** Signature Approval: ** 3/1/05

** e-mail must be sent by author of letter

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** Deal No. **

** REPIVED 12/9/2004 **

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** Our e-mail address is listed as GRP CPC Correspondence Dept in the Global Address List **
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5633 Canoga Avenue  
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Canoga Park, CA 91309-7922

CERTIFIED MAIL

March 1, 2005
In reply refer to 2005RC0522

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

Attention: Information Technology Unit

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

Subject: The Boeing Company, Rocketdyne Propulsion & Power  
Santa Susana Field Laboratory  
Ventura County, California

Dear Sir/Madam,

Pursuant to the referenced permit, The Boeing Company, Rocketdyne Propulsion & Power (Rocketdyne) hereby submits the enclosed annual discharge monitoring report (DMR) for the Santa Susana Field Laboratory (SSFL) for the period of January 1, 2004 through December 31, 2004. The DMR is provided for the SSFL domestic sewage treatment plants and outfalls authorized by NPDES Permit No. CA0001309, that was revised July 1, 2004. The previous NPDES permit's requirements, which were effective from July 1998, were used during the 1st and 2nd Quarter of 2004 and through August 19, 2004. The current NPDES permit requirements took effect commencing on August 20, 2004. Therefore, this annual report, as necessary, discusses and refers to two sets of permit requirements and permit limits. In lieu of a 3 ½" computer diskette of this report (as discussed in the permit), a compact disk with the report contents is being submitted.

EXECUTIVE SUMMARY

This is the first annual monitoring report submitted compliant with Order R4-2004-0111 (July 1, 2004). The new permit includes:

1) Discharge limits for many new constituents,
2) New analytical methodologies, and in some cases
3) More stringent discharge limits as compared with data in the previous permit (Order No. 98-051).

During the 2004 monitoring period, only three constituents and pH exceeded their respective permit limits. Review and analysis of data between the former and current permit highlight the technical infeasibility of setting limits without needed baseline data. For example, the previous permit required that only 2,3,7,8-TCDD be analyzed. This is the more toxic of the dioxin compounds and was found to be non-detectable over the six years of monitoring at SSFL. The new permit requires sampling and analysis of 16 additional congeners of TCDD, including those that naturally occur as the result of forest fires. While 2,3,7,8-TCDD remains
undetected, the additional TCDD congeners formed from naturally occurring events are now being noted in the monitoring results.

In a second example, more sensitive analytic procedures for metals within the new permit require analysis of total metals versus analysis of dissolved metals. The new more sensitive analytical procedure yields results so low that they now measure trace background levels (parts per quintrillion).

Results reported herein for both TCDD and mercury reflect naturally occurring soil conditions and ash deposition from recent forest fires. Similarly, changes and upgrades to monitoring locations briefly resulted in elevated pH levels. With regard to copper, elevated levels slightly over the permit limit occurred at only one sampling location. It is considered to be within naturally occurring variables.

**DISCHARGE STATUS**

On July 1 2004, the SSFL NPDES permit was revised by the Regional Water Quality Control Board-Los Angeles Region (RWQCB), with an effective date of August 20, 2004. Prior to the revision, seven permitted outfalls, the Area I southeast border location (Happy Valley) and the three domestic sewage treatment plants (STPs) STP-1 through STP-3 were regulated. Subsequent to the July 1st revision, twelve outfalls (Outfalls 001 through 011, and 018), two rocket engine test facilities (Outfalls 012 and 013) the Advanced Propulsion and Test Facility (APTF, Outfall 014), and STPs 1 through 3 (Outfalls 015, 016, and 017) were regulated (Figure 1).

Precipitation during 2004 at SSFL is totaled for each month of the year in Table 1. Liquid waste shipments during 2004 are totaled for each month of the year in Table 2.

There were no discharges from the domestic sewage treatment plants (STP -1, -2, or -3) or from the Bravo Test Stand or APTF (Outfalls 013 and 014, respectively) for the 2004 monitoring period. Use of the STPs terminated in December and October 2001, respectively. Wastewater previously treated by the STPs was captured and transported off site for proper disposal, as summarized in the monthly (under the former permit) and quarterly (under the revised permit) DMR reports to the RWQCB and as Table 2 in this report.

