and conduits. Once completed, Boeing optimized the treatment system and performed 24-hour discharge of Storm Water at the Outfall 018 SWTS on July 19, 2011. Additional modifications and optimization at Outfall 011 and 018 SWTSs will be completed throughout 2012. For a more detailed description of the activities implemented by Boeing in 2011 relative to the SWTSs, please refer to the quarterly DMRs.

***Site-wide Storm Water Conveyance System***

In 2011, Boeing completed the installation of Storm Water conveyance pipelines for Outfalls 003, 004, 005, 006, 007, 010, 012, and 013 to allow the transfer of Storm Water to Silvernale Pond for treatment via the Outfall 018 SWTS. For a more detailed description of the activities implemented by Boeing in 2011 relative to the conveyance system, please refer to the quarterly DMRs.

In September 2011, a site-wide maintenance checkup was performed for all of the pumps within the conveyance system to ensure proper operation during the rainy season. The maintenance program for the conveyance system will occur twice annually (one month prior to the start of the rainy season, and one month after the end of the rainy season).

***Bioassessment***

A bioassessment review was conducted on May 13, 2011 for Second Quarter 2011 as required by the permit. However, because all drainages associated with NPDES permit-regulated outfalls at the Santa Susana Site were dry at the time of sampling, the biologist determined that there was no suitable habitat from which to complete the bioassessment sampling due to the lack of naturally occurring continuous flow of water in these drainages.

**DISCHARGE STATUS**

Precipitation during 2011 at Santa Susana is provided for each month of the year in Table 1. Surface water samples were collected when flow was observed at the designated outfall locations during storm events of greater than 0.1 inches. Surface water samples were collected from Outfalls 001, 002, 006, 008, 009, 010, 011, 018, and the Arroyo Simi Receiving Water

location (RSW-002) for all qualifying events from January 1 to December 31, 2011, in accordance with the NPDES permit. Additionally, for any discharges of treated groundwater from the Groundwater Extraction Treatment System (GETS) Outfall 019 effluent treated water samples were collected in accordance with the NPDES permit upon discharge.

Figure 1 illustrates the Santa Susana facility and the locations of the outfalls. Table A, below, provides a summary of the 2011 sampling record by outfall/location where flow was observed and Storm Water samples were collected per the requirements of the NPDES permit.

Table A. Summary of Storm Water Sampling Events

| Date | Outfall/Location | Samples Collected (i.e., grab, composite) |
|---|---|---|
| 1/3/2011 | Outfall 002 (South Slope below R-2 Pond) | Grab & Composite |
| | Outfall 008 (Happy Valley) | Grab & Composite |
| | Outfall 009 (WS-13 Drainage) | Grab & Composite |
| 1/6-7/2011 | Outfall 019 (GETS) | Grab & Composite |
| 2/16/2011 | Outfall 009 (WS-13 Drainage) | Grab & Composite |
| 2/17-18/2011 | Outfall 018 (R-2 Pond) | Grab & Composite |
| 2/19/2011 | Outfall 002 (South Slope below R-2 Pond) | Grab & Composite |
| 2/24/2011 | Arroyo Simi Receiving Water/Sediment (RSW-002) | Grab |
| | Outfall 019 (GETS) | Grab |
| 2/25/2011 | Outfall 002 (South Slope below R-2 Pond) | Grab |
| | Outfall 009 (WS-13 Drainage) | Grab & Composite |
| | Outfall 019 (GETS) | Composite |
| 2/26/2011 | Outfall 002 (South Slope below R-2 Pond) | Composite |
| | Outfall 008 (Happy Valley) | Grab & Composite |
| | Outfall 010 (Building 203) | Grab & Composite |
| | Outfall 018 (R-2 Pond) | Grab |
| 2/27/2011 | Outfall 018 (R-2 Pond) | Composite |
| 3/2-3/2011 | Outfall 002 (South Slope below R-2 Pond) | Grab & Composite |
| | Outfall 009 (WS-13 Drainage) | Grab & Composite |
| 3/6-7/2011 | Outfall 002 (South Slope below R-2 Pond) | Grab & Composite |
| | Outfall 009 (WS-13 Drainage) | Grab & Composite |
| 3/9/2011 | Arroyo Simi Receiving Water (RSW-002) | Grab |
| 3/14/2011 | Arroyo Simi Receiving Water (RSW-002) | Grab |

| Date | Outfall/Location | Samples Collected (i.e., grab, composite) |
|---|---|---|
| 3/19/2011 | Arroyo Simi Receiving Water (RSW-002) | Grab |
| 3/20/2011 | Outfall 001 (South Slope below Perimeter Pond) | Composite |
| | Outfall 002 (South Slope below R-2 Pond) | Grab & Composite |
| | Outfall 006 (FSDF-2) | Composite |
| | Outfall 008 (Happy Valley) | Grab |
| | Outfall 009 (WS-13 Drainage) | Grab & Composite |
| | Outfall 011 (Perimeter Pond) | Composite |
| 3/21/2011 | Outfall 018 (R-2 Pond) | Grab & Composite |
| | Outfall 001 (South Slope below Perimeter Pond) | Grab |
| | Outfall 006 (FSDF-2) | Grab |
| | Outfall 008 (Happy Valley) | Composite |
| | Outfall 010 (Building 203) | Grab & Composite |
| 3/24/2011 | Outfall 011 (Perimeter Pond) | Grab |
| | Outfall 001 (South Slope below Perimeter Pond)* | Grab |
| | Arroyo Simi Receiving Water (RSW-002) | Grab |
| 3/25/2011 | Outfall 009 (WS-13 Drainage) | Grab |
| 3/29/2011 | Outfall 001 (South Slope below Perimeter Pond)* | Grab |
| | Arroyo Simi Receiving Water (RSW-002) | Grab |
| 3/30/2011 | Outfall 009 (WS-13 Drainage) | Grab |
| 4/4/2011 | Arroyo Simi Receiving Water (RSW-002) | Grab |
| 5/12/2011 | Arroyo Simi Receiving Water (RSW-002) | Grab |
| 6/1-2/2011 | Outfall 019 (GETS) | Grab & Composite |
| 6/10/2011 | Outfall 019 (GETS) | Grab & Composite |
| 7/19/2011 | Outfall 018 (R-2 Pond) | Grab |
| 7/20/2011 | Outfall 018 (R-2 Pond) | Composite |
| | Outfall 002 (South Slope below R-2 Pond) | Grab |
| 7/21/2011 | Outfall 002 (South Slope below R-2 Pond) | Composite |
| 8/9/2011 | Arroyo Simi Receiving Water (RSW-002) | Grab |
| 8/10/2011 | Outfall 019 (GETS) | Grab |
| 8/11/2011 | Outfall 019 (GETS) | Composite |
| 9/7/2011 | Outfall 019 (GETS) | Grab |
| 9/8/2011 | Outfall 019 (GETS) | Composite |
| 10/5/2011 | Outfall 009 (WS-13 Drainage) | Grab & Composite |
| 10/19/2011 | Outfall 019 (GETS) | Grab |

