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Via FedEx

February 26, 2010
In reply refer to SHEA-109657

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

BOEING

Attention: Information Technology Unit

Reference: Compliance File CI-6027 and NPDES No. CA0001309

Subject: 2009 Annual NPDES Discharge Monitoring Report, The Boeing Company Santa Susana Site, Ventura County, California

Dear Sir/Madam:

The Boeing Company (Boeing) hereby submits this annual discharge monitoring report (DMR) for the Santa Susana Field Laboratory (Santa Susana) for the period of January 1, 2009 through December 31, 2009. This DMR is provided for all outfalls authorized by NPDES Permit No. CA0001309. The Los Angeles Regional Water Quality Control Board (Regional Board) issued a revised permit on May 19, 2009, with an effective date of June 29, 2009.

The following is a tabulated list of the two permits effective during 2009.

NPDES Permit Revisions	Order Number	Issue Date	Effective Dates
2007 Permit	R4-2007-0055	November 9, 2007	December 20, 2007, 2009 to June 28, 2009
2009 Permit	R4-2009-0058	May 19, 2009	June 29, 2009 to present.

The 2009 Permit identified changes to the Monitoring and Reporting that included the sampling method of composite samples for a number of constituents in the NPDES permit.

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 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/programs.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 2009. 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 Annual Rainfall (Table 1)
- Summary of Liquid Waste Shipments (Table 2)
- Summary of Permit Limit Exceedances (Table 3)
- Outfall-specific Summary Tables and Charts of Analytical Results (Sections 1 through 11)
- Arroyo Simi (Receiving Water) Summary Tables and Charts of Analytical Results (Section 12)
- Summary of Reasonable Potential Analysis (RPA) (Section 13)
- Storm Water Pollution Prevention Plan Annual Evaluation (Section 14)
- Analytical Laboratory QA/QC Procedures and Certifications (Section 15)

OVERVIEW OF THE 2009 REPORTING PERIOD AT SANTA SUSANA

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

As reported in previous DMRs and annual reports submitted by Boeing to the Regional Board, Boeing's investigations suggest that most of the constituents detected in storm water result from naturally occurring soil contributions and atmospheric deposition, or were detected at concentrations consistent with regional background concentrations. Additionally, based on Santa Susana operations and activities, it is Boeing's conclusion that most of the detections of constituents exceeding permit limits are not the direct result of a known discharge or release from an industrial process or historical contamination at the site. In some cases, former industrial activities at Santa Susana may have impacted localized areas of on-site soils and sediments that could have potentially affected storm water quality. However, under regulatory supervision, Boeing completed numerous mitigation actions to manage surface water impacts potentially resulting from former industrial activities. These actions included extensive soil removal; covering and/or stabilizing areas pending site-wide corrective action implementation; and implementing an extensive system of BMPs. Boeing has implemented and continues to implement and improve BMPs to minimize the transport of soils and/or sediment that may be associated with constituents regulated in the Santa Susana NPDES permit. Additionally, numerous BMPs are designed to remove dissolved constituents from storm water.

Unlike most industrial facilities regulated through the NPDES Program, the Santa Susana is a predominantly natural habitat. Greater than ninety percent of the facility is natural and undeveloped, and is covered with natural vegetation (much of which is native), sandstone rock outcrops, and weathered sandstone sediment and soil. Such land use is typically defined as "open space." All discharges from Santa Susana are storm water with the exception of

discharges from the groundwater extraction and treatment system (GETS), when it is operational. Storm water discharges are not continuous, consistent, or scheduled. Storm water discharge results from rainfall becoming surface flow, and occurs through natural, unlined drainages. Compounds that naturally occur in rocks and sediment (e.g., metals) are present in the surface water that flows through these drainages. Furthermore, as with all areas around the Los Angeles River Basin, there is a contribution of constituents from atmospheric deposition. The contributions from naturally occurring and atmospheric sources have been addressed in the Technical Report "Potential Background Constituent Levels in Storm Water at Boeing's Santa Susana Field Laboratory," February 23, 2006 (Flow Science Background Report). Boeing continues to evaluate this issue, while aggressively striving to achieve the goal of compliance with the permit limits.

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Since storm water runoff is sporadic and highly variable in intensity and volume, it is expected that the concentration of these compounds will also vary from sampling event to sampling event.

Auto Sampler Installation for Composite Sampling

In response to the revised NPDES Permit issued May 19, 2009, Boeing began installation of the auto sampling systems to collect composite samples in the Third Quarter of 2009. The auto sampling systems consist of two peristaltic pumps with computer controllers to collect flow-weighted composite samples. The pumps draw samples from the flumes at the outfalls or from sample boxes downstream of the flumes and discharge these samples into Teflon lined 55-gallon drums. Two drums, pumps, and controllers were installed at each outfall. Two drums are needed so that sufficient sample volume can be captured for a wide range of storm sizes for the duration of the storm or until drum capacity is reached. The controllers were appropriately programmed based on the forecasted storm.

Despite Boeing's efforts to have all of the autosamplers installed and fully operational prior the rain season, not all of the autosamplers operated correctly during Fourth Quarter 2009 because of technical challenges resulting from start-up, real-time troubleshooting, equipment failures and adverse environmental conditions. In these instances, grab samples were instead collected and submitted for analysis for all analytes. Boeing is actively working to get these autosamplers fully operational with reduced risks of system failure during rain events.

Best Management Practices (BMPs)

In 2009 Boeing improved and upgraded multiple BMPs as described below and noted in the Summary of Non-compliance and Corrective Actions section of this report. The upgrades were initiated to improve surface water discharge quality. Specific upgrade details are also provided by outfall location in Table B below.

To help to evaluate the effectiveness of BMPs, a monitoring program has been implemented whereby automated influent and effluent sampling units have been installed above and below BMPs at Outfalls 003, 004, 006, 010, 011, and 018 to collect samples to analyze for suspended sediment concentrations during storm events as a means of estimating the constituent removal effectiveness of the BMPs.

Cease and Desist Order No. R4-2007-0056, issued November 7, 2007, directed Boeing to work with an independent expert panel of storm water researchers and practitioners on the development of Engineered Natural Treatment Systems (ENTS) in the Outfall 008 and 009 watersheds to meet the NPDES numeric effluent limits at these outfalls. On December 3,

2008, the RWQCB issued Boeing a Cleanup and Abatement Order, directing Boeing to address constituents that have exceeded NPDES permit limits/benchmarks through the performance of interim source removal activities in the Outfalls 008 and 009 (Interim Source Removal Action (ISRA) Order). The Board's July 2009 approval of the ISRA workplan directed Boeing to coordinate the timing, design, construction and implementation of any BMPs or ENTS with Board staff as part of the ISRA implementation, and further stated that Board staff will address the BMPs or ENTS for the Outfall 008 and 009 watersheds comprehensively as part of the ISRA. Accordingly, the expert panel is continuing to evaluate watershed conditions and provide restoration and/or ENTS recommendations to Boeing as the ISRA proceeds. Monitoring data collected following the completion of interim source removal activities will provide information that will shape the development of any needed future BMPs and/ or ENTS within these watersheds, including site restoration, increased retention, and filtration using natural systems. The storm water quality data contained in this annual report will be provided to the expert panel for their review and consideration as part of this planning effort.

Installation of Electrical Power

Electrical installations to support the delivery of electricity to specific locations for the Santa Susana Site was conducted in the Fall of 2009. The installation of electrical power will support the necessary BMP upgrades, pumps, and treatment systems. The installation of this electrical distribution system was intended to replace the diesel powered generators that had been in use in the past. This upgrade will reduce the air emissions resulting from this activity, be less disruptive to the wildlife that inhabits the area, and will provide more flexibility in the future if additional BMP support equipment installation becomes necessary. Electrical installation was completed during 2009 for Outfalls 004, 005, 007, 011 and 018.

BMP Maintenance Activities

Boeing continues implement measures to improve the efficiencies of the flow through BMPs at Santa Susana. This includes rinsing the sand, carbon, zeolite media beds, air blowing to dry the media, adding broken concrete and limestone to buffer the pH. The addition of a limestone buffer was added to address the microbial activity within the BMP media beds. This was accomplished by installing bulk limestone on the top of the multimedia filtration bed and downstream of the existing BMP, directly upstream of the existing flow monitoring flume in a stainless steel filtration box. In addition, Boeing obtained chemical dosing equipment in 2009 to prepare for the 2010 storm events pH concerns as needed.

Outfall 004

Storm water from the northern hillside and concentrating it in one section of the BMP. As part of the ongoing effort to improve retention and manage stormwater runoff, check dams were installed to retain storm water and reduce peak flows to the structural BMP. A small gabion dam structure was built to collect storm water runoff prior to the structural BMP. An extended sand filter was modified and the sand filter media was replaced to improve the filtration of storm water that flows down the service road prior to its entry into the structural BMP where it is filtered again through zeolite and granular activated carbon.

In addition to the electrical installation previously described, a sump was installed at the effluent section of the structural BMP. This sump is a 1,100 gallon tank placed next to the outfall to capture storm water that may discharge from the structural BMP. From this 1,100 gallon tank, storm water can be transferred to the additional storm water SRE retention area or a 20,000 gallon tank placed in the upper portions of the drainage. A pump will transfer BMP

effluent storm water to the upstream where it will be retained and evaporated. This feature is intended to increase infiltration and evapotranspiration of stormwater and minimize discharges from Outfall 004.

Outfalls 005/007
In addition to the electrical installation of power, during the Fourth Quarter of 2009, storm water was retained at Outfalls 005 and 007 in the BMP impoundments and pumped to retention tanks for future management.

Outfalls 012 and 013
In 2009, Boeing replaced the BMP media which consists of bagged GAC and zeolite media upstream of the existing retention berms at Outfall 012 and 013 that is covered by an impervious membrane liner. Boeing twice replaced this liner.