In 2004, neither cooling nor boiler water treatment chemicals were discharged at the SSFL. Instead, outside contractors were utilized for water treatment needs that arose. Generated wastewater was captured and transported off site for proper disposal, as summarized in the monthly and quarterly DMR reports to the RWQCB and as Table 2 in this report.

**DISCHARGE ANALYSES - DISCUSSION**

All analyses of sampled discharge were conducted at a laboratory certified for such analyses by the appropriate agency in accordance with current EPA guidelines, procedures, or as specified in the monitoring program.

This annual DMR summarizes analytical data collected from the permitted outfalls during the 2004 year. Data for this report has been summarized in tabular form. Consistent with prior annual report submittals and in accordance with the NPDES permit, graphic presentation of
the data collected has also been included for specific analytes and parameters that could be effectively graphed. Due to the revision of the NPDES permit and modifications to some of the permit limits, the graphs show both pre-revision (January 1 through August 19, 2004) and post-revision (August 20 and ongoing) permit limits and analytical results, where appropriate. Analytes that had a permit limit at some time during the year were graphed. Analytes that did 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 where data was collected (Outfalls 001 through 011, and 018) and the Alfa Test Stand (Outfall 012) are provided in the Attachment as follows:

Attachment

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<tr>
<td>Section 2</td>
<td>Outfall 002</td>
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<td>Section 3</td>
<td>Outfall 003</td>
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<td>Section 13</td>
<td>Outfall 018</td>
<td>R-2 Spillway</td>
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Note: HV#1 and HV#2 represent surface water samples collected in the Happy Valley Drainage. Prior to the RWQCB establishing Outfall 008 as a surface water monitoring location in July 2004, HV#1 and HV#2 locations were used. HV#1 was located in the general vicinity of Outfall 008, and HV#2 was located at the southeastern property boundary of the SSFL (Figure 1).

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

2004 NPDES PERMIT CHANGES

Based on specific analytes that were detected at concentrations greater than their permit limits, and that also were affected by requirements in the new NPDES permit versus the old permit, the following paragraphs discuss the permit modifications and how they potentially affected the detection and reporting of these specific compounds.

TCDD (Dioxin) Analyses and Reporting

The former SSFL NPDES permit (dated July 2, 1998) and the current SSFL NPDES permit stipulate limits for dioxin compounds (referred to in the permits as TCDD). In the 1998
permit, the use of the term TCDD was more literal, as it referred only to the constituent 2,3,7,8-TCDD. Therefore, the TCDD concentrations in the Attachment for the period January 1 through August 19, 2004 are for the single constituent 2,3,7,8-TCDD. When subsequently used in this letter report, the term 2,3,7,8-TCDD refers to the single constituent 2,3,7,8-TCDD. Note that for this timeframe, the 2,3,7,8-TCDD concentrations are shown in the summary table with all other constituents.

The current permit generically uses the term TCDD as referring to 2,3,7,8-TCDD and the sixteen related 2,3,7,8-TCDD substituted dioxin and furan constituents (congeners) as described in the footnotes to the new SSFL NPDES permit. Based on the aforementioned footnotes in the current NPDES permit (Pages T-6 and T-9), the term “TCDD” is explained to be “TCDD and all congeners” or “all seventeen congeners,” meaning that all seventeen 2,3,7,8-substituted congeners are to be analyzed when establishing permit compliance.

To enable a single total concentration (commonly called a Total Equivalence [TEQ]) to be calculated from the sum of the 17 congeners, 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 TCDD summary tables included in the Attachment show the TEFs for the various congeners. The common term for the sum of the factored concentration is TEQ. When subsequently used in this letter 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).

Note that for the August 20 through December 31 timeframe, the TCDD data (all seventeen dioxin/furan congeners) are shown on separate tables in the Attachment.

Based on the previous NPDES permit (July 2, 1998 through August 19, 2004), permit limits were not established for 2,3,7,8-TCDD, and 2,3,7,8-TCDD was the only congener listed in the permit. If it were detected, it would be reported as simply 2,3,7,8-TCDD (however, it was not detected in any surface water samples collected during 2004).