| Date | Outfall/Location | Samples Collected (i.e., grab, composite) |
|---|---|---|
| 10/20/2011 | Outfall 019 (GETS) | Composite |
| 11/6/2011 | Outfall 009 (WS-13 Drainage) | Grab & Composite |
| 11/10/2011 | Arroyo Simi Receiving Water (RSW-002) | Grab |
| 11/11-12/2011 | Outfall 009 (WS-13 Drainage) | Grab & Composite |
| 11/16/2011 | Outfall 019 (GETS) | Grab |
| 11/17/2011 | Outfall 019 (GETS) | Composite |
| 11/20/2011 | Outfall 009 (WS-13 Drainage) | Grab & Composite |
| 12/12/2011 | Outfall 009 (WS-13 Drainage) | Grab & Composite |

* Receiving water requirements for RSW-001 were satisfied at Outfall 001.

Collected samples were submitted to and analyzed by a California-certified analytical laboratory per the NPDES permit requirements. All sanitary wastes from the domestic Sewage Treatment Plants (STPs I, II, and III) were shipped offsite to a permitted offsite treatment and disposal facility. Details of the STP waste shipments are summarized in Table 2.

**SURFACE WATER DISCHARGE ANALYTICAL RESULTS REPORTING**

All analyses of surface water discharge samples were conducted at laboratories certified for such analyses by the California Department of Public Health or approved by the Regional Board's Executive Officer, and in accordance with current EPA guidelines, procedures, or as specified in the monitoring program. As indicated on Page E-33 of the NPDES permit, analytical results were designated "Detected but not Quantified (DNQ)" (similar to organic analyses being J-flagged by the laboratory or data validator) if the analytical result was greater than or equal to the laboratory's method detection limit (MDL), and less than the State Board's Minimum Level (ML) or laboratory reporting limit (RL). For the purposes of determining compliance with permit limits, data that were designated DNQ or that were J-flagged (estimated values), were reported as such, but were not used to establish compliance because the estimated value was less than the laboratories' RL.

Attachment H of the NPDES permit presents the State Board's MLs for use in reporting and determining compliance with NPDES permit limits. The analytical laboratory achieved these MLs for 2011. However, some constituents' daily maximum and/or monthly average discharge

limits in the NPDES permit are less than their respective MLs and less than the laboratory RL. In cases where the permit limit is less than the RL and ML, the RL was used to determine compliance. As required in the NPDES permit, Section 11 of this report provides a summary table of constituents listed in the permit, their analytical laboratory methods, MDLs, and RLs, and copies of laboratory quality assurance and quality control procedures. California Department of Public Health Environmental Laboratory Accreditation Program (ELAP) certifications are also included in Section 13, as required in the NPDES permit.

During 2011, specific constituents that had permit limits that were less than the RLs and MLs were mercury, bis(2-ethylhexyl)phthalate (DEHP), cyanide, polychlorinated biphenyls (PCBs), (Aroclors), chlordane, 4,4'-dichlorodiphenyldichloroethane (4,4'-DDD), 4,4'-dichlorodiphenyldichloroethane (4,4'-DDE), 4,4'-dichlorodiphenyltrichloro-ethane (4,4'-DDT), dieldrin, toxaphene, and chlorpyrifos. None of these compounds were detected at concentrations equal to or greater than their RL during 2011.

## SUMMARY OF NON-COMPLIANCE AND CORRECTIVE ACTIONS

Analytical results for all surface water samples are summarized in Table 3 and in the Attachment - Sections 1 through 10. Consistent with prior annual report submittals and in accordance with the NPDES permit, a graphical presentation of the data collected has also been included for specific analytes and parameters that could be effectively graphed. Analytes that had a permit limit were graphed. Analytes that do not have permit limits were not graphed. Graphing consisted of charting an analyte's analytical result(s) with the sample date(s). The graphs for each section of the attachment as described below.

The tabular and graphic data for all outfall locations, including the Arroyo Simi receiving water location, where data were collected (i.e., where outfalls flowed) are provided in the attachment as follows:

Attachment:

| | |
|---|---|
| Section 1 Outfall 001 | South Slope below Perimeter Pond |
| Section 2 Outfall 002 | South Slope below R-2 Pond |
| Section 3 Outfall 006 | FSDF-2 |
| Section 4 Outfall 008 | Happy Valley |
| Section 5 Outfall 009 | WS-13 Drainage |

Section 6 Outfall 010 Building 203
Section 7 Outfall 011 Perimeter Pond
Section 8 Outfall 018 R-2A Pond
Section 9 Outfall 019 GETS
Section 10 Receiving Water and Sediment Sampling Location – Arroyo Simi (RSW-002)

Included after Table 3 and at the beginning of the sections in the Attachment are the Annual Reporting Summary Notes. The Annual Reporting Summary Notes include a compilation of notes, abbreviations, and data validation codes that are found in the analytical data summary tables contained in the Attachments.

As indicated in the Attachments, and as summarized in Table 3, a 2011 Summary of Daily Max, Monthly Average, and Daily Mass Permit Limit or Benchmark Limit Exceedances includes:

- Iron at Outfalls 001, 002, 011 and 018
- Manganese at Outfalls 001 and 011
- E.Coli and Fecal Coliform at the Arroyo Simi (RSW-002)
- Background dioxins (TCDD) toxic equivalent (TEQ) at Outfalls 001, 002, and 009
- Chloride at Outfall 019
- TDS at Outfall 019

***Discussion of Permit Limit or Benchmark Exceedances***

The following paragraphs present a summary of permit limit or benchmark exceedances by outfall. Following these summaries, a discussion of corrective measures is included.