In addition, a contain and hold system was added at each of these two Outfalls consisting of a pump and above ground 20,000 tank. Storm water is contained in the BMP and transferred via the pump to the staged tank for future management.

Outfalls 011 and 018
In addition to the electrical power installation previously discussed, two temporary storm water treatment systems (TSTSs) were installed at Santa Susana to treat storm water from Outfalls 011 and 018, with capacities of 690 and 1,035 gallons per minute (gpm), respectively. The TSTSs are expected to reduce the concentration of the constituents of concern (COCs) listed in the current 2009 NPDES Permit limits present in storm water discharged to these outfalls.

The Outfall 011 TSTS, located adjacent to R-1 Pond, consists of screen filters, an equalization tank, two banks of sand filters, 1 micron bag filter, and granular activated carbon (GAC). Water is pumped from the Perimeter Pond to the R-1 Pond and then from R-1 pond to the treatment system before being discharged to Outfall 011. Potassium permanganate ($KMnO_4$) solution is injected into the influent water to precipitate dissolved iron and manganese. Treated effluent water from the granular activated carbon (GAC) skid is discharged directly to Outfall 011. Construction began for the Outfall 011 TSTS in November 2009 and was mostly completed in the Fourth Quarter of 2009, with finalization in the First Quarter 2010.

The Outfall 018 TSTS consists of water treatment and solids removal systems. Water from R-2 Pond is pumped uphill to Silvernale Pond, from which it is pumped for treatment at the Outfall 018 TSTS, located adjacent to Silvernale Pond. $KMnO_4$, aluminum sulfate (alum) and polymer are injected into the water at different stages to enhance treatment. The $KMnO_4$ oxidizes iron and manganese so that it will precipitate out of solution. The alum and polymer stimulate coagulation and flocculation of fine sediments with co-precipitation of other metals and constituents. The water treatment system is comprised of screen filters, equalization tanks, contact tanks, two banks of sand filters, bag filters, and GAC filters. Effluent from the water treatment system is discharged at Outfall 018 at approximately 1,000 gpm. The addition of alum and polymer coagulation followed by settling and filtration produces solids that are backwashed to a solids holding tank and later removed in a system comprised of a weir and lamella plate tank, solids holding tanks, and a centrifuge. Dewatered solids from this system are collected in roll-off bins and transported offsite for disposal, while the supernatant is routed back to the front end of the water treatment system. Construction of the Outfall 018

TSTS began in November 2009 and was mostly completed in the fourth quarter of 2009 with finalization in the First Quarter of 2010.

Treatment Pilot Study

Boeing has been developing substantial treatment systems to treat water from the Outfalls 005/007, 011 and 018 watersheds prior to its discharge. Because of the size of these watersheds (011 and 018), the extraordinarily low effluent limits, and the advanced technology required for treatment, developing such systems requires pilot testing. Boeing has been engaged in pilot testing of different aspects and process options for these treatment systems for over two years. During the First Quarter of 2009, Boeing implemented a pilot-testing program at R-2 Pond proximate to Outfall 018. Initially, the pilot system had the same treatment train utilized during the tests conducted in the summer of 2008 (i.e., sand filters, multimedia filters, cartridge filters, and granular activated carbon). However, the rain events during the first quarter 2009 demonstrated that sediment loads during some rain events were too high to be controlled with physical filtration units. The influent turbidity measured during the 2008 summer pilot study increased more than ten-fold during a storm in the 4th quarter of 2009, from 100 NTU to 1000-1200 Nephelometric Turbidity Units (NTU).

Boeing responded by implementing an ACTIFLO process (rapid clarification) test at pilot scale during the Second Quarter of 2009, as an alternative to control high turbidity peaks and protect the rest of the system from solids overload. This system required coagulation and flocculation chemicals (ferric sulfate and anionic polymer) that were able to reduce influent turbidities ranging between 1000-2000 NTU to approximately 3-5 NTU. Also during the ACTIFLO process test, physical filtration performance of multimedia filters, granular activated carbon, and ion-exchange units showed success reducing targeted constituents when they followed the sediment-reducing ACTIFLO process. Initial results from the pilot study suggest that the ACTIFLO process with the addition of an oxidant such as potassium permanganate achieves nearly complete removal of targeted metals (iron, manganese, lead, mercury, and copper).

During the Second Quarter of 2009, additional pilot testing was conducted to further treat the ACTIFLO process effluent with ultrafiltration membranes, using a Toray demonstration scale unit. The purpose was to remove turbidity to even lower levels. Approximately 4000 analyses were conducted as part of the pilot testing activities.

Based on the final results of the pilot test, selected filter media and processes will be included in the final permanent treatment system to improve water quality discharges within the context of the iterative BMP process. Implementation of additional BMPs based upon the pilot program results will likely commence during the upcoming rainy season at the Santa Susana Site.

Temporary stormwater treatment system (TSTS) were installed in 2009 at Outfalls 018 and 011. Oxidant and coagulant were used to attempt to remove turbidity, sediment, and regulated constituents in surge tanks and sand filters. The chemical feed systems and TSTS were installed during the 4th quarter of 2009 and started up during the storms in December, 2009. Coagulant and oxidant dosing tests were conducted to determine the doses and system configuration that would optimize turbidity, sediment and regulated constituent removal to attempt to achieve effluent limits with the TSTS. Coagulant was used at Outfall 018. Oxidant was used at both outfalls.

In addition to the onsite pilot studies, Expert Panel member Dr. Robert Pitt of the University of Alabama conducted a laboratory investigation on filtration media performance. With lab work managed by Dr. Shirley Clark of Penn State and study design guidance from Geosyntec Consultants and the other members of the Expert Panel, Dr. Pitt conducted a media study with the objective of (1) providing data to inform storm water filtration BMP design (e.g., optimal media combinations and contact times), and (2) assessing the potential of media to achieve the BMP performance objectives (i.e., the Santa Susana NPDES Permit limits) in a cost-effective manner (e.g., considering maintenance frequency). Bench-scale column and batch tests were performed, and a draft final report has being prepared for Expert Panel review. The purpose of the column tests was to assess flow-through rates, time (or cumulative solids loading) until clogging/maintenance, time until breakthrough, effects of media depth (or contact time), achievable effluent concentrations, optimal combinations of media, and potential for contaminant release. The purpose of the batch tests was to assess pollutant uptake capacity and removal kinetics, and performance under aerobic versus anaerobic conditions. The study used storm water samples collected at the Penn State Harrisburg campus, with water quality amendments where possible to match Santa Susana conditions. The study results are expected to provide valuable information on filtration media performance for storm water treatment BMP design. A final report is expected to be released in February or March 2010.

ISRA Related Activities

Pursuant to the December 3, 2008 Section 13304 Order issued by the RWQCB, Boeing has been proceeding with ISRA in the Outfall 008 and 009 watersheds to address constituents that have exceeded NPDES Permit limits/benchmarks. The 2009 ISRA activities within the Outfall 008 and 009 watersheds consisted of excavation of approximately 5,200 cubic yards of soil, collection of approximately 130 confirmation samples, and restoration of the completed ISRA areas. Restoration activities included backfilling and grading of the excavation areas, installation of rock cropping and straw fiber roles, hydroseeding and planting within the Outfall 008 watershed to stabilize sediment per the recommendations from the Surface Water Expert Panel.

BMPs were implemented during the ISRA excavation activities to minimize the transportation of sediment into the Outfall 008 watershed. Prior to the start of removal activities, hay bales and silt fencing were installed in the drainages below the disturbed areas of the Outfall 008 watershed. Shaker/rubble plates were installed at the entrance and exit of the work area to reduce sediment tracking from the construction site onto private or public roads. Stock piles were covered during nights and weekends, and on windy days to control dust from the stock pile areas. Water was sprayed to suppress dust during the excavation of soil from the removal areas. Runoff was not generated during these operations.

BMPs were also implemented below the two planned Outfall 009 ISRA areas prior to beginning vegetation clearance to minimize the transportation of sediment from the areas. BMPs included the installation of hay bales in drainages. Stock piles were covered during nights, weekends, and on windy days to control dust from the stock pile area. Water was sprayed to suppress dust during excavation activities and excavation areas were covered with plastic and sand bags prior to rain events. Runoff was not generated during these activities. Since the completion of restoration activities associated with the 2009 ISRA areas, the site conditions, including BMPs, have been monitored and maintained.

Boeing continues to submit monthly and quarterly progress reports to RWQCB Staff on the progress of the ISRA activities, including permit status. ISRA related documents can be found electronically at:

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

Northern Drainage

The Northern Drainage lead and clay target debris removal associated with the former shooting range resumed in June 2009 and clean up efforts are expected to continue through December 2009. Sediment and erosion control BMPs consisting of fiber rolls, straw bales, and silt fencing, have been installed in the Northern Drainage watershed downstream of the excavation areas to minimize the potential for erosion along the drainage and will be implemented throughout the duration of the project. Hydroseeding of the areas associated with the Northern Drainage cleanup effort was completed prior to the rainy season

Phase II clay target removal in the Northern Drainage using a vacuum truck and manual excavation between the Former Shooting Range and Outfall 009 were conducted during the Third Quarter of 2009. Boeing also performed hand-excavation of visible clay targets and black foam material within the Northern Drainage on the Brandeis-Bardin Campus of American Jewish University property. Sediment and erosion control BMPs consisting of fiber rolls, straw bales, and silt fencing have been installed in the Northern Drainage watershed downstream of the excavation areas to minimize the potential for erosion along the drainage. BMPs were implemented throughout the duration of the project and the rainy season. Hydroseeding in the Northern Drainage cleanup areas was completed during the Fourth Quarter 2009.