Based on the current NPDES permit, permit limits have been established for TCDD TEQ at Outfalls 001 through 007. For the purposes of evaluating compliance with the current permit limits for Outfalls 001 through 007 (as stated in the NPDES permit on Page 40, Section II, C. 3), TCDD TEQ is based on detected congeners and do not include those congeners reported as ND (not detected) or detected, but not quantified (DNQ). A DNQ is a value less than the laboratory reporting limit, but greater than the laboratory level of detection [LOD]. Therefore, when evaluating whether a permit limit exceedence occurred, ND or DNQ data (the resulting estimated value) were considered zero in the calculation. Outfalls 001 through 007 have a compliance limit for TCDD, which is shown as the TCDD TEQ permit limit of 2.8 x 10^-3 ug/L or 28 parts per quintillion.

Permit limits for TCDD have not been established for Outfalls 008 through 011, and 018. For these outfalls, TCDD TEQ is based on detected congeners and DNQ congeners. Congener values that are ND are considered to have concentrations equal to zero and are not included in the TCDD TEQ calculation for these outfalls without permit limits.
To enable comparison to the 1998 SSFL NPDES permit and its definition of TCDD (the 1998 permit specifically referred to the single congener 2,3,7,8-TCDD, and the values reported under the 1998 permit were for the single congener 2,3,7,8-TCDD), it should be noted that the congener 2,3,7,8-TCDD was not detected in samples collected during 2004.

Metals Analysis and Reporting

The new NPDES permit requires that many metals now be analyzed for total metals instead of dissolved metals as was required in the old permit. The dissolved metals analysis detects those metals that are dissolved in the water and can not be settled or filtered out. The total metals analysis detects all metals in a sample aliquot, even those trapped in suspended solids or sediment being carried by the water. The requirement for analyzing for total metals was intended for non-storm water surface water discharges such as sewage treatment plant effluent which is filtered to remove suspended solids and sediment prior to discharge. In the application of historical dissolved metals data to a reasonable potential analysis, the RWQCB used a translator factor to estimate total recoverable results. This translator factor was not intended for use with storm water discharges and does not seem to reflect an accurate correlation between dissolved and total metals. The analysis for total metals results in a sample aliquot that contains sediment, which may be, and likely is, comprised of naturally occurring metals. The result is an analytical process that is more likely to identify and detect naturally occurring metals.

Laboratory Reporting Limits

Attachment T-A of the NPDES permit presents the State Water Resources Control Board (SWRCB) minimum levels (MLs) for use in reporting and determining compliance with NPDES permit limits. The analytical laboratory achieved these MLs for this reporting period. 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 reporting limit (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 14 provides a summary of constituents listed in the permit, analytical laboratory methods, method detection limits (MDLs), RLs, and laboratory quality assurance and quality control procedures. California Department of Health Services Environmental Laboratory Accreditation Program (ELAP) certifications are also included in Section 14, as required in the NPDES permit.

During 2004, specific constituents that had permit limits that were less than the RLs and ML were mercury (daily maximum permit limit of 0.10 and 0.13 ug/L, monthly average limit of 0.05 ug/L, RL of 0.2 ug/L); cyanide (monthly average limit of 4.3, RL of 5.0 ug/L, and Bis-(2-ethylhexyl) phthalate (daily maximum permit limit of 4.0, RL of 5.0 ug/L). Of these compounds, only mercury was detected at a concentration equal to or greater than its RL.

SUMMARY OF NON-COMPLIANCE AND CORRECTIVE ACTIONS

Monitoring methods and results have been reviewed for permit compliance for all thirteen outfalls that had discharges during 2004. As indicated in the attached tables and charts in Sections 1 through 13, and as summarized in Table 3, 2004 Summary of Permit Limit Exceedences, Outfalls 002, 003, 004, 005, and 006 had TCDD exceedences; Outfalls 002 and 006 had mercury exceedences; Outfall 004 had a single copper exceedence; and Outfalls 003,
006, 010, 012, and 018 had pH values that were not within the permitted range. It is believed that the causes of the TCDD and mercury exceedences are more general in nature. Therefore, a general discussion of those issues and corrective actions follows this summary. A summary of permit exceedences is discussed below.