**Storm Water Outfall 001**

General Approach for Achieving Compliance at Outfall 001

A detailed discussion of the benchmark exceedances by constituent type and potential sources of these exceedances at Outfall 001 is set forth in the paragraphs below. However, whatever the source of the exceedances, Boeing continues to take proactive steps to meet the requirements of its NPDES permit. These steps have been summarized in Table C of this report and are primarily focused on stabilization of streambed channel banks to reduce sediment erosion through the planting of native vegetation and hydroseed application. Boeing believes that implementing these stabilization and erosion control measures is the most effective way to

meet effluent standards while not severely impacting the adjacent undisturbed habitats. These activities will continue to be re-evaluated and upgraded as needed to minimize the occurrence of any future benchmark exceedances.

Exceedance Summary

During the 2011 monitoring period, samples collected at Outfall 001 showed that there were three exceedances for three constituents with benchmark limits, as summarized in Table 3.

- On March 20-21, iron was detected at concentrations of 5.7 milligrams per liter (mg/L), which is above the daily maximum benchmark limit of 0.3 mg/L.

- On March 20-21, manganese was detected at a concentration of 81 µg/L, which is above the daily maximum benchmark limit of 50 µg/L.

- On March 20-21, TCDD-TEQ was detected at a concentration of $3.27 \times 10^{-8}$ µg/L, which is above the daily maximum benchmark limit of $2.8 \times 10^{-8}$ µg/L.

Exceedance Discussion

*Metals*

Benchmark limit exceedances for iron and manganese, occurred at Outfall 001 in 2011. Outfall 001 is located in the undeveloped portion of the property where no industrial activities have occurred.

As reported in previous DMRs, the Storm Water Expert Panel study, *SSFL Metals Background Report: Sources of Metals in SSFL Watersheds*[1], noted that heavy metals in Storm Water discharges from Outfalls 001, 002, 008, and 009 originate from various sources, including natural soil components, rainfall, and dry atmospheric deposition from local and regional sources. This report also explained that data show wet weather metals concentrations in creeks in regional natural watersheds are generally one order of magnitude lower than concentrations in regional developed watersheds, and that Santa Susana "outfall metal concentrations were comparable to the concentrations at these undeveloped watersheds."

Boeing believes that the metals concentrations in Storm Water runoff from the Santa Susana site are associated with total suspended solids (TSS) consisting of native sediments and soils, and that TSS and metals loading will vary based on rainfall intensity, duration, and erosion

[1] Available at http://www.boeing.com/aboutus/environment/santa_susana/tech_reports.html

characteristics. The elevated metal concentrations observed are thus likely predominately due to the erosion of native soils and ash, and their subsequent migration into Storm Water.

*TCDD TEQ*

The daily benchmark limit and monthly average benchmark limit for TCDD TEQ was exceeded at Outfall 001 in March 2011.

TCDD congeners have been frequently detected in DTSC-approved, non-impacted background soils at the SSFL (MWH, 2005). In some areas, onsite operations have utilized combustion processes; however, when these potentially impacted areas were investigated, the TCDD TEQ values in soils were found either to be equivalent to background levels or, if elevated, they were shown to decrease over relatively short distances to near background levels down slope or down drainage from the suspected source area.

The presence of TCDD in both background soils and fire-related materials is well documented in the scientific literature (USEPA, 2000), substantiated by previously completed on- and offsite studies (MWH, 2005), and presented in the Flow Science Background Report (Flow Science, 2006). These reports suggest that the levels of TCDD TEQ measured in surface water at the SSFL could originate primarily from wildfire combustion processes, regional and atmospheric deposition, and other naturally occurring sources over which Boeing has no reasonable control.

A report completed by the Storm Water Expert Panel, *SSFL Storm Water Dioxin Background Report*[2], underscores the significant role of TCDD in Storm Water discharges from Outfalls 001, 002, 008, and 009 at the Santa Susana site. Among other things, the Storm Water Expert Panel explains that dioxins are ubiquitous in the environment and come from wildfires and atmospheric deposition from widespread offsite emissions. As a result, "natural background soils are a significant source of dioxins in Storm Water" at Santa Susana.

**Storm Water Outfall 002**

General Approach for Achieving Compliance at Outfall 002

As was done for Outfall 001, a detailed discussion of the benchmark exceedances by constituent type and potential sources of these exceedances for Outfall 002 is noted in the paragraphs below. The approach in place for Outfall 001 is also in place for Outfall 002. These steps have been summarized in Table C of this report and are primarily focused on stabilization

[2] Available at http://www.boeing.com/aboutus/environment/santa_susana/tech_reports.html.

of streambed channel banks to reduce sediment erosion through the planting of native vegetation and hydroseed application. Boeing believes that implementing these stabilization and erosion control measures is the most effective way to meet effluent standards while not severely impacting the adjacent undisturbed habitats. These activities will continue to be re-evaluated and upgraded as needed to minimize the occurrence of any future benchmark exceedances.

Exceedance Summary

During the 2011 monitoring period, samples collected at Outfall 002 had four exceedances for two constituents with benchmark limits, as summarized in Table 3:

- On February 19, iron was detected at concentrations of 0.97 mg/L, which is above the daily maximum benchmark limit of 0.3 mg/L.

- On February 24-25, iron was detected at concentrations of 0.49 mg/L, which is above the daily maximum benchmark limit of 0.3 mg/L.

- On March 20, iron was detected at concentrations of 5.4 mg/L, which is above the daily maximum benchmark limit of 0.3 mg/L. Additionally, iron exceeded the mass-based benchmark limit of 400 lbs/day for March 20, 2011. The reported mass calculation is 468.23 lbs/day for March 20, 2011.

- On March 20, TCDD-TEQ was detected at a concentration of $4.98 \times 10^{-8}$ µg/L, which is above the daily max benchmark limit of $2.8 \times 10^{-8}$ µg/L.

Exceedance Discussion

*Iron and Manganese*

Benchmark limit exceedances for iron and manganese occurred at Outfall 002 in 2011. Outfall 002 is located in the undeveloped portion of the property where no industrial activities have occurred. The reduction of TSS in Storm Water runoff is likely to be the most effective approach for reducing concentrations of these metals. The background concentrations of these metals in the soil are likely a contributing factor as well. Boeing continues to investigate erosion sources and erosion control measures at the site, and will improve BMPs as appropriate, to better control sediment and associated metals transport into the surface water.