Phase II clay target removal in the Northern Drainage using a vacuum truck and manual excavation from the Former Shooting Range was completed in the Fourth Quarter of 2009. Hand-excavation of visible clay targets and black foam material within the Northern Drainage to the Brandeis-Bardin Campus of American Jewish University property was performed. Additionally, confirmation soil sampling was completed with all results detected below clean-up criteria. Culvert maintenance activities were also completed during the Fourth Quarter 2009. Sediment and erosion control BMPs (consisting of fiber rolls, straw bales, and silt fencing) have been installed in the Northern Drainage watershed downstream of the excavation areas to minimize the potential for erosion along the drainage. BMPs were maintained, replaced and/or implemented throughout the Fourth Quarter prior to and following a rain event. Additionally, plastic sheeting was placed over all exposed soils areas. Hydroseeding in the Northern Drainage cleanup was also completed during the Fourth Quarter 2009.

Plans are being developed for restoration of the Northern Drainage following the clean-up activities to be conducted in the First Quarter 2010. Restoration activities include planting along the banks to stabilize sediment per the recommendations from the Surface Water Expert Panel.

Culvert Maintenance

Culvert maintenance was completed in 2009 at eleven culverts feeding into the Northern Drainage on both Sage Ranch and Boeing property. These culvert maintenance activities resulted in reduced water velocities and sediment loadings from eleven side drainages into the Outfall 009 primary drainage. This was accomplished by installing customized headwalls

with a filter chamber into existing culverts and lining those culverts. The headwalls have weirs that slow water velocities and create an upstream detention basin in which settling occurs. The overflow passes through a filter box that removes additional pollutants. The culverts were also lined to reduce erosion of older culvert material and discharges of pollutants from the culverts themselves. Fiber rolls and hydroseed were also installed to stabilize soil in the areas disturbed by culvert maintenance activities.

Bioassessment

A bioassessment review at Santa Susana was conducted for the Second Quarter of 2009 as required by the permit. However, all drainages associated with Permit-regulated outfalls at Santa Susana were dry and there was no suitable habitat to complete the bioassessment sampling.

Wildfires

Wildfires, the effects of which have been widely documented and which have occurred at and near the Santa Susana site, release significant amounts of metals and dioxins, and storm water runoff following wildfire events has been observed to carry significantly higher concentrations and loads of these constituents. Atmospheric deposition rates of metals have been observed to rise several-fold during fires. Atmospheric deposition rate of dioxin concentrations are also elevated during fires. Fires leave behind ash and destroy vegetation, resulting in significant changes in the hydrologic response of watersheds, including higher runoff volumes, higher runoff flow rates, and higher concentrations of total suspended solids (TSS), all of which may contribute to the downstream conveyance of regulated constituents (Flow Science Background Report). Post-fire effects can continue to impact the quantity and quality of storm water runoff for several years following a fire.

As reported in past quarterly and annual reports, the Topanga Wildfire began on September 28, 2005, and burned approximately 70% of the Santa Susana site. On-site restoration activities were immediately implemented following the Topanga Wildfire and have continued to date to reduce the impact of the ash and charred material on surface water quality. In 2009, additional activities were implemented in order to help restore the natural, engineered and/or institutional controls that aid in minimizing the erosion of surface materials and the migration of sediment in surface water. Hydromulch and/or hydroseed were placed over approximately 20 acres of areas observed to have erodible soils and/or ash. Hydromulch is a semi-liquid organic binder blended with hydromulch paper or wood fiber/pulp that is dispersed onto and adheres to the ground surface and soil surface to protect from further soil erosion, to aid in minimizing sediment transport, and to decrease the potential for mudslides and debris flows. Hydroseed is hydromulch that incorporates a native seed mixture.

Other significant fires in the vicinity of the site included the October 2009 Station Fire that burned approximately 160,000 acres in the San Gabriel Mountains, the Marek and the Sesnon Wildfires. The Marek Wildfire began on October 12, 2008, burning east (upwind) of the Santa Susana site and approaching as close as 10 miles, and the Sesnon Wildfire burned approximately 1 mile from Black Canyon, north of the Santa Susana site, on October 13, 2008.The Sesnon fire burned 14,703 acres upwind of the Santa Susana site. The Sesnon and Station fire was in such proximity that fire officials ordered evacuation of the Santa Susana site. Smoke and ash from the Station fire also impacted the Santa Susana where site activities were suspended due to air quality concerns, and, like the previous fires, are likely to have contributed to increases in concentrations of regulated constituents in Santa Susana soils and

storm water runoff. Following the fire, Boeing continued upgrading its BMPs throughout the facility to attempt to stay within permit limits for storm water runoff.

Natural Occurrences of Regulated Constituents Affecting Surface Water Quality

It is Boeing's conclusion that most of the constituents detected in storm water monitoring data collected over the past several years cannot be attributed to the presence of any specific on-site current or historic industrial or operational source(s). Our analysis suggests that many, if not most, of the permit limit exceedances may be due to naturally occurring or regional background concentrations – from naturally occurring constituents in soils, impacts from on-site wildfires and ash deposition from wildfires occurring upwind, or due to regional atmospheric deposition. Attempts to find patterns in the exceedances or magnitudes of constituent concentrations have been generally unsuccessful to date. In most cases exceedances are not repeated with regularity or consistency, and most concentrations of constituents greater than permit limits cannot be correlated to any potential on-site source area or site activity.

In cases where historical site operations appeared to impact or have the potential to impact surface water, extensive measures have been taken, generally by way of removing impacted soils and backfilling with clean material. In some instances, tarping and/or other protective measures were installed to isolate impacted soils from storm water runoff. Following such interim measures, constituents in surface waters were generally within the ranges expected due to natural background conditions.

An outfall by outfall description of the BMPs implemented in 2009 is described in the Corrective Action Section of this document.

Site Closure Activities

As part of closure activities, Boeing is actively removing impermeable surfaces. This provides the following water quality benefits:

1. Runoff volumes are reduced. This reduces mass loadings during rainfall events.
2. Runoff velocities, particularly peak velocities are reduced. This reduces downstream scour and erosion, which reduces sediment loadings, and improves water quality.
3. The site approaches its pre-development hydrologic condition, which improves overall watershed health and well-being.

Boeing is actively aware of the relationships between impermeable surfaces and water quality and, therefore, is actively seeking opportunities to remove impermeable surfaces as quickly as is practicable.

DISCHARGE STATUS

Precipitation during 2009 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. For all qualifying events between January 1 to December 31, 2009, surface water samples were collected from Outfalls 001, 002, 003, 004, 005, 006, 007, 008, 009, 010, 011, 012, 013, 014, and 018, in accordance with the NPDES permit.

Figure 1 illustrates the Santa Susana facility and the locations of the outfalls. The following table provides a summary of the 2009 sampling record (Table A), by outfall/location where flow was observed and samples collected per the requirements of the NPDES Permit

Table A. Summary of Storm Water Sampling Events

Date	Outfall/Location
1/5/2009	Outfall 009 (WS-13 Drainage) – Dry weather discharge
1/24/2009	Outfall 006 (FSDF-2)
	Outfall 010 (Building 203)
2/6/2009	Outfall 004 (SRE)
	Outfall 006 (FSDF-2)
	Outfall 009 (WS-13 Drainage)
	Outfall 010 (Building 203)
	Outfall 013 (Bravo Test Stand)
2/7/2009	Outfall 012 (Alfa Test Stand)
2/13/2009	Outfall 006 (FSDF-2)
	Outfall 009 (WS-13 Drainage)
	Outfall 010 (Building 203)
2/16/2009	Outfall 001 (South Slope below Perimeter Pond)
	Outfall 002 (South Slope below R-2 Pond)
	Outfall 004 (SRE)
	Outfall 008 (Happy Valley Drainage)
	Outfall 011 (Perimeter Pond Weir)
	Outfall 012 (Alfa Test Stand)
	Outfall 013 (Bravo Test Stand)
	Outfall 018 (R-2 Spillway)
2/27/2009	Arroyo Simi Receiving Water/Sediment Sampling (Frontier Park - City of Simi Valley)
5/7/2009	Arroyo Simi Receiving Water (Frontier Park - City of Simi Valley)
8/27/2009	Arroyo Simi Receiving Water (Frontier Park - City of Simi Valley)
10/14/2009	Outfall 006 (FSDF-2)
	Outfall 009 (WS-13 Drainage)
	Outfall 010 (Building 203)
	Outfall 013 (Bravo Test Stand)
11/4/2009	Arroyo Simi Receiving Water (Frontier Park - City of Simi Valley)
12/7/2009	Outfall 009 (WS-13 Drainage)
	Outfall 010 (Building 203)
12/11/2009	Outfall 006 (FSDF-2)

All sanitary wastes from the domestic sewage treatment plants (STPs I, II, and III) were shipped off-site to a permitted treatment and disposal facility. Details of the 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 United States Environmental Protection Agency (EPA) guidelines, procedures, or as specified in the monitoring program. As indicated on Page T-3 in 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 T-A 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 2009. 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 11, as required in the NPDES permit.

During 2009, specific constituents that had permit limits that were less than the RLs and MLs were mercury, bis(2-ethylhexyl)phthalate, cyanide, polychlorinated biphenyls (PCBs), (Aroclors), chlordane, 4,4-DDD, 4,4-DDE, 4,4-DDT, dieldrin, toxaphene, and chlorpyrifos. None of these compounds were detected at concentrations equal to or greater than their RL during 2009.

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 16. Consistent with prior annual report submittals and in accordance with the NPDES permit, 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 are included in 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 004	SRE

Section 4 Outfall 006	FSDF-2
Section 5 Outfall 008	Happy Valley
Section 6 Outfall 009	WS-13 Drainage
Section 7 Outfall 010	Building 203
Section 8 Outfall 011	Perimeter Pond
Section 9 Outfall 012	Alfa Test Stand
Section 10 Outfall 013	Bravo Test Stand
Section 11 Outfall 018	R-2A Pond

Section 12 Receiving Water and Sediment Sampling Location – Arroyo Simi (Frontier Park)

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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 are a compilation of notes, abbreviations, and data validation codes that are found in the analytical data summary tables contained in the attachment.