**Stormwater Outfall 002**

Outfall 002 had three exceedences during the 2004 monitoring period. One exceedence was TCDD, and two exceedences were mercury. On December 28, TCDD was detected at a concentration of $3.7 \times 10^8$ ug/L (37 parts per quintillion) compared to a permit limit of $2.8 \times 10^8$ ug/L (28 parts per quintillion). On December 28 and 31, mercury was detected at 0.21 and 0.32 ug/L, compared to a permit limit of 0.10 ug/L (for compliance determination, the laboratory reporting limit for mercury of 0.20 ug/L is used). Sources and corrective actions for TCDD and mercury are discussed below.

**Stormwater Outfall 003**

Outfall 003 had three exceedences during the 2004 monitoring period. Two exceedences were for TCDD, and one exceedence was for pH. On October 17 and December 5, TCDD was detected at concentrations of $8.5 \times 10^8$ ug/L (8.5 parts per quadrillion) and $4.5 \times 10^8$ ug/L (45 parts per quintrillion) compared to a permit limit of $2.8 \times 10^8$ ug/L (28 parts per quintrillion), respectively. Sources and corrective actions for TCDD are discussed below.

The permitted pH range for Outfall 003 in October was 6.5 to 8.5. On October 17, pH was measured at 9.13. This elevated pH value was likely the result of construction activities, which included the installation of a mortar and concrete surface-water sampling station. The alkalinity of the newly installed mortar and concrete sampling station likely resulted in a slightly increased pH value. Surface water samples collected from this outfall later in the quarter were within the permitted range.

**Stormwater Outfall 004**

Outfall 004 had two exceedences during the 2004 monitoring period. One exceedence was for TCDD, and one exceedence was for copper. On October 17 TCDD was detected at a concentration of $7.08 \times 10^8$ ug/L (70.8 parts per quadrillion) compared to a permit limit of $2.8 \times 10^8$ ug/L (28 parts per quintrillion). Sources and corrective actions for TCDD are discussed below.

On October 17, copper was detected at a concentration of 15 ug/L, slightly exceeding the permit limit of 14 ug/L. Three subsequent samples collected during the quarter were compliant from Outfall 004. Based on the extensive history of compliance with copper discharge limits at Outfall 004 both prior to and after this non-compliant event, this copper result is not truly representative of the general discharge water quality at this location. In addition, it should be noted that this concentration of copper was a result of the new requirement to analyze for total recoverable metals instead of dissolved metals and is within the naturally occurring variability and concentrations similar to this may be detected in the future. Additional BMP's are being implemented in an attempt to further reduce the level of all constituents at this outfall.
Stormwater Outfall 005

Outfall 005 had two exceedences during the 2004 monitoring period. One exceedence was TCDD and one exceedence was mercury. On October 17, TCDD was detected at a concentration of 3.32 x 10^{-6} ug/L (3.32 parts per quadrillion) compared to a permit limit of 2.8 x 10^{-6} ug/L (28 parts per quintillion). On December 27, mercury was detected at 0.20 ug/L, compared to a permit limit of 0.10 ug/L (for compliance determination, the reporting limit for mercury of 0.20 ug/L is used). Sources and corrective actions for TCDD and mercury are discussed below.

Stormwater Outfall 006

Outfall 006 had four exceedences during the 2004 monitoring period. One exceedence was TCDD, one exceedence was mercury, and two exceedences were pH. On October 17, TCDD was detected at a concentration of 1.92 x 10^{-4} ug/L (19.2 parts per quadrillion) compared to a permit limit of 2.8 x 10^{-4} ug/L (28 parts per quintillion). On December 27, mercury was detected at 0.22 ug/L, compared to a permit limit of 0.10 ug/L (for compliance determination, the laboratory reporting limit for mercury of 0.20 ug/L is used). On October 27 and December 27, pH was measured at 6.29 and 9.7, respectively. The October 27th result is most likely the result of the low ambient pH of the rain water itself. Samples of ambient rain have been found to have a pH level as low as 4.9. The December 27th result is directly attributable to recent construction activity to install a stainless steel sample box where mortar was used to secure the device. The alkalinity of the mortar used to install the new sampling station likely resulted in the increased pH value. Four consecutive daily samples collected on December 28 through December 31 from Outfall 006 were within the permitted range for pH.