*TCDD TEQ*

The reported concentrations of TCDD TEQ in the samples collected on March 20 from Outfall 002 exceeded the daily max benchmark limit of $2.80 \times 10^{-8}$ µg/L.

As discussed for Outfall 001, Boeing believes the metals concentrations in Storm Water runoff from the SSFL are associated with TSS consisting of native sediments and soils, and that TSS and metals loading will vary based on rainfall intensity, duration, and erosion characteristics. Continued monitoring of surface water and aggressive BMP actions taken as noted above and in Table C to control sediment transport is underway until this issue is resolved.

**Storm Water Outfall 003**

There were no discharges from Outfall 003 during 2011. Therefore there were no permit limit exceedances at Outfall 003 in 2011.

**Storm Water Outfall 004**

There were no discharges from Outfall 004 during 2011. Therefore there were no permit limit exceedances at Outfall 004 in 2011.

**Storm Water Outfall 005**

There were no discharges from Outfall 005 during 2011. Therefore there were no permit limit exceedances at Outfall 005 in 2011.

**Storm Water Outfall 006**

There were no permit limit exceedances in discharges from Outfall 006 during 2011.

**Storm Water Outfall 007**

There were no discharges from Outfall 007 during 2011. Therefore there were no permit limit exceedances at Outfall 007 in 2011.

**Storm Water Outfall 008**

There were no permit limit exceedances in discharges from Outfall 008 during 2011.

**Storm Water Outfall 009**

General Approach to Achieving Compliance at Outfall 009

As noted in the Outfall 008 discussion under the ***Outfall 008/009 ISRA and BMP Plan Related Activities*** section, the compliance approach for Outfall 009 is addressed in the separate BMP plan. The Outfall 008/009 BMP plan was developed in 2010 and its implementation activities will continue through 2012. A discussion as to the most probable source of the exceedances for this outfall is noted below.

Exceedance Summary

During the 2011 monitoring period, Outfall 009 had one benchmark limit exceedance and one mass-based permit limit exceedance for one constituent collected at this outfall, as summarized in Table 3:

- On March 20, 2011 TCDD-TEQ was detected at a concentration of $8.26 \times 10^{-8}$ µg/L, which is above the daily max benchmark limit of $2.8 \times 10^{-8}$ µg/L. Additionally, TCDD TEQ exceeded the mass-based permit limit of $4.20 \times 10^{-9}$ µg/L for March 20, 2011. The reported mass calculation is $8.02 \times 10^{-9}$ for March 20, 2011.

Exceedance Discussion

*TCDD TEQ*

Concentrations of TCDD TEQ in samples collected from Outfall 009 during 2011 exceeded the daily max and daily mass benchmark/permit limit for TCDD TEQ.

TCDD congeners have been frequently detected in DTSC-approved, non-impacted background soils at the SSFL (MWH, 2005). In some areas, operations onsite have utilized combustion processes. However, when investigating these potentially impacted areas, the TCDD TEQ values in soils have been found either to be equivalent to background levels or, if elevated, they have been shown to decrease in relatively short distances to near background levels down slope or down drainage from the suspected source area.

Boeing continues to investigate and remove sources of TCDD within Outfall 009. As discussed above, substantial evidence, including a report from the Storm Water Expert Panel, shows that background conditions are significant contributors of regulated constituents, including TCDD at Outfall 009.

Boeing is committed to fulfilling the requirements of the NPDES permit and continues to take actions to reduce discharges of regulated constituents, including TCDD as described in the sections above of this report addressing Site-Wide Planting of Native Vegetation, Outfalls 008/009 ISRA and BMP Plan Related Activities, and Northern Drainage Activities, and in Table C below.

**Storm Water Outfall 010**

There were no permit limit exceedances in discharges from Outfall 010 during 2011.

**Storm Water Outfall 011**

Exceedance Summary

During the 2011 monitoring period, samples collected at Outfall 011 had two exceedances for two constituents with NPDES permit limits, as summarized in Table 3:

- On March 20 – 21, iron was detected at concentrations of 3.6 mg/L, which is above the NPDES permit limit of 0.3 mg/L.

- On March 20 – 21, manganese was detected at a concentration of 55 µg/L, which is above the NPDES permit limit of 50 µg/L.

Exceedance Discussion

*Iron and Manganese*

Boeing believes the metals concentrations in Storm Water runoff from the SSFL are associated with TSS consisting of native sediments and soils, and that TSS and metals loading will vary based on rainfall intensity, duration, and erosion characteristics. Indeed, there is substantial evidence showing that background conditions are significant contributors of regulated constituents, including metals.

A permanent SWTS at Outfall 011, located adjacent to R-1 Pond, for Storm Water discharges has been completed. This system replaced the temporary system that has been used in previous seasons. During this transition period, Storm Water discharges have been regulated through the existing structural BMP at Perimeter Pond and flow was controlled to prevent over topping. Additional BMP and SWPPP related actions at Outfall 011 are further described in Table C.

**Storm Water Outfall 012**

There were no discharges from Outfall 012 during 2011. Therefore there were no permit limit exceedances at Outfall 012 in 2011.

**Storm Water Outfall 013**

There were no discharges from Outfall 013 during 2011. Therefore there were no permit limit exceedances at Outfall 013 in 2011.

**Storm Water Outfall 014**

There were no discharges from Outfall 014 during 2011. Therefore there were no permit limit exceedances at Outfall 014 in 2011.

**Storm Water Outfall 018**

Exceedance Summary

During the 2011 monitoring period, samples collected at Outfall 018 had two exceedances for one constituent with NPDES permit limits, as summarized in Table 3:

- On February 26 – 27 and March 20, iron was detected at concentrations of 0.74 mg/L and 1.1 mg/L, respectively, which is above the NPDES permit limit of 0.3 mg/L.

Exceedance Discussion

*Iron*

Permit limit exceedances for iron occurred at Outfall 018 in 2011. Boeing believes that these metal exceedances are primarily due to the erosion and surface water transport of native uncontaminated soils, as these concentrations are similar to those seen in Storm Water runoff from offsite and other open areas (Flow Science, 2006). Additionally, Boeing has investigated and continues to investigate – with coordination with the DTSC – potential sources of constituents coming from areas of historical Site industrial activity. Boeing continues to investigate erosion sources and erosion control measures at the Outfall 018 watershed, and will improve BMPs as appropriate, to better control sediment and associated metals transport into the surface water.