As indicated in the Attachments, and as summarized in Table 3, a 2009 Summary of Daily Max, Monthly Average, and Daily Mass Permit Limit or Benchmark Limit Exceedances includes:

- Cadmium at Outfall 013
- Iron at Outfalls 001, 002, 011 and 018
- Lead at Outfalls 001, 002, 009, 011 and 018
- Manganese at Outfalls 001, 002, 011 and 018
- Nitrate + Nitrite as Nitrogen (N) at Outfall 006
- pH at Outfalls 006, 010, and 013 (pH compliance is based on a range of pH values, therefore, non-compliance could be less than or greater than the permitted range)
- TCDD TEQ at Outfalls 001, 002, 004, 009, 010, 011, 012, and 018
- Zinc at Outfall 013

Discussion of the Most Prevalent Permit Exceedance

A discussion regarding TCDD TEQ (dioxin) is included below, considering that it was reported to exceed daily maximum permit limits at eight compliance outfall locations, and TCDD TEQ has been a consistent source of exceedances at Santa Susana since the limit was established as TCDD TEQ. A short discussion regarding monthly average exceedances is also included.

TCDD (Dioxin): Discussion of Occurrence and Potential Sources

Due to the unique process by which TCDD concentrations are determined, a brief discussion of TCDD reporting is included. To enable a single total concentration (commonly called a Toxicity Equivalence (TEQ)) to be calculated from the sum of the 17 dioxin and furan congeners, 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (2,3,7,8,-TCDD) 'equivalent' concentrations are calculated for each congener by multiplying that individual congener's concentration by its toxic equivalency factor (TEF). The TEF is based on the toxicity of the congener compared to the toxicity of 2,3,7,8-TCDD. The TEFs published by the World Health Organization (WHO) in 1998 are used. The dioxin summary tables in the attachments show the TEFs for the various congeners. The common term for the sum of the factored concentration is TEQ.

When used in this report, the term TCDD refers to the total equivalence of the seventeen 2,3,7,8-substituted dioxin and furan congeners (commonly called the TCDD TEQ).

For the purposes of evaluating compliance with permit limits (as stated in the NPDES permit on Page 54, Section II, C. 3), TCDD TEQ is based on detected congeners and does not include those congeners reported as ND (not detected) or detected, but not quantifiable (DNQ). A DNQ is a value less than the laboratory RL, but greater than the method detection limit (MDL). Therefore, when evaluating whether a permit limit exceedance occurred, ND or DNQ data (the resulting estimated values) were considered zero in the calculation.

During 2009, TCDD TEQ exceeded daily permit or benchmark limits at Outfalls 001, 002, 004, 009, 010, 011, 012, and 018, and exceeded monthly average permit limits at Outfalls 001 and 011. TCDD has been frequently detected in DTSC-approved non-impacted background soil sample locations (MWH, 2005). In some areas, on-site operations have utilized combustion processes. However, the TCDD TEQ values in soils collected from these potentially impacted areas have been found either not to be elevated above background levels, or if elevated, they have been shown to decrease to near background levels within a short distance from the suspected source area.

Also, as documented in the Flow Science Background Report (Flow Science, 2006), TCDD TEQ concentrations in storm water runoff from off-site surface water sampling locations in undeveloped areas and in receiving waters throughout the region during storm conditions are comparable to concentrations in storm water runoff from Santa Susana.

Monthly Average Exceedance Discussion

Monthly average permit limits are not appropriate for inconsistent, sporadic, and infrequent storm water-dominated discharges such as those at Santa Susana. Based on the data collected from Santa Susana, monthly average permit limit exceedances are typically the result of a single sample where there are no additional rainfall events or monitoring data during the month.

A monthly average based only on one or two data points is not representative of actual monthly average concentrations or constituent mass traveling to receiving waters over a one-month period. In addition, monthly average permit limits are calculated based on the State of California's Policy for the Implementation of Toxics Standards for Inland Waters, Enclosed Bays, and Estuaries (State Implementation Policy), and the EPA's Technical Support Document for Water Quality-based Toxics Control methodology developed for continuous, end of pipe discharges, such as Publicly Owned Treatment Works or industrial wastewater discharges. This methodology often uses California Toxics Rule chronic criteria as the basis for average monthly permit limits. Santa Susana storm flows are often shorter in duration than chronic exposure timeframes (i.e., shorter than 4 days (for metals) or 30 days (for ammonia)). Therefore, the average monthly permit compliance criteria and the calculated average monthly concentration may not be representative of appropriate permit criteria or actual monthly site conditions throughout Santa Susana.

Discussion of Permit Limit or Benchmark Exceedances

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

Storm Water Outfall 001

Exceedance Summary

During the 2009 monitoring period, samples collected at Outfall 001 had six exceedances for four constituents with benchmark limits, as summarized in Table 3:

- On February 16, manganese was detected at a concentration of 110 µg/L, which is above the daily maximum benchmark limit of 50 µg/L.
- On February 16, iron was detected at concentrations of 8.1 mg/L, which is above the daily max benchmark limit of 0.3 mg/L.
- On February 16, lead was detected at a concentration of 6.6 µg/L, which is above the daily max benchmark limit of 5.2 µg/L.
- The February monthly average for lead was 6.6 µg/L, which is above the monthly average benchmark limit of 2.6 µg/L.
- On February 6, TCDD-TEQ was detected at a concentration of 7.3×10^{-7} µg/L, which is above the daily max benchmark limit of 2.8×10^{-8} µg/L.
- The February monthly average for TCDD-TEQ was 7.3×10^{-7} µg/L, which is above the monthly average benchmark limit of 1.40×10^{-8} µg/L.

Exceedance Discussion

Iron, Lead, and Manganese

Benchmark limit exceedances for iron, lead, and manganese occurred at Outfall 001 in 2009. Outfall 001 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 is 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 daily benchmark limit and monthly average benchmark limit for TCDD TEQ was exceeded at Outfall 001 in February 2009. At this time, Boeing is uncertain where the TCDD TEQ in this sample originated, but Boeing will continue to investigate sources of TCDD TEQ onsite. The presence of TCDD in both background soils and fire-related materials is well documented in the scientific literature (USEPA, 2000; Gullett and Touati, 2003). These findings are further substantiated by previously completed onsite and offsite studies (MWH, 2005) as presented in the Flow Science Background Report (Flow Science, 2006) and reported previous Discharge Monitoring Reports (DMRs). These reports suggest that the levels of TCDD TEQ measured in surface water samples at Santa Susana may result primarily from wildfire combustion processes, regional atmospheric deposition, and other off-site sources over which Boeing has no reasonable control. Continued monitoring of surface water during storm events will provide a more thorough dataset with which to further evaluate the occurrence of TCDD TEQ. Boeing is committed to attempting to achieve the water quality based effluent limit, if possible.

Storm Water Outfall 002

Exceedance Summary

During the 2009 monitoring period, samples collected at Outfall 002 had four exceedances for four constituents with benchmark limits, as summarized in Table 3:

- On February 16, manganese was detected at a concentration of 240 µg/L, which is above the daily maximum benchmark limit of 50 µg/L.
- On February 16, iron was detected at concentrations of 17 mg/L, which is above the daily max benchmark limit of 0.3 mg/L.
- On February 16, lead was detected at a concentration of 11 µg/L, which is above the daily max benchmark limit of 5.2 µg/L.
- On February 16, TCDD-TEQ was detected at a concentration of 4.8×10^{-7} µg/L, which is above the daily max benchmark limit of 2.8×10^{-8} µg/L.

Exceedance Discussion

Iron, Lead, and Manganese

Benchmark limit exceedances for iron, lead, and manganese occurred at Outfall 002 in 2009. 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 is 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 concentration of TCDD TEQ in the sample collected on February 16, 2009, from Outfall 002 exceeded the daily max benchmark limit of 2.80×10^{-8} µg/L. At this time, Boeing is uncertain where the TCDD TEQ in this sample originated, but Boeing will continue to investigate sources of TCDD TEQ onsite. As discussed above, the levels of TCDD TEQ measured in surface water samples at the Santa Susana site may result primarily from wildfire combustion processes, regional atmospheric deposition, and other off-site sources over which Boeing has no reasonable control. Continued monitoring of surface water at the outfall locations during storm events will provide a more thorough dataset with which to further evaluate the occurrence of TCDD. Boeing is committed to attempting to achieve the water quality based effluent limit, if possible.

Storm Water Outfall 003

There were no discharges from Outfall 003 during 2009. Therefore, there were no permit limit exceedances at Outfall 003 in 2009

Storm Water Outfall 004

Exceedance Summary

Outfall 004 had two exceedances for one constituent with permit limits collected at this outfall during the 2009 monitoring period, as summarized in Table 3:

- On February 6 and February 16, TCDD TEQ was detected at 6.1×10^{-7}, and 3.6×10^{-7} µg/L, respectively, which are above the daily max permit limit of 2.80×10^{-8} µg/L.

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Exceedance Discussion

TCDD TEQ

Concentrations of TCDD TEQ in samples collected from Outfall 004 during 2009 exceeded the daily max permit limit of 2.80×10^{-8} µg/L. At this time, Boeing is uncertain where the TCDD TEQ in these samples originated, but Boeing will continue to investigate sources of TCDD TEQ onsite. As discussed above, the levels of TCDD TEQ measured in surface water samples at Santa Susana may result primarily from wildfire combustion processes, regional atmospheric deposition, and other off-site sources over which Boeing has no reasonable control. Continued monitoring of surface water at the outfall locations during storm events will provide a more thorough dataset with which to further evaluate the occurrence of TCDD TEQ.