Stormwater Outfall 010

Outfall 010 had one permit limit exceedence during the 2004 monitoring period. The permitted pH range for Outfall 010 is 6.5 to 8.5. On October 20, pH was measured at 9.40. This elevated pH value was likely the result of construction activities, which included the installation of a mortar and concrete surface-water sampling station. The alkalinity of the newly installed mortar and concrete sampling station likely resulted in the increased pH value. Surface water samples collected from this outfall later in the quarter were within the permitted range for pH.

Non-Stormwater Outfall 012

Outfall 012 had one permit limit exceedence during the 2004 monitoring period. The permitted pH range for Outfall 012 is 6.5 to 8.5. On October 20, pH was measured at 8.75. It is unclear why this particular sample yielded a slightly elevated pH level at this location. Non-storm water samples collected subsequent to this sample have remained within the permitted range for pH.

Stormwater Outfall 018

Outfall 018 had one permit limit exceedence during the 2004 monitoring period. The permitted pH range for Outfall 018 is 6.5 to 8.5. On October 20, pH was measured at 8.51. Outfall 018 is directly downstream of a year round pond. Algae that grows naturally in the pond tends to increase the alkalinity and therefore, the pH of the pond. An aerator has been
installed in the pond to control the growth of algae, and subsequently, the pH of the pond. Surface water samples collected subsequent to this sample were within the permitted range for pH.

TCDD Non-Compliance, Discussion of Occurrence, and Potential Sources

On October 17 at Outfalls 003, 004, 005, and 006, on December 5 at Outfall 003, and on December 28 at Outfall 002, TCDD was detected at concentrations that exceeded the permit limit. The detected values of TCDD ranged from $3.7 \times 10^{-4}$ to $1.92 \times 10^{4}$ ug/L.

In the surface water sampling results presented in this report there are a number of detections of TCDD, and several patterns that are evident from an evaluation of the data collected during the quarter. These patterns provide insight into the potential source(s) of TCDD in the surface water samples collected during this period. The following summarize these patterns.

- The highest concentrations of TCDD in surface water are in NPDES outfalls on the north side of the facility. The results from the southern outfalls (001, 002, 011, and 018) have consistently lower TCDD concentrations than from northern outfalls (004, 005, 006, 007, and 010). This finding suggests that there is a difference in source characteristics between the northern and southern areas of the facility.

- TCDD concentrations in northern outfalls generally decrease during the reporting period. An evaluation of the TCDD concentrations at most northern outfalls indicates that the concentrations greatly decrease after the first sampling event and with time approach levels similar to those detected at the southern outfalls. Some of the northern outfalls also receive discharge from impervious areas, such as tarped soils or large asphalt-covered areas. These include Outfalls 003, 004, 005, 006, and 010, which represented many of the highest TCDD detections in October. It is likely that these impervious areas may have been “washed” by the initial storms of the season as described in the bullets below.

In addition to these patterns, additional information about the facility assists in the evaluation of the presence of TCDD in surface water. This information includes:

- TCDD is naturally present in soil. Data from the SSFL Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) program has shown that there is a natural concentration of TCDD in soil at the site. This is likely due to burned plant material and ash deposited on soil by the brush fires that routinely occur throughout the hills of southern California. The Department of Toxic Substances Control (DTSC) has reviewed and approved this dataset as representing natural ambient conditions.

- Soil is naturally present in surface water runoff. Some of the NPDES samples have been analyzed for total suspended solids (TSS) and settleable solids. These data demonstrate that during rain events, soil can be entrained in surface-water runoff from the facility.

- Large and frequent storms increased soil runoff. The large storms that occurred during 4th Quarter 2004 resulted in an increased amount of soil erosion and runoff in storm water. This increase contributed to the increases in TCDD in surface water.