The approach to meet permit limits has been employed at Outfall 018 as discussed above for Outfall 011. The construction of the permanent SWTS at Outfall 018 is complete and located adjacent to Silvernale Pond. This system replaced the temporary system that had been used in previous seasons. During this transition period, Storm Water was retained at Silvernale and R-2 Ponds, or conveyed to temporary retention tanks. Therefore, Storm Water discharges have been regulated by Storm Water conveyance, temporary retention and natural pond retention. Further discussion regarding the activities at the permanent SWTSs is included in the Outfall 011 and 018 Storm Water Treatment Systems section above. Additional BMP- and SWPPP-related actions at Outfall 018 are further described in Table C.

**GETS Outfall 019**

In 2011, Boeing continued treatment of certain waste streams using a fixed groundwater treatment unit operating under the DTSC Permit-by-Rule. Treated groundwater from the GETS was discharged from an effluent line located downstream of Outfall 001.

Exceedance Summary

During the 2011 monitoring period, samples collected at Outfall 019 had three exceedances for two constituent with NPDES permit limits, as summarized in Table 3:

- On September 7-8 and October 19-20, chloride was detected at concentrations of 170 mg/L and 250 mg/L, respectively, which are above the NPDES permit limit of 150 mg/L.

- On October 19-20, total dissolved solids (TDS) was detected at concentrations of 1,100 mg/L, which is above the NPDES permit limit of 950 mg/L.

Exceedance Discussion

*Chloride and TDS*

The elevated concentrations of chloride and TDS were caused from an overdosing of calcium chloride solution into the treatment system. Calcium chloride was introduced at the end of the treatment processes in order to prevent an NPDES permit exceedance in chronic toxicity.

The GETS actively utilizes ion exchange media to remove targeted metals. However the ion exchange media, when brand new is non-selective, and thus initially removes all the metal ions within the process stream. As a result, the process water lacks the buffering needed to support aquatic life as determined in the chronic toxicity test. After the system is operated for a period of time, the ion exchange media slowly begins to release (desorb) the metal ions (calcium, magnesium, potassium, etc.) and only adsorbs targeted metals specific to the media.

Internal field testing methods such as pH, hardness, alkalinity, etc. kits were used throughout the system to ensure the buffering and other parameters were adequate and within limits; however, additional testing to verify overdosing of calcium chloride did not take place. When the ion exchange media was replaced in August, the calcium chloride dosing rate was increased to account for lack of buffering in the process water but was not decreased quickly enough, thus overcompensating and increasing the buffering (chloride) in the process water.

The following corrective measure has been implemented in an effort to prevent chloride and TDS exceedances in the future: Following an ion exchange media change-out, the system will be re-started in "recycle" and the operator will check for hardness, chloride, and TDS at several sample locations using HACH® field test kits (hardness and chloride) and a Horiba U-22 Water Quality Instrument. After verifying the measured constituent concentration levels are within NPDES permit limits the system is returned to "normal" operation and allowed to discharge.

**Arroyo Simi, Frontier Park (Receiving Water RSW-002 and Sediment Sampling Location)**

Monitoring requirements for bacteria were added to the Santa Susana NPDES permit on June 3, 2010, in anticipation of the adoption in July 2010 of the Los Angeles River Watershed Total Maximum Daily Load (TMDL). In explaining why these requirements were added, the Board stated:

> "One of the [Basin Plan water quality] objectives [for Inland Surface Waters] included is bacteria, coliform. Since the water quality objective was not included in the current Order, the tentative permit includes a requirement to monitor for E. coli and for fecal coliform. The water quality objective is applicable to the Los Angeles River and Arroyo Las Posas which both have fresh water contact recreational beneficial uses. Consequently, the Discharger is required to monitor for the concentration of the constituents."

Response to Comments, The Boeing Company Santa Susana Field Laboratory Tentative Order No. R4-2-1—00XX, NPDES Permit No. CA0001309, CI No. 6027, at 14-15.

<u>Exceedance Summary</u>
During the 2011 monitoring period, samples collected at Arroyo Simi Receiving Water Location – Frontier Park (RSW-002) had three exceedances for two constituents with NPDES permit limits, as summarized in Table 3:

- On February 24, Escherichia Coli (E. Coli) was detected at a concentration of 300 MPN/100mL, above the single sample maximum receiving water NPDES permit limit of 235MPN/100mL.

- On March 19 and 24, E. Coli and Fecal Coliform were both detected at a concentrations of ≥1,600 MPN/100mL, above the single sample maximum receiving water NPDES permit limits of 235MPN/100mL for E. Coli and 400MPN/100mL for Fecal Coliform.

- The geometric mean for E. coli in March 2011 was calculated at 246 MPN/100mL, which is above the single sample maximum receiving water limits for E. coli of 126. The geometric mean for Fecal Coliform in March 2011 was calculated at 283 MPN/100mL and is above the single sample maximum receiving water limits for Fecal Coliform of 200 MPN/100mL.[3]

Exceedance Discussion

*Bacteria*

Boeing collects all sanitary waste generated at the Santa Susana site and transports it to a permitted offsite treatment and disposal facility for treatment and disposal. With the exception of the treated groundwater that is managed in a closed system until it is discharged, the permitted discharges consist entirely of Storm Water. Thus, there is no indication that any human waste can be exposed to or enter any Storm Water discharges from Santa Susana, and any bacteria detected in waters receiving Storm Water discharges from the site, such as the Arroyo Simi, therefore must have originated from non- human, natural sources.

To confirm that bacteria present in the Arroyo Simi were not of human origin, Boeing collected a sample from the Arroyo Simi-Frontier Park location on March 24, 2011 and analyzed it for human-specific Bacteroides. The laboratory results indicate that "the total Bacteroides detected in the samples was not derived from human [sources]; therefore it must be derived from other animal sources" (MWH, 2011).

Studies have shown that non-human sources, such as birds and wildlife, contribute to bacteria in Storm Water runoff.[4] Fecal coliform bacteria can enter rivers through direct discharge of waste from mammals and birds. Pets, especially dogs, can also contribute to fecal contamination of surface waters. Runoff from roads, parking lots, and yards can carry animal wastes to streams through storm sewers. Birds can be a significant source of fecal coliform

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[3] In a separate letter to Regional Board Staff dated May 13, 2011, Boeing summarized the actions it is taking to satisfy the bacteria monitoring requirements established the Santa Susana NPDES Permit.