Boeing increased the capacity of its BMP at Outfall 004 in 2009 to meet the proposed design storm criteria of 2.5 inches in a 24-hour period. At outfall locations with structural BMPs where TCDD TEQ exceeded its applicable limits, additional dioxin removal can be facilitated by increasing the retention time of the water within activated carbon media contained in the BMPs installed. However, it is unclear exactly what retention time would be necessary to achieve the water-quality based effluent limit of 2.8×10^{-8} µg/L for TCDD TEQ. Dioxin congeners are hydrophobic molecules that partition readily into the organic fraction of sediments and solid materials. Activated carbon is believed by the United States Environmental Protection Agency (EPA) to be best available technology for the removal of dioxins from water (http://www.epa.gov/OGWDW/dwh/t-soc/dioxin.html). However, Boeing is unaware of any studies documenting what retention time, if any, in which activated carbon can achieve this effluent limit. In fact, specific studies of activated carbon do not show effluent concentrations as low as the water quality based permit effluent limit of 2.8×10^{-8} µg/L. One of the few studies identified while researching the literature reported an effluent concentration just below 8.1×10^{-5} µg/L (Torrens, 2000). Nevertheless, Boeing is committed to attempting to achieve the water quality based effluent limit, if possible. Following the 2008-2009 rain season, Boeing took additional measures at Outfall 004 to retain stormwater runoff as discussed previously in this report.

Storm Water Outfall 005

There were no discharges from Outfall 005 during 2009. Therefore, there were no permit limit exceedances at Outfall 005 in 2009

Storm Water Outfall 006

Exceedance Summary

Outfall 006 had three exceedances of two constituents with permit limits collected at this outfall during the 2009 monitoring period, as summarized in Table 3:

- On October 14 and December 11, pH was measured at 6.2 and 6.4, respectively, outside the daily max permit limit range of 6.5-8.5.
- On October 14, nitrate + nitrate as nitrogen (N) was detected at a concentration of 13 mg/L, which is above the NPDES permit limit of 10 mg/L.

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Exceedance Discussion

Nitrate + Nitrite as Nitrogen (N)

Nitrate + nitrite as nitrogen (N) was detected at a concentration of 13 mg/L in storm water Nitrate + nitrite as nitrogen (N) was detected at a concentration of 13 mg/L in storm water collected on October 14, 2009 from Outfall 006. This concentration exceeds the NPDES Permit limit of 10.0 mg/L for nitrate + nitrate as nitrogen as indicated in Appendix E.

The reason for the elevated nitrate/nitrite condition at this location has not been identified. All forms of nitrogen, including organic nitrogen, that are released to surface waters may be transformed to nitrate by soil bacteria under aerobic conditions. Primary sources of organic nitrogen can include leaf litter, animal excrement, atmospheric deposition, and fertilizers. The exceedance of nitrates/nitrites detected at this location is most likely the result of nitrification and/or some other bacterial metabolic activities occurring in soils, sand, or the granular activated carbon (GAC) media of the filter BMPs. Accumulated decaying debris and organics may also have caused the nitrate/nitrite exceedance. There is no fertilizer application occurring at the Site. It is worth noting that the nitrate/nitrate permit limit is not based on a natural condition measured in similar open space watersheds and, therefore, an exceedance may not represent a discharge of an anthropogenic pollutant within this watershed.

pH

Measurements on storm water collected at Outfall 006 on October 14, 2009 and December 11, 2009, indicated a pH of 6.2 and 6.4, respectively, which is outside the NPDES Permit limit range of 6.5 to 8.5. The reason for the decreased pH condition at this location appears to be the presence of byproducts resulting from microbial activity in the structural treatment control Best Management Practice (BMP) media beds at the outfall, which consists of sand, zeolite, and granular activated carbon filters. While the combination of elevated nitrate with low pH can suggest a water with low buffering capacity and nitrification occurring, the nitrate is not at a level that would suggest that it is influencing the pH, although it was measured above the permit limit (set at the maximum contaminant level for nitrate), suggesting microbial activity in the BMP media beds.

Boeing continues to implement measures to alleviate pH issues at this location that include rinsing the media, air blowing to dry the media, adding broken concrete to buffer the pH and adding limestone to buffer the pH to within permit limit range. The addition of a limestone buffer is expected to address the microbial activity within the BMP media beds. This was accomplished by installing bulk limestone on the top of the multimedia filtration bed and downstream of the existing BMP, directly upstream of the existing flow monitoring flume in a

stainless steel filtration box. The bulk limestone was installed in order to address prior occurrences of elevated pH readings in filtered storm water runoff at Outfall 006.

Boeing is preparing plans to maintain the BMPs at Outfall 006 during the summer of 2010. Additionally, Boeing will continue to monitor pH and Nitrate + Nitrite as Nitrogen at Outfall 006 and, if necessary, continue to implement BMP measures prior to maintenance actions taken during the dry season.

Storm Water Outfall 007

. There were no discharges from Outfall 007 during 2009. Therefore there were no permit limit exceedances at Outfall 007 in 2009

Storm Water Outfall 008

There were no permit limit exceedances in discharges from Outfall 008 during 2009.

Storm Water Outfall 009

Exceedance Summary
Outfall 009 had ten permit limit exceedances for two constituents with benchmark limits collected at this outfall during the 2009 monitoring period, as summarized in Table 3:

- On February 6, February 13, October 14, and December 7, TCDD TEQ was detected at $9.5x10^{-7}$ µg/L, $1.2x10^{-5}$ µg/L, $1.60x10^{-6}$ µg/L and $1.10x10^{-7}$ µg/L, respectively, which are above the daily max benchmark limit of $2.8x10^{-8}$ µg/L. The detections on February 6, February 13, and October 14 were equivalent to a daily mass result of $5.6 x10^{-9}$ lbs/day, $1.1x10^{-8}$ lbs/day, and $6.97x10^{-9}$ lbs/day, respectively. Each of these mass results is above the daily mass benchmark limit of $4.20x10^{-9}$ lbs/day.

- On February 6, February 13, and December 7, lead was detected at 7.5 µg/L, 20 µg/L, and 5.7 µg/L, respectively, which are above the daily max benchmark limit of 5.2 µg/L.

Exceedance Discussion

TCDD TEQ
Concentrations of TCDD TEQ in samples collected from Outfall 009 during 2009 exceeded the daily max and daily mass benchmark limit for TCDD TEQ. At this time, Boeing is uncertain where the TCDD TEQ in this sample originated, but Boeing will continue to investigate sources of TCDD TEQ onsite. The presence of TCDD TEQ in both background soils and fire-related materials is well documented in the scientific literature (USEPA, 2000; Gullett and Touati, 2003). These findings are further substantiated by previously completed onsite and offsite studies (MWH, 2005) as presented in the Flow Science Background Report (Flow Science, 2006) and reported in previous Santa Susana DMRs. These reports suggest that the levels of TCDD TEQ measured in surface water samples at Santa Susana may result primarily from wildfire combustion processes, regional atmospheric deposition, and other off-site sources over which Boeing has no control. Continued monitoring of surface water at the outfall locations during storm events will provide a more thorough dataset with which to further evaluate the occurrence of TCDD TEQ.

Boeing has continued source removal activities in the Outfall 009 watershedsto address constituents, including TCDD TEQ, that have exceeded NPDES permit limits/benchmarks pursuant to the Board's December 3, 2008 ISRA Order discussed previously in this report. In addition, as directed by the Board in the July 2009 approval of the ISRA workplan, Boeing is coordinating the timing, design, construction and implementation of any BMPs or ENTS in this watershed with Board staff as part of the ISRA implementation, Boeing is continuing to work with the Expert Panel, who are evaluating watershed conditions and providing restoration and/or ENTS recommendations to Boeing as the ISRA proceeds

Lead

Lead was detected at Outfall 009 during 2009 in concentrations above its benchmark limit, as indicated Table 3. During 2009, cleanup activities occurred and are ongoing in the Northern Drainage area to remove residual lead shot and clay pigeon debris under California Department of Toxic Substance Control (DTSC) oversight. Additionally, since the concentration of the exceedance was fairly low, background soils could have contributed to this exceedance. The reduction of TSS in stormwater runoff is likely to be the most effective approach for reducing lead exceedances since lead typically has low solubility and is associated with sediments. Additionally, Boeing has investigated and continues to investigate potential sources of constituents, including lead, believed to come from areas of historical Site industrial activity in coordination with DTSC. Boeing continues to upgrade its BMPs across Santa Susana to mitigate the transport of these trace metals from historical site industrial areas into downstream areas of the watershed. 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.

Boeing has continued source removal activities in the Outfall 009 watershed to address constituents, including lead, that have exceeded NPDES permit limits/benchmarks pursuant to the Board's December 3, 2008 ISRA Order discussed previously in this report. In addition, as directed by the Board in the July 2009 approval of the ISRA workplan, Boeing is coordinating the timing, design, construction and implementation of any BMPs or ENTS in this watershed with Board staff as part of the ISRA implementation, Boeing is continuing to work with the Expert Panel, who are evaluating watershed conditions and providing restoration and/or ENTS recommendations to Boeing as the ISRA proceeds

Storm Water Outfall 010

Exceedance Summary

During the 2009 monitoring period, samples collected at Outfall 010 had two exceedances for two constituents with permit limits, as summarized in Table 3:

- On October 14, pH was measured at 5.8, respectively, outside the daily max permit limit range of 6.5-8.5.
- On December 7, TCDD TEQ was detected at a concentration of 8.90×10^{-8} µg/L, which is above the daily max permit limit of 2.80×10^{-8} µg/L.

Exceedance Discussion

pH

Measurements on storm water collected at Outfall 010 on October 14, 2009, indicated a pH of 5.8, which is outside the NPDES Permit limit range of 6.5 to 8.5. The reason for the decreased pH condition below the NPDES Permit range at this location could be associated with byproducts of biological activity within the BMP filter media.

Boeing implemented measures to alleviate pH issues at this location that included rinsing the media and adding limestone to buffer the pH to within permit limit range. Bulk limestone was installed on the top of the multimedia filtration bed and downstream of the existing BMP, directly upstream of the existing flow monitoring flume in a stainless steel filtration box. The bulk limestone was installed in order to address occurrences of lowered pH readings in filtered storm water runoff at Outfall 010. Boeing is preparing plans to upgrade the BMPs at Outfall 010 during the dry season of 2010. Additionally, Boeing will continue to monitor pH at Outfall 010 and, if necessary, continue to implement BMP measures.