- Known soil contaminant source areas do not appear to be contributing to TCDD in surface water. The SSFL RFI program, with the oversight of the DTSC, has identified several areas at SSFL where TCDD concentrations in soil or sediment are elevated above background.
Downstream soil/sediment from each of these areas have been sampled, and it has been shown that TCDD is not migrating.

In consideration of the above NPDES and RFI information collected according to regulatory agency permits or approved work plans and under agency oversight, the following conclusions are provided, along with additional supporting information, if applicable.

- **Surface water runoff from the site contains a predictable range of background levels of TCDD.** This is based on 3 findings:

  First, the findings of natural background TCDD in soil and the presence of soil as TSS in surface water provide data for the predictable range of TCDD in surface water.

  Second, the detected 'background' TCDD range has been confirmed by the sampling and analysis of background surface water at the facility. As part of the RWQCB-required reasonable potential analysis (RPA), two locations were sampled for background surface water (i.e., water that does not come from developed areas of the facility). Surface water from both of these locations contained TCDD, with one result similar to levels measured at outfalls in the southern portion of the SSFL.

  Third, in areas where there has been excavation of soil (e.g., FSDF in Area IV, above Outfalls 005 and 006), TCDD is detected in surface water samples.

  - **Initial, elevated TCDD levels were caused by non-facility-related sources and are returning to the normal background range.** This is also based on 3 findings:

    First, it is well documented that ash from brush fires contains TCDD (especially higher-chlorinated dioxin congeners).

    Second, the recent Piru and other Southern California fires, and prevailing wind direction brought a significant ash fall to the SSFL, especially in the northern areas.

    Third, surface water samples from the northern outfalls had initial TCDD levels elevated above background. These formerly elevated levels are decreasing with each rain event. This suggests a depletion of this source.

The presence of TCDD in surface water at NPDES Outfalls is due to both the presence of naturally occurring TCDD in soil, and ash from non-facility-related fires. Facility operations are likely not the source of the TCDD. Continued monitoring of surface water will provide a more thorough dataset with which to further evaluate the occurrence of TCDD.

The six TCDD exceedences reported in the 4\textsuperscript{th} Quarter have been compared to Federal and California maximum contaminant levels (MCLs) for drinking water (drinking water standard). The drinking water MCL is $3.0 \times 10^{-8}$ mg/L ($3.0 \times 10^{-5}$ ug/L or 30 parts per quadrillion) and is established for 2,3,7,8-TCDD. This concentration represents the safe level of 2,3,7,8-TCDD or TCDD TEQs that can be present in drinking water. Note, the single congener 2,3,7,8-TCDD was not detected in any of the surface water samples collected during the 4\textsuperscript{th} Quarter. Two of the TCDD TEQ results, $1.92 \times 10^{-4}$ and $7.08 \times 10^{-5}$ ug/L, were greater than this level and represent one-time occurrences. All of the remaining four reported TCDD TEQ values above the permit limit are approximately 10 to 1,000 times lower than the drinking water standard. The following table compares analytical results from the compliance outfalls with the TCDD MCL, samples collected from upstream non-operations areas, and the permit limit.
### TCDD Summary for Compliance Outfalls

<table>
<thead>
<tr>
<th>Outfall/Date</th>
<th>MCL (ug/L)</th>
<th>Previous Upstream RPA Location Sample Results* (ug/L)</th>
<th>Permit Limit (ug/L)</th>
<th>TCDD TEQs (ug/L)</th>
</tr>
</thead>
<tbody>
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<td>Outfall 001</td>
<td>0.000003</td>
<td>0.0000000026</td>
<td>0.0000000028</td>
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</tr>
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### TCDD Summary for Compliance Outfalls (continued)