[4] See, e.g., CREST (Nov 2008), LA River bacteria source identification study: Final Report, available at http://www.crestmdl.org/studies/BSI%20STUDY%@)REPORT.pdf; Grant, et al, (2001), "Generation of Enterococci Bacteria in a Costa Saltwater Marsh and Its Impact on Surf Zone Water Quality," Environ.Sci. Technol. 35(12):2407-2416; Griffin et al. (2001), "Marine Recreation and Public Health Microbiology: Quest for the Ideal Indicator," BioScience 51(10): 817-826; Tiefenthaler et al (2008), "Fecal indicator bacteria (FIB) levels during dry weather from Southern California reference streams," Environmental Monitoring and Assessment 155(1-4): 477-492.

bacteria. Wildlife present in the area include a variety of bird species; and small and large mammals such as ground squirrels, mice, bobcats, mountain lions, horses, dogs, all of which are sources of fecal coliform bacteria. Both fecal coliform and E. coli from a wide range of sources can be washed into streams, rivers and creeks during rainfall events.

Coliforms include genera that originate in feces (e.g. Escherichia) as well as genera not of fecal origin (e.g. Enterobacter, Klebsiella, Citrobacter). The assay is intended to be an indicator of fecal contamination; more specifically of E. coli which is an indicator of microorganism for other pathogens that may not be present in feces. Presence of fecal coliforms in water may not be directly harmful, and does not necessarily indicate the presence of feces (Doyle, M.P., and M.C. Erickson. 2006).

In adopting the Los Angeles River Watershed TMDL, the Regional Board has recognized that "there are natural sources of bacteria that may cause or contribute to exceedances of the single sample objectives and that it is not the intent of the Regional Board to require treatment or diversion of natural coastal creeks or to require treatment of natural sources of bacteria from undeveloped areas."[5] Given the Regional Board's expressed acknowledgment of such sources of bacteria such as the abundant and varied wildlife present throughout the Santa Susana site, Boeing will continue to monitor both E. Coli and human-specific Bacteroides in all samples collected for bacterial analysis at Frontier Park (as well as for fecal coliform, as required by the permit) to continue to verify that indicator bacteria at this sampling location are from animals and not human sources.

**CORRECTIVE ACTIONS**

Throughout 2011, Boeing took actions to improve the quality of surface water discharges as detailed above. In addition, Boeing continued implementation of the General Permit and General Construction SWPPPs. The 2011 SWPPP annual evaluation is included as Section 12 of this report.

Corrective actions include sediment and erosion control BMPs including hydromulch and hydroseed application, planting of native vegetation, housekeeping activities, weed abatement, structural BMP implementation or upgrades, and site-wide Storm Water conveyance system and treatment system optimization. For a more detailed description of the activities

[5] Resolution No. R10-007, July 9, 2010, Amendment to the Water Quality Control Plan for the Los Angeles Region to Incorporate a Total Maximum Daily Load for Indicator Bacteria in the Los Angeles River Watershed, Attachment A at 2-3.

implemented by Boeing in 2011 relative to corrective actions, please refer to the quarterly DMRs. The following table (Table B) lists the Outfall location and all respective BMP implemented and respective activities completed during the 2011 calendar year:

Table B. 2011 BMP Activities

| OUTFALL | BMP ACTIVITIES DURING 2011 |
|---|---|
| 001<br>(South Slope below Perimeter Pond) | Performed regular inspections including sediment and erosion control BMPs, flume maintenance, housekeeping activities, outfall access road maintenance, and weed abatement. Additionally, native vegetation was planted and irrigated, hydroseed was applied along the drainage, outfall flow meter was calibrated, flow meter tape was replaced, and maintenance on sample equipment was performed as needed. |
| 002<br>(South Slope below R-2 Pond) | Performed regular inspections including sediment and erosion control BMPs, flume maintenance, housekeeping activities, outfall access road maintenance, and weed abatement. Additionally, native vegetation was planted and irrigated, hydroseed was applied along the drainage, outfall flow meter was calibrated, flow meter tape was replaced, and maintenance on sample equipment was performed as needed. |
| 003<br>(RMHF) | Performed regular inspections including sediment and erosion control BMPs, structural BMPs, and Storm Water filter system inspections, including flume maintenance, housekeeping activities, and weed abatement. Additionally, native vegetation was planted and irrigated, hydroseed was applied along the north-side of drainage, outfall flow meter was calibrated, flow meter tape was replaced, and maintenance on sample equipment and optimization of structural BMP system were also performed as needed. |
| 004<br>(SRE) | Performed regular inspections including sediment and erosion control BMPs, structural BMPs, and Storm Water filter system inspections, flume maintenance, housekeeping activities, and weed abatement. Additionally, storage tanks were added for additional Storm Water retention, the outfall flow meter was calibrated, flow meter tape was replaced, and maintenance on sample equipment and optimization of structural BMP system were also performed as needed. |
| 005<br>(FSDF-1) | Performed regular inspections including sediment and erosion control BMPs, structural BMPs and sedimentation basin, and |

| OUTFALL | BMP ACTIVITIES DURING 2011 |
|---|---|
| | Storm Water filter system inspections, housekeeping activities, and weed abatement. Additionally, storage tanks were added for additional Storm Water retention, maintenance and optimization of structural BMPs and Storm Water conveyance system were also performed as needed. |
| 006<br>(FSDF-2) | Performed regular inspections including sediment and erosion control BMPs, structural BMPs, and Storm Water filter system inspections, including adding storage tanks for additional Storm Water retention, flume maintenance, housekeeping activities, and weed abatement. Additionally, the outfall flow meter was calibrated, flow meter tape was replaced, and maintenance on sample equipment and optimization of structural BMP system were also performed as needed. |
| 007<br>(Building 100) | Performed regular inspections including sediment and erosion control BMPs, structural BMPs and sedimentation basin, and Storm Water filter system inspections, housekeeping activities, and weed abatement. Additionally, storage tanks were added for additional Storm Water retention, maintenance and optimization of structural BMPs and Storm Water conveyance system were also performed as needed. |
| 008<br>(Happy Valley) | Performed regular inspections including sediment and erosion control BMPs, flume maintenance, housekeeping activities, outfall access road maintenance, and weed abatement. Additionally, recently planted native vegetation was irrigated, hydroseed was applied near access road, outfall flow meter was calibrated, flow meter tape was replaced, and maintenance on sample equipment was performed as needed. |
| 009<br>(WS-13 Drainage) | Performed regular inspections including sediment and erosion control BMPs, flume maintenance, housekeeping activities, and weed abatement. Additionally, recently planted native vegetation was irrigated, hydroseed was applied (ISRA, demo and BMP upgrade areas), culvert modification was completed, a sand bag berm for Storm Water retention was implemented, outfall flow meter was calibrated, flow meter tape was replaced, and maintenance on sample equipment was performed as needed. |
| 010<br>(Building 203) | Performed regular inspections including sediment and erosion control BMPs, structural BMPs, and Storm Water filter system inspections, flume maintenance, housekeeping activities, and weed abatement. Additionally, hydroseed was applied, storage |