TCDD TEQ

TCDD TEQ concentration in storm water samples from Outfall 010 exceeded the NPDES permit limit of 2.80×10^{-8} µg/L on December 7, 2009 as indicated in Appendix E. The reported concentration of TCDD TEQ was 8.90×10^{-8} µg/L.

TCDD TEQ congeners have been frequently detected in DTSC-approved, non-impacted background soils at Santa Susana (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.

At this time Boeing continues to investigate sources of TCDD TEQ onsite. The presence of TCDD TEQ in both background soils and fire-related materials is well documented in scientific literature (USEPA, 2000; Gullett and Touati, 2003). These findings are further substantiated by previously completed onsite and offsite studies (MWH, 2005) as presented in the Flow Science Background Report (Flow Science, 2006) and reported in prior Santa Susana Site DMRs. These reports suggest that the levels of TCDD TEQ measured in surface water samples at the site may result primarily from wildfire combustion processes, regional atmospheric deposition, and other off-site sources over which Boeing has no control. Continued monitoring of surface water at the outfall locations during storm events will provide a more thorough dataset with which to further evaluate the occurrence of TCDD TEQ. Irrespective of the source of the exceedance, Boeing is committed to fulfilling the requirements of the NPDES permit and therefore continues to take actions to reduce discharges of regulated constituents.

As previously mentioned, Boeing is preparing plans to maintain the BMPs at Outfall 010 during the dry season of 2010. Additionally, Boeing will continue to monitor TCDD TEQ at Outfall 010 and, if necessary, continue to implement BMP measures

Storm Water Outfall 011

Exceedance Summary
During the 2009 monitoring period, samples collected at Outfall 011 had seven exceedances for five constituents with permit limits, as summarized in Table 3:

- On February 16, manganese was detected at a concentration of 150 µg/L, which is above the daily maximum benchmark limit of 50 µg/L.
- On February 16, iron was detected at concentrations of 11 mg/L, which is above the daily max benchmark limit of 0.3 mg/L.
- On February 16, lead was detected at a concentration of 7.1 µg/L, which is above the daily max benchmark limit of 5.2 µg/L.
- The February monthly average for lead was 7.1 µg/L, which is above the monthly average benchmark limit of 2.6 µg/L
- The February monthly average for zinc was 60 µg/L, which is above the monthly average benchmark limit of 54 µg/L.
- On February 16, TCDD-TEQ was detected at a concentration of $1.4x10^{-6}$ µg/L, which is above the daily max benchmark limit of $2.8x10^{-8}$ µg/L.
- The February monthly average for TCDD-TEQ was $1.4x10^{-6}$ µg/L, which is above the monthly average benchmark limit of $1.40x10^{-8}$ µg/L.

Exceedance Discussion

TCDD TEQ
Concentrations of TCDD TEQ in samples collected from Outfall 011 during 2009 exceeded the daily max permit limit of $2.80x10^{-8}$ ug/L. At this time, Boeing is uncertain where the TCDD TEQ in these samples originated, but Boeing will continue to investigate sources of TCDD TEQ onsite. As discussed above, the levels of TCDD TEQ measured in surface water samples at the Santa Susana may result primarily from wildfire combustion processes, regional atmospheric deposition, and other off-site sources over which Boeing has no reasonable control. Continued monitoring of surface water at the outfall locations during storm events will provide a more thorough dataset with which to further evaluate the occurrence of TCDD TEQ.

To mitigate against the potential for exceedances of TCDD TEQ effluent limits, Boeing initiated a pilot study program and design of a storm water treatment system for Outfall 011 which, when fully operational, should prevent pond overflow under most storms and provide a significantly higher degree of treatment. Boeing is committed to attempting to achieve the water quality based effluent limit, if possible.

Iron, Lead, Manganese and Zinc
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 potential sources of constituents coming from areas of historical Site industrial activity with coordination from the California Department of Toxic Substance Control (DTSC). Boeing continues to investigate erosion sources and erosion control measures at the Outfall 011 watershed, and will improve BMPs as appropriate, to better control sediment and associated metals transport into surface water. Irrespective of the source of the exceedance, Boeing is committed to fulfilling the requirements of the NPDES permit and therefore continues to take took actions to reduce discharges of regulated constituents. Those actions are further described in Table B.

Boeing is developing a substantial treatment system to treat water from this watershed prior to its discharge. Because of the size of the watershed and the low effluent limits, developing such a system requires pilot testing. Boeing has been engaged in pilot testing of different aspects and process options for this treatment system for over two storm seasons. During the First Quarter of 2009, Boeing implemented a pilot-testing program at R-2 Pond proximate to Outfall 018, to evaluate various filter media and processes that will aid in removing constituents from storm water. The results of this program will help determine approximate filter media and processes to be used to improve water quality discharges from all outfalls.

Boeing installed a temporary stormwater treatment system (TSTS) in the Fourth Quarter of 2009 consisting of screens, sand filter banks, 1 micron bag filter banks, and granular activated carbon. This TSTS was outfitted with an oxidant feed system to precipitate and filter iron and manganese. This TSTS will operate for the 2009-2010 storm season. Results from testing the TSTS will be used to modify treatment for the following storm seasons.

Additionally, Boeing reconfigured the structural treatment control BMP at the outfall to improve the hydraulics and overall retention time within the BMP media bed. This reconfiguration consisted of replacing bagged media with bulk media with modifications to the media holding system to facilitate the bulk media. This BMP will treat overflows, should they occur, that are not treated by the TSTS.

Storm Water Outfall 012

Exceedance Summary

Outfall 012 had one exceedance for one constituent with permit limits collected at this outfall during the 2009 monitoring period, as summarized in Table 3:

- On February 16, TCDD TEQ was detected at 7.4×10^{-7} µg/L, which is above the daily max permit limit of 2.80×10^{-8} µg/L.

Exceedance Discussion

TCDD TEQ

Outfall 012 is located directly downstream of the Alfa Test Stand, an inactive rocket engine testing facility residing within Area II of Santa Susana. Cooling water was previously discharged during rocket engine testing upstream of this monitoring location.

Samples collected of actual deluge water collected during rocket engine tests prior to the shut-down of rocket engine testing activities never exceeded the permit limit of TCDD-TEQ. Prior

storm events that were monitored at this location did not exceed the TCDD-TEQ permit limit. This suggests that this exceedance is not likely to have resulted from dioxins formed during combustion activities at the test stand but, rather, may be a result of recent fires or atmospheric deposition.

Nevertheless, to respond to this exceedance, Boeing replaced the BMP media, liner system, and added additional retention at the Outfall 012 BMP during 2009 as discussed previously. Boeing will continue to perform pollution prevention/good housekeeping BMPs that attempt to prevent pollutants from entering storm water, including inspecting and cleaning pumps, pipes, pressure vessels, chemical devices used during the operation of the test stands and removal of all substance residuals, wind-blown debris, corrosion or other deterioration and stains/drips and grease from inside and around mechanical equipment. Such 'source control' BMPs are effective in minimizing contamination before it can enter storm water. Boeing also installed a pump and 20,000 gallon frac tank at this location to capture runoff and prevent discharges, if possible.

Storm Water Outfall 013

Exceedance Summary

During the 2009 monitoring period, samples collected at Outfall 013 had three benchmark exceedances for three constituents with benchmark limits, as summarized in Table 3:

- On October 14, cadmium was detected at a concentration of 8.4 µg/L, which is above the daily max benchmark limit of 3.1 µg/L.
- On October 14, zinc was detected at a concentration of 260 µg/L, which is above the daily max benchmark limit of 159 µg/L.
- Also on October 14, pH was measured at 6.1, outside the daily max benchmark limit range of 6.5-8.5.

Exceedance Discussion

Cadmium and Zinc

Boeing benchmark limit exceedances for cadmium and zinc occurred at Outfall 013 in 2009. Outfall 013 is located directly downstream of the Bravo Test Stand, an inactive rocket engine testing facility residing within Area II of Santa Susana. Cooling water was previously discharged during rocket engine testing activities upstream of this monitoring location. Storm water runoff sampled at Outfall 013 is primarily from rain falling on the test stand and the concrete apron of the test stand itself. Elevated levels of zinc could be due to a galvanic coating or anti corrosion paint used on the test stand or pavement runoff. Elevated levels of cadmium could be due to an anti fouling paint used on the test stand or pavement runoff. The make-up of the paints used is not known since records of the paints' purchased are not available. Note, the magnitudes of the exceedances are not unlike urban runoff from parking or paved areas.

Boeing replaced the BMP media which consists of bagged GAC and zeolite media upstream of the existing retention berms at Outfall 013 that is covered by an impervious membrane liner. Boeing twice replaced this liner.

In addition, a contain and hold system was added at each of these two Outfalls consisting of a pump and above ground 20,000 tank. Storm water is contained in the BMP and transferred via the pump to the staged tank for future management

pH
pH measurements at Outfall 013 indicated a pH of 6.1 on October 14, which is slightly outside of the NPDES benchmark limit range of 6.5-8.5. The low pH value at Outfall 013 could be associated with byproducts of biological activity within the BMP media. As noted above, Boeing replaced BMP filtration media and added retention capacity at the outfall.

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Storm Water Outfall 014

There were no discharges from Outfall 014 during 2009. Therefore, there were no permit limit exceedances at Outfall 014 in 2009

Storm Water Outfall 018

Exceedance Summary
During the 2009 monitoring period, samples collected at Outfall 018 had four exceedances for four constituents with permit limits, as summarized in Table 3:

- On February 16, manganese was detected at a concentration of 140 µg/L, which is above the daily maximum benchmark limit of 50 µg/L.
- On February 16, iron was detected at concentrations of 12 mg/L, which is above the daily max benchmark limit of 0.3 mg/L.
- On February 16, lead was detected at a concentration of 8.2 µg/L, which is above the daily max benchmark limit of 5.2 µg/L.
- On February 16, TCDD TEQ was detected at 2.6×10^{-6} µg/L, which is above the daily max permit limit of 2.80×10^{-8} µg/L.