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<tr>
<th>Outfall/Date</th>
<th>MCL (ug/L)</th>
<th>Previous Upstream RPA Location Sample Results* (ug/L)</th>
<th>Permit Limit (ug/L)</th>
<th>TCDD TEQs (ug/L)</th>
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<td>October 27</td>
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<td>December 5</td>
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<td>No Data</td>
<td>0.0000000028</td>
<td>ND</td>
</tr>
<tr>
<td>Outfall 005</td>
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<td>No Data</td>
<td>0.0000000028</td>
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</tr>
<tr>
<td>December 27</td>
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<td>No Data</td>
<td>0.0000000028</td>
<td>ND</td>
</tr>
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<td>No Data</td>
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<td>0.000019</td>
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</table>
Outfall 006
October 27  0.00003  No Data  0.000000028  ND
Outfall 006  December 5  0.00003  No Data  0.000000028  ND
Outfall 006  December 27  0.00003  No Data  0.000000028  ND
Outfall 007  October 17  0.00003  No Data  0.000000028  ND
Outfall 007  October 27  0.00003  No Data  0.000000028  ND
Outfall 007  December 28  0.00003  No Data  0.000000028  0.000000001

This table shows values as decimal numbers to facilitate comparison. The text of this report uses scientific and exponential notation.
Upstream RPA (reasonable potential analysis) samples were collected in December 2002 and February 2003. These locations are non-operational areas sampled as part of the RWQCB RPA.
No Data indicates upstream locations from these outfalls were not sampled as part of the RWQCB RPA.
Compliance values as calculated as explained in the report text.
*RPA TCDD TEQs calculated using all reported results and may include estimated data, Detected Not Quantified. (DNQs).

**Mercury Non-Compliance, Discussion of Occurrence, and Potential Sources**

On December 28 and 31 at Outfall 002, and on December 27 at Outfalls 005 and 006, mercury was detected at concentrations that were equal to or above the laboratory RL (as discussed above, the permit limit for mercury is less than the RL, so in accordance with RWQCB policy, the RL was used to establish compliance). The detected values of mercury at the outfalls and dates listed above were 0.21, 0.32, 0.20 and 0.22 ug/L, respectively. In addition, the monthly average for mercury for December at Outfall 002 was 0.27 ug/L (the average was calculated by summing the values and dividing by the number of values), which exceeded the permitted monthly average of 0.05 ug/L.

In the surface water sampling results presented in this report, there are a number of detects of mercury. Some of the reported concentrations of mercury are above the reporting limit of 0.2 ug/L; however, three of the four permit limit exceedences were within 10 percent of the laboratory-reporting limit. The maximum detected concentration of mercury was 0.32 ug/L. This section provides an explanation of those results.

There is a pattern evident from an evaluation of the mercury data. This pattern provides insight into the potential source(s) of mercury in the surface water samples.

All of the reported concentrations of mercury in surface water are within a narrow concentration range. The mercury results range from 0.17 to 0.32 ug/L at all outfalls where it was detected. The consistency of these values suggests that the concentrations are representative of background.

In addition to this, there is additional information about the facility that assists in the evaluation of the presence of mercury in surface water. These are:
• **Mercury naturally is present in soil.** Data from the SSFL RFI program has shown that there is background mercury in soil at the site. The DTSC has reviewed and approved use of a mercury background dataset as representing natural ambient conditions.

• **Soil is naturally present in surface water runoff.** Some of the NPDES samples have been analyzed for total suspended solids (TSS) and settleable solids. These data demonstrate that during rain events, soil can be entrained in surface water runoff from the facility.

• **Large and frequent storms increased soil runoff.** The large storms that occurred during the 4th Quarter 2004 resulted in an increased amount of soil erosion and runoff in storm water. This increase contributed to the increases in mercury in surface water.

• **Because the site-wide mercury sampling results are within a narrow detection range, the detected results are not considered to be related to known soil contamination source areas.** Mercury exceedences detected at Outfall 002 were preceded by compliant detections in October, and downstream of Outfall 018 that also had one result detected value greater than the RL (0.26 ug/L on December 28). Although mercury exceedences at Outfalls 005 and 006 are located downslope of a previous interim measure cleanup area including mercury at the FSDF, the detections are single occurrences just above the RL and again were preceded by compliant values. DTSC provided oversight of the FSDF soil excavation and the area was backfilled with clean soil.

In consideration of the above information, all collected according to regulatory agency work plans and under agency oversight, the following conclusions are provided. Additional supporting information, if applicable, is provided.