| OUTFALL | BMP ACTIVITIES DURING 2011 |
|---|---|
| | tanks were added for additional Storm Water retention, the outfall flow meter was calibrated, flow meter tape was replaced, and maintenance on sample equipment and optimization of structural BMPs and conveyance system were also performed as needed. |
| 011<br>(Perimeter Pond) | Performed regular inspections including sediment and erosion control BMPs, structural BMPs, and Storm Water weir inspections, flume maintenance, housekeeping activities, and weed abatement. Additionally, hydroseed was applied (demo areas), the outfall flow meter was calibrated, flow meter tape was replaced, and maintenance on sample equipment and optimization of structural BMPs, weir and conveyance system were also performed as needed. |
| 012<br>(Alfa Test Stand) | Performed regular BMP inspections including structural BMPs and Storm Water conveyance system inspections, housekeeping activities, and weed abatement. Additionally, hydroseed was applied (demo areas) storage tanks were added for additional Storm Water retention, maintenance and optimization of structural BMPs and Storm Water conveyance system were also performed as needed. |
| 013<br>(Bravo Test Stand) | Performed regular BMP inspections including structural BMPs and Storm Water conveyance system inspections, housekeeping activities, and weed abatement. Additionally, hydroseed was applied (demo areas) storage tanks were added for additional Storm Water retention, maintenance and optimization of structural BMPs and Storm Water conveyance system were also performed as needed. |
| 014<br>(APTF Test Stand) | Performed regular inspections including sediment and erosion control BMPs, structural BMPs and sedimentation basin, and Storm Water filter system inspections, housekeeping activities, and weed abatement. Additionally, storage tanks were added for additional Storm Water retention, maintenance and optimization of structural BMPs were also performed as needed. |
| 018<br>(R-2 Spillway) | Performed regular inspections including sediment and erosion control BMPs, structural BMPs, and Storm Water conveyance, and spillway inspections, flume maintenance, housekeeping activities, and weed abatement. Additionally, hydroseed was applied (demo areas), the outfall flow meter was calibrated, flow meter tape was replaced, and maintenance on sample |

| OUTFALL | BMP ACTIVITIES DURING 2011 |
|---|---|
| | equipment and optimization of structural BMPs, weir and conveyance system were also performed as needed. |
| 019<br>(GETS) | Performed regular system maintenance on a quarterly basis, including belt inspections, oil changes and system alarm check. System optimization including installation and replacement of media vessels were installed to enhance the filtration system. Treated ground water was discharged below the Outfall 001 location. |

**REASONABLE POTENTIAL ANALYSIS (RPA)**

Outfall monitoring data were collected during the First (Outfalls 001, 002, 006, 008, 009, 010, 011, 018, and 019), Second (Outfall 019), Third (Outfalls 018 and 019), and Fourth (Outfalls 009 and 019) Quarters of 2011. Data from these quarters were added to the RPA data set, as per the MWH and Flow Science RPA procedures, for the following outfall monitoring groups: Outfalls 001, 002, 011, 018, 19; Outfalls 003-010; and Outfalls 012, 013 and 014 (MWH and Flow Science, 2006). The analytical results for the sample collected at Outfall 010 on February 26, 2011 did not trigger reasonable potential for Zinc, as detailed below. Additionally, RPA analyses were performed for E.Coli at Outfall 009 for samples collected on February 16 and March 20, 2011; these analyses are discussed below and also did not trigger reasonable potential. RPA was not triggered for any other constituent in 2011 not already regulated under the current NPDES Permit. Complete RPA tables for the outfall monitoring groups are provided in Section 11.

In response to the water quality objectives update for fecal coliform and the addition of water quality objectives for E. Coli as discussed in the first quarter 2011 DMR, RPA was not conducted for Fecal Coliform.

*E. Coli*

As noted above, Boeing collects all sanitary waste generated at the Santa Susana site and transports it to an offsite facility for treatment and disposal. The discharge at Outfall 009 consists entirely of Storm Water. Boeing continues to improve Storm Water quality in discharges at Outfall 009 through methods designed to preserve the natural conditions in the watershed to the maximum extent feasible by implementing erosion control/restoration measures such as the planting and maintenance of native plants and the application of hydroseed mulch, as well as through continuing with planned ISRA activities as detailed above and in the quarterly DMRs. Thus, there are no indications that any human waste can be

exposed to or enter any Storm Water discharges from Santa Susana, and any bacteria detected at Outfall 009 therefore must have originated from non- human, natural sources.

Additional samples confirmed that bacteria that were present in samples collected at Outfall 009 were not of human origin; and therefore derived from other animal sources (MWH, 2011). Details of these samples and analyses can be found the the first quarter 2011 DMR.