Exceedance Discussion

Iron, Lead, and Manganese
Permit limit exceedances for iron, lead, and manganese occurred at Outfall 018 in 2009. 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 storm water runoff from offsite and other open areas (Flow Science, 2006). Additionally, Boeing has investigated and continues to investigate potential sources of constituents coming from areas of historical Site industrial activity with coordination from the California Department of Toxic Substance Control (DTSC). 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. Irrespective of the source of the exceedance, Boeing is committed to fulfilling the

requirements of the NPDES permit and therefore continues to take actions to reduce discharges of regulated constituents. Those actions are further described in Table B.

Boeing continued a pilot-testing program at R-2 Pond in 2009, proximate to Outfall 018, to evaluate various filter media that will aid in removing constituents from storm water. The results of this program will help determine approximate filter media and processes to be used to improve water quality discharges.

Boeing also installed a temporary stormwater treatment system (TSTS) next to Silvernale Pond for the Outfall 018 watershed. This TSTS consist of equalization tanks, banks of sand filters, banks of 1 micron bag filters, and banks of granular activated carbon (GAC). The Outfall 018 TSTS has coagulant (alum) and oxidant (permanganate) feeds to assist with solids removal and iron and manganese removal. It also includes pH adjustment to improve performance of the coagulant and oxidant and to keep effluent pH within permit limits. Solids produced by the system is treated by a solids handling system consisting of a thickener and centrifuge system. Solids are capture and disposed of offsite. The TSTS was installed in the 4th quarter of 2009 and testing of the system began at that time to optimize the removals to attempt to achieve effluent limits, if possible.

TCDD TEQ

Concentrations of TCDD TEQ in samples collected from Outfall 018 during 2008 exceeded the daily max permit limit of 2.80×10^{-8} ug/L. Boeing is developing a substantial treatment system to treat water from this watershed prior to its discharge. Because of the size of the watershed and the low effluent limits, developing such a system requires pilot testing. Boeing has been engaged in pilot testing of different aspects and process options for this treatment system for over two storm seasons. During the first quarter of 2009, Boeing implemented a pilot-testing program at R-2 Pond proximate to Outfall 018. Initially, the pilot system had the same treatment train utilized during the tests conducted in the summer of 2008 (i.e., sand filters, multimedia filters, cartridge filters, granular activated carbon, and ion exchange). However, the heavy rain events during the first quarter 2009 demonstrated that sediment loads during the rain event was too high to be controlled with the physical filtration configuration treatment train

Boeing responded by implementing an ACTIFLO process (rapid clarification) test at pilot scale, as an alternative to control high turbidity peaks and protect the rest of the system of solids overload. This system required coagulation chemicals (ferric sulfate and anionic polymer) that were able to reduce influent turbidities ranging between 1000-2000 Nephelometric Turbidity Unit (NTU) to approximately 3-5 NTU. Initial results from the pilot study also suggests that the ACTIFLO process achieves nearly complete removal of targeted metals (iron, manganese, lead, mercury, and copper), when combined with potassium permanganate as an oxidant. Additional pilot testing was also conducted to further treat the ACTIFLO process effluent with microfiltration membranes using a Toray skid. As a result of the pilot program, it is anticipated that the final treatment system will be able to remove constituents of concerns to below permit limits. Approximately 4000 analyses were conducted as part of the pilot testing activities. This data is currently being processed and reviewed. The final results of this program will help determine approximate filter media and processes to be used to improve water quality discharges. Implementation of additional BMPs based upon the pilot program results will likely commence during the upcoming rainy season.

Dioxin removal can potentially be facilitated by increasing the retention time of the water within activated carbon media contained in the BMP installed at those outfall locations with structural BMPs where TCDD TEQ exceeded its applicable limit. However, it is unclear exactly what retention time would be necessary to achieve the water-quality based effluent limit of $2.8x10^{-8}$ µg/l for TCDD TEQ. Dioxin congeners are hydrophobic molecules that partition readily into the organic fraction of sediments and solid materials. Activated carbon is believed by United States Environmental Protection Agency (EPA) to be best available technology for the removal of dioxins from water (http://www.epa.gov/OGWDW/dwh/t-soc/dioxin.html). However, Boeing is unaware of any studies documenting what retention time, if any, in which activated carbon can achieve this effluent limit. In fact, specific studies of the use of activated carbon do not show effluent concentrations as low as the water quality based effluent limit of $2.8x10^{-8}$ µg/L. One of the few studies identified while researching the literature reported an effluent concentration just below $8.1x10^{-5}$ µg/L (Torrens, 2000). Nevertheless, Boeing is committed to attempting to achieve the water quality based effluent limit, if possible.

Treated Groundwater Outfall 019

In 2009, Boeing continued to explore the feasibility of the treatment of certain waste streams using a fixed groundwater treatment unit operating under the DTSC Permit-by-Rule. Treated effluent discharges from the Groundwater Extraction Treatment System (GETS) will be released at a separate outfall (Outfall 019) that is co-located with Outfall 011. In 2009, treated groundwater was hauled off-site. Therefore, no discharges were associated with Outfall 019.

Arroyo Simi (Frontier Park, Receiving Water and Sediment Sampling Location)

There were no exceedances in the receiving water for the Arroyo Simi during 2009.

CORRECTIVE ACTIONS

Throughout 2009, Boeing took actions to improve the quality of surface water discharges. These actions included the installation and rinsing of BMP materials at various outfalls and the continued implementation of the site-wide Storm water Pollution Prevention Plan (SWPPP). SWPPP Activities throughout the Santa Susana site included site-wide inspections and metal and debris removal, and hydromulch at various areas throughout Santa Susana. The 2009 SWPPP annual evaluation is included as Section 14 of this report.

The following table lists the Outfall location and respective BMP activities completed during the 2009 calendar year:

Table B. 2009 BMP Activities

OUTFALL	BMP ACTIVITIES DURING 2009
001 (South Slope below Perimeter Pond)	Inspected and maintained erosion control BMPs, performed maintenance on the flume and conducted housekeeping activities at the sample location. Performed two calibration checks on outfall flow meter (June and October). Inspected watershed areas and planned for additional revegetation

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OUTFALL	BMP ACTIVITIES DURING 2009
	measures to be implemented. Removed burnt vegetation under direction of a biologist. Hydroseeded approximately 2.0 acres. Completed process of installing automatic composite samplers.
002 (South Slope below R-2 Pond)	Inspected and maintained erosion control BMPs, performed maintenance on the flume and conducted housekeeping activities at the sample location. Performed two calibration checks on outfall flow meter (June and October). Inspected watershed areas and planned for additional revegetation measures to be implemented. Removed burnt vegetation under direction of a biologist. Hydroseeded approximately 2.5 acres. Completed process of installing automatic composite samplers.
003 (RMHF)	Conducted structural BMP and storm water filter system inspections. Performed maintenance on the flume and conducted housekeeping activities at the sample location. Performed two calibration checks on outfall flow meter (June and September). Rinsed media bed and completed process of installing automatic composite samplers.
004 (SRE)	Conducted structural BMP and storm water filter system inspections. Installed additional sand bag check dams to slow down water into BMP. Performed maintenance on flume and conducted housekeeping activities at the sample location. Performed two calibration checks on outfall flow meter (June and September). Completed replacement of sand media bed. Completed process of installing automatic composite samplers. Completed design and installation of a sump, a pump, a tank, electricity delivery, and a pipeline to collect water from downstream of the BMP and distribute it upland within the Outfall 004 subwatershed to increase storage and evapotranspiration of the water. Completed modification to the BMP at its western end to slow water flowing down the service road area, retain more of it behind check dams on the service road, and filter it more thoroughly in the BMP.
005 (FSDF-1)	Conducted BMP, sedimentation basin and storm water filter system inspections. Conducted housekeeping activities at the sample location. Pilot study testing of a storm water treatment system consisting of a three stage of filtration, two stage of ion exchange, one of activated carbon and membrane system. Prepared for the electrical upgrade to Outfall 005 for storm water treatment system. Installed permanent pumps, partial lines, and storage tanks for Outfalls 005/007. Placed gravel at outfall.
006 (FSDF-2)	Conducted structural BMP and storm water filter system inspections. Performed maintenance on flume and conducted housekeeping activities at the sample location. Placed crushed concrete and rinsed media bed. Performed two calibration

OUTFALL	BMP ACTIVITIES DURING 2009
	checks on outfall flow meter (June and September). Placed limestone in outfall treatment area. Completed process of installing automatic composite samplers.
007 (Building 100)	Conducted BMP, sedimentation basin and stormwater filter system inspections. Conducted housekeeping activities at the sample location. Pilot study testing of a storm water treatment system consisting of a three stage of filtration, two stages of ion exchange, one of activated carbon and membrane system. Prepared for the electrical upgrade to Outfall 007 for storm water treatment system. Installed permanent pumps, partial lines, and storage tanks for Outfalls 005/007.
008 (Happy Valley)	Inspected and maintained erosion control BMPs, performed maintenance on the flume and conducted housekeeping activities at the sample location. Continued progress with the Expert Panel on site restoration and ENTS planning. Continued progress on permitting and planning for ISRAs, submitted Final ISRA Workplan, and conducted ISRA work, including restoration and erosion control activities, such as, planting native plants for erosion control. Performed calibration check on outfall flow meter (June and October). Completed process of installing automatic composite samplers.
009 (WS-13 Drainage)	Inspected and maintained erosion control BMPs, performed maintenance on the flume and conducted housekeeping activities at the sample location. Completed culvert maintenance within the 009 watershed completed. Continued progress on planning ENTS and implementation of erosion and sediment control plans for the Northern Drainage project areas. Performed two calibration checks on outfall flow meter (June and September). Continued progress with the Expert Panel on site restoration and ENTS planning. Continued progress on permitting and planning for ISRA, submitted Final ISRA Workplan and implemented erosion and sediment control plans for the Northern Drainage project areas. Resumed the Northern Drainage lead and clay target debris removal. Fiber rolls were installed in July and additional hydroseed were also installed in September to stabilize soil in the areas disturbed by culvert maintenance activities in the Outfall 009 Watershed. Fiber rolls, coco matting, and hydroseed were installed in October to stabilize soil in the areas disturbed by culvert maintenance activities in the Outfall 009 Watershed. Completed process of installing automatic composite samplers.
010 (Building 203)	Conducted structural BMP and sedimentation/filtration basin inspections. Performed maintenance on the flume and conducted housekeeping activities at the sample location. Performed two calibration checks on outfall flow meter (June and September). Rinsed filtration media beds. Installed

OUTFALL	BMP ACTIVITIES DURING 2009
	additional fiber rolls in upland areas. Placed limestone in outfall treatment area. Completed process of installing automatic composite samplers.
011 (Perimeter Pond Flume)	Conducted BMP and drainage system inspections. Performed maintenance and conducted housekeeping at the sample location. Pilot study testing of a storm water treatment system consisting of three stages of filtration, two stages of ion exchange, one of activated carbon and membrane system. Performed two calibration checks on outfall flow meter (June and October). Completed upgrade modification of BMP for bulk media placement. Installed new carbon media bed and rinsed media. Applied hydroseed to 1.5 acres of watershed. Continued process of procurement and design of the storm water treatment system. Continued with installation of electricity and temporary storm water treatment equipment, pumps, and pipelines. Completed process of installing automatic composite samplers.
012 (Alfa Test Stand)	Conducted inspection of structural BMPs. Performed maintenance and conducted housekeeping activities at the sample location. Installed high-density polyethylene (HDPE) liner (twice during 2009). Cleaned sediment and test stand of paint chips and put in diversion from the hillside to prevent sediment loading of BMP. Replaced filtration media and rinsed new media. Placed pump and tanks at outfall for storage of storm water.
013 (Bravo Test Stand)	Conducted inspection of structural BMPs. Performed maintenance and conducted housekeeping activities at the sample location. Installed high-density polyethylene (HDPE) liner (twice during 2009). Replaced filtration media and rinsed new media. Placed pump and tanks at outfall for storage of storm water
014 (APTF Test Stand)	Conducted inspection of BMPs. Performed maintenance and conducted housekeeping activities at the sample location. Completed demolition of APTF and associated structures. Initiated installation of new erosion and sediment control BMPs throughout and adjacent to the demolished facility. Continued post-demolition activities at APTF including: installation/maintenance of BMPs, erosion control and soil stabilization BMPs such as fiber rolls, silt fence, hydroseed. Applied 1.5 acres of hydroseed. Replaced filtration media and rinsed new media. Placed pump and tanks at outfall for storage of storm water.
018 (R-2 Spillway)	Conducted structural BMP inspections. Performed housekeeping activities at the sample location. Rinsed filtration media. Conducted pilot study testing of a storm water treatment system consisting of three stages of filtration, two stages of ion exchange, one-stage of activated carbon and

OUTFALL	BMP ACTIVITIES DURING 2009
	membrane system. Completed ACTIFLO enhanced coagulation and Toray microfiltration membrane pilot studies. Performed two calibration checks on outfall flow meter (June and October). Continued process of procurement and design of the storm water treatment system. Continued with installation of electricity and temporary storm water treatment equipment, pumps, and pipelines. Completed installation of automatic composite samplers
019 (GETS)	Groundwater Extraction Treatment System (GETS) under construction. Treated ground water hauled off-site. No discharges.

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REASONABLE POTENTIAL ANALYSIS (RPA)

Outfall monitoring data were collected during the First (Outfalls 001, 002, 004, 006, 008, 009, 010, 011, 012, 013, and 018) and Fourth (Outfalls 006, 009, 010, and 013) Quarters of 2009. 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; Outfalls 003-010; and Outfalls 012-014 (MWH and Flow Science, 2006). Three constituents not regulated under the current NPDES permit showed results in the RPA suggesting further review. A summary RPA table for these constituents is provided below. Complete RPA tables for the outfall monitoring groups are provided in Section 13.

Table C. 2009 RPA Summary

Constituent	Maximum Observed Effluent Concentration	Maximum Projected Effluent Concentration	Basin Plan/CTR Comparison Criteria	Analysis Method	Outfall Location, Sample Date
1,2-Dichloroethane	2.4 µg/L	NA	0. 5 µg/L	EPA 624	018, 2/16/2009
Total Cyanide	9.6 µg/L	NA	5.2 µg/L	SM4500-CN-C,E	006, 2/6/2009
Total Cyanide	8.7 µg/L	NA	5.2 µg/L	SM4500-CN-C,E	008, 2/16/2009

The Regional Board's RPA procedures for priority pollutants utilize the most stringent water quality criterion or objective for each pollutant.

1,2-Dichloroethane

The source of the criterion specified for 1,2-dichloroethane (1,2-DCA) is identified as the Regional Board's Basin Plan. The Basin Plan limit for 1,2-dca (0.0005 mg/L) is contained in Table 3-7 of the Water Quality Control Plan (Basin Plan) for the Los Angeles Region (p. 3-10 of the June 13, 1994 Basin Plan).

This basin-plan limit for 1,2-DCA is a Maximum Contaminant Level (MCL) for the MUN (municipal supply) beneficial use as set forth in Table 64444-A of Section 64444 of Title 22 of the California Code of Regulations. These Title 22 regulations apply to treated drinking water as it leaves the treatment plant and enters the drinking water distribution system. Compliance with the Title 22 regulations for this chemical is determined using the average annual concentration.

Given that the waters downstream of the Santa Susana site do not have a beneficial use designation of MUN and the storm flows do not enter the drinking water distribution system, it is not appropriate to use the MCL as the basis of an RPA of the site's storm flow monitoring data. Boeing does not believe that reasonable potential was triggered for 1,2-DCA at Outfall 018.

Cyanide

The source of the criterion specified for total cyanide is identified as the California Toxics Rule for freshwater Criterion Continuous Concentration (CCC or "chronic" CTR value). Chronic toxicity is defined as toxicity that would occur with a relatively long exposure. The CTR itself defines chronic toxicity as toxicity that would occur with relatively long exposure of four days or more (CTR, footnote D, Section 131.38 (B) (1), Federal Register Volume 65, No. 97, May 18, 2000 at page 31716). The CTR also establishes fresh water Criterion Maximum Concentration (CMC or "acute" CTR Criterion). This acute toxicity criteria, established at 22 µg/L, is generally used to evaluate a one-hour exposure.

Storm water discharges from the Santa Susana site typically last less than four days. The Outfall 006 storm water flow occurred for less than three days during the sample event on February 6, 2008. The Outfall 008 storm water flow occurred for less than two days during the sample event on February 16, 2008. Given the short duration of storm events, it is not appropriate to use the chronic CTR criterion as the basis of an RPA of storm flow monitoring data. Boeing does not believe that reasonable potential was triggered for total cyanide at Outfalls 006 and 008.

Storm water flows are significantly different from steady-state discharges in that they exhibit highly variable rates and water quality constituent concentrations both during and between storms. It remains Boeing's position that the currently used RPA procedures, which were developed for steady-state discharges, are not appropriate for, and should not be applied to, storm water and storm water-dominated discharges from the Santa Susana Site.

CONCLUSIONS

Based on the reported data in 2009 and in previous years, and consistent with published studies referenced in this report, Boeing's belief is that a majority of the constituents that exceeded permit limits result from naturally occurring contributions (e.g., wildfires, native soil discharges into channels), or were detected at concentrations consistent with regional background concentrations and, therefore, were not the direct result of a known discharge or release from an industrial process or historical contamination on the site.

However, former industrial activities at the Santa Susana site may have impacted localized areas of on-site soils and sediments that could have potentially affected surface water quality at some outfalls. Under DTSC supervision, mitigation actions were taken in 2009 and in previous years to manage surface water impacts potentially resulting from former industrial

activities. These mitigation actions consisted of implementing an extensive system of BMPs. Boeing has installed and continues to install BMPs to minimize the potential for surface water to contact contaminated on-site soils, sediment, or bedrock, and to minimize transport of soils and/or sediment that may be impacted with constituents regulated in the Santa Susana NPDES permit.

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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FACILITY CONTACT

If there are any questions regarding this report or it enclosures, you may contact Ms. Lori Blair 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 2009 at the Boeing Company, Santa Susana Field Laboratory.

Sincerely,

Thomas D. Gallacher
Director, Santa Susana Field Laboratory
Environment, Health and Safety

BK:bjc

Figure 1 Storm Water Drainage System and Outfall Locations

Table 1 2009 Rainfall Summary
Table 2 2009 Liquid Waste Shipments
Table 3 2009 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 004	SRE
Section 4 Outfall 006	FSDF-2
Section 5 Outfall 008	Happy Valley
Section 6 Outfall 009	WS-13 Drainage
Section 7 Outfall 010	Building 203
Section 8 Outfall 011	Perimeter Pond
Section 9 Outfall 012	Alfa Test Stand
Section 10 Outfall 013	Bravo Test Stand
Section 11 Outfall 018	R-2A Pond

Section 12 Receiving Water and Sediment Sample Location – Arroyo Simi (Frontier Park)
Section 13 Reasonable Potential Analysis (RPA) Summary Tables
Section 14 Storm Water Pollution Prevention Plan Annual Evaluation
Section 15 Analytical Laboratory Methods, Method Detection Limits, Reporting Limits, QA/QC Procedures, and ELAP Certifications

cc: Ms. Cassandra Owens, Regional Water Quality Control Board
Mr. Rick Brausch, Department of Toxic Substances Control
Mr. Gerard Abrams, 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

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