*Zinc*

The sample collected at Outfall 010 on February 26, 2011 was observed to have a total zinc concentration of 161 ug/L, a dissolved zinc concentration of 70.5 ug/L, and a hardness of 86 mg/L. Boeing has evaluated reasonable potential for zinc using the provisions of the California Toxics Rule (CTR). The CTR specifies that, for a hardness of 86 mg/L, the acute water quality criterion for dissolved zinc is 105.3 ug/L.[6] The sample dissolved zinc concentration of 70.5 ug/L is below the CTR criterion for zinc, and the sample does not trigger a finding of reasonable potential.[7]

Boeing does not believe the currently used RPA procedures are appropriate for storm water and storm water-dominated discharges from the SSFL. The RPA procedures are outlined in the California State Implementation Plan (SIP) and EPA's Technical Support Document for Water Quality-Based Toxics Control (TSD). It is inappropriate to use the RPA procedures for determining water quality impacts in the Storm Water context because those procedures were developed for steady-state discharges. Storm Water discharges are not steady-state discharges, but rather exhibit highly variable flow rates and water quality COC concentrations during and between storms.[8]

**CONCLUSIONS**

Based on the reported data in 2011 and in previous years, and consistent with published studies referenced in this report, Boeing believes that a majority of the constituents that

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[6] Note that the dissolved fraction of a metal is the toxicologically relevant bioavailable fraction, and the CTR criteria are thus provided in terms of the dissolved fraction of the metal. "Freshwater and saltwater criteria for metals are expressed in terms of the dissolved fraction of the metal in the water column." Federal Register, Vol. 65, No. 97, Thursday, May 18, 2000 (CTR), at footnote m on p. 31716. The criterion for zinc for a hardness of 86 mg/L was calculated using the equations provided at p. 31717 of the CTR.

[7] Alternatively, the CTR criterion for dissolved zinc can be converted to a criterion value for total zinc using the sample-specific conversion factor (CF), which describes the fraction of total zinc that is present in the dissolved phase. The CF for this sample is (70.5/161) = 44%, which results in a CTR criterion for total copper of 251 ug/L. Thus, the total zinc concentration of the sample (161 ug/L) is below the CTR criterion for total zinc.

[8] See Flow Science, Boeing SSFL Technical Memo for RPA Procedures (May 2006) (submitted to Regional Board May 8, 2006) available at: http://www.boeing.com/aboutus/environment/santa_susana/water_quality/tech_reports_10-11-10_ReasonablePotenAnalyMethodTechlMemo.pdf

exceeded permit limits in Storm Water discharges result from naturally occurring contributions (e.g., wildfires, native soil discharges into channels), or were detected at concentrations consistent with regional background concentrations.

As discussed above, the Expert Panel's reports on Metals and Dioxins shows that background conditions are significant contributors of regulated constituents. The Regional Board has recognized that many chemical constituents "are naturally occurring in the environment" and that in many cases "these constituents may be naturally elevated above the [applicable] water quality objective," thereby resulting in exceedances of applicable effluent limits. For this reason, Staff has recommended that the Regional Board "consider developing" implementation provisions for water quality standards to account for background conditions[9]. Boeing agrees that continued monitoring of surface water will provide a more thorough dataset with which to evaluate further the occurrence and likely sources of regulated constituents.

Mitigation actions were taken in 2011 under DTSC and Regional Board supervision to address the potential that former industrial activities at the Santa Susana site may have impacted localized areas of onsite soils and sediments that could have potentially affected surface water quality at some outfalls. These mitigation actions consisted of implementing an extensive system of BMPs at SSFL. Boeing has installed and continues to install BMPs to minimize the potential for surface water to contact and transport contaminated onsite soils, sediment, or bedrock, offsite that may be impacted with constituents regulated in the Santa Susana NPDES permit.

The efforts in 2011 by Boeing to reduce the amount of disturbed soil with implementation of sediment and erosion control BMPs, culvert modifications, Storm Water conveyance and construction of the SWTSs resulted in 99 percent compliance and a reduction of permit limit exceedances by approximately 80 percent from 2010.

Boeing will continue to evaluate patterns of compliance and non-compliance, potential source areas, and effectiveness of BMPs to minimize the potential for pollutants, whether naturally occurring or not, to impact surface water at Santa Susana.

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[9] See Revised Staff Report for 2008-2010 Triennial Review (Mar. 18, 2010); available at: http://www.swrcb.ca.gov/rwqcb4/water_issues/programs/basin_plan/BasinPlanTriennialReview/Addl_Documents2010_03_18/Revised%20Staff%20Report.pdf; see also Response to Comments on the Draft Triennial Review Staff Report and Tentative Resolution at 3-5 (Mar. 18, 2010); available at: http://www.swrcb.ca.gov/rwqcb4/water_issues/programs/basin_plan/BasinPlanTriennialReview/Addl_Documents2010_03_18/Response%20to%20Comments%20on%20the%20Tentative%20Resolution%20and%20Staff%20Report.pdf.

**FACILITY CONTACT**

If there are any questions regarding this report or it enclosures, you may contact Mr. Paul Costa of Boeing at (818) 466-8778.

**CERTIFICATION**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for a knowing violation.

Executed on the 27th day of February 2012 at The Boeing Company, Santa Susana Field Laboratory, Simi Valley, California.

Sincerely,

Thomas D. Gallacher
Site Director
Environment, Health and Safety

TDG/bjg

Figure 1 Storm Water Drainage System and Outfall Locations

Table 1 2011 Rainfall Summary
Table 2 2011 Liquid Waste Shipments
Table 3 2011 Summary of Permit Limit and Benchmark Limit Exceedances

Attachments:

Section 1 Outfall 001 South Slope below Perimeter Pond
Section 2 Outfall 002 South Slope below R-2 Pond
Section 3 Outfall 006 FSDF-2
Section 4 Outfall 008 Happy Valley
Section 5 Outfall 009 WS-13 Drainage
Section 6 Outfall 010 Building 203
Section 7 Outfall 011 Perimeter Pond
Section 8 Outfall 018 R-2A Pond
Section 9 Outfall 019 GETS
Section 10 Receiving Water and Sediment Sample Location – Arroyo Simi (Frontier Park)
Section 11 Reasonable Potential Analysis (RPA) Summary Tables
Section 12 Storm Water Pollution Prevention Plan Annual Evaluation
Section 13 Analytical Laboratory Methods, Method Detection Limits, Reporting Limits, QA/QC Procedures, and ELAP Certifications

cc: Ms. Cassandra Owens, Regional Water Quality Control Board
Mr. Stewart Black, Department of Toxic Substances Control
Mr. Roger Paulsen, Department of Toxic Substances Control
Mr. Robert Marshall, California State University – Northridge, Library
Mr. Gabriel Lundeen, Simi Valley Library
Ms. Lynn Light, Platt Branch, Los Angeles Library
Ms. Bronwyn Kelly, MWH (ltr only)
Mr. Brandon Steets, Geosyntec (electronic copy)

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