• **Surface water runoff from the site contains a narrow and predictable range of mercury.** This is based on 2 findings:

  First, the findings of natural background mercury in soil and the presence of soil as TSS or settleable solids in surface water.

  Second, in areas where there has been comprehensive excavation of soil (e.g., FSDF in Area IV, above NPDES Outfalls 005 and 006, Outfall 010 below B/203) mercury is detected in surface water samples.

• **Fire ash contributes mercury to surface water at the site.** Fires are a known source of mercury. That mercury deposits in the form of particulates downwind of the fire. SSFL was downwind of the large Piru and Simi Valley fire. This contributed to the mercury levels at the site.

The four mercury exceedences reported in the 4th Quarter have been compared to California drinking water standards. The drinking water standard of 2.0 ug/L, represents the safe level of mercury that can be present in drinking water. All of the reported values for these exceedences are approximately 6 to 10 times less than the drinking water standard. Although this surface water is not directly consumed, the concentrations of mercury detected in the surface water samples did not and do not pose a health risk to the surrounding communities.

The presence of mercury in surface water at NPDES outfalls at the facility seems to be due to the presence of naturally occurring mercury in soil. Onsite mercury sources have been
identified, investigated, and mitigated, and no new sources of mercury are known or have been identified. The recent fires are a new contributing source of mercury to the levels at the site.

EVALUATION OF POTENTIAL HEALTH RISK BASED ON TCDD AND MERCURY EXCEEDENCES

TCDD and mercury in surface water detected at the site during 4th Quarter 2004 do not pose a health risk. The exceedences of the TCDD MCL in Outfalls 004 and 006 occurred only once in each outfall on October 17, 2004, and subsequent concentrations have been below the MCL. Measured levels in all other outfalls are below the MCL. Mercury concentrations in the 4th Quarter 2004 samples did not exceed its MCL of 2.0 µg/L. Although the surface water monitored in this report is not used for drinking, the comparison of the results to the MCLs provides evidence that the discharge did not pose a risk to the neighboring communities. The following table compares analytical results from the compliance outfalls with the mercury MCL and the permit limits.
Mercury Summary for Compliance Outfalls

<table>
<thead>
<tr>
<th>Outfall/Date</th>
<th>MCL (ug/L)</th>
<th>Permit Limit (ug/L)</th>
<th>Analytical Result (ug/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outfall 001</td>
<td>2.0</td>
<td>0.10</td>
<td>DNQ</td>
</tr>
<tr>
<td>December 28</td>
<td>2.0</td>
<td>0.10</td>
<td>DNQ</td>
</tr>
<tr>
<td>Outfall 002</td>
<td>2.0</td>
<td>0.10</td>
<td>DNQ</td>
</tr>
<tr>
<td>October 20</td>
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<td>DNQ</td>
</tr>
<tr>
<td>Outfall 002</td>
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<td>DNQ</td>
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<tr>
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</tr>
<tr>
<td>Outfall 003</td>
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<td>DNQ</td>
</tr>
<tr>
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<td>DNQ</td>
</tr>
<tr>
<td>Outfall 003</td>
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### Mercury Summary for Compliance Outfalls (continued)

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<tr>
<th>Outfall/Date</th>
<th>MCL (ug/L)</th>
<th>Permit Limit (ug/L)</th>
<th>Analytical Result (ug/L)</th>
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<td>0.13</td>
<td>DNQ</td>
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<td>Outfall 005</td>
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<tr>
<td>Outfall 005</td>
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<td>0.13</td>
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<tr>
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<tr>
<td>December 27</td>
<td></td>
<td></td>
<td>0.2</td>
</tr>
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**Table Notes:**
- ug/L is micrograms per liter.
- The daily maximum permit limit for mercury is 0.10 ug/L for Outfalls 001 and 002, and 0.13 ug/L for Outfalls 003 through 007.
- The laboratory reporting limit is 0.20 ug/L.
- Mercury values less than 0.20 but greater than the laboratory method detection limit (MDL) are reported as Detected Not Quantified (DNQ).
- Mercury values less than the MDL are reported as ND.

### CORRECTIVE ACTIONS

Best management practices (BMPs) to minimize the potential for chemicals or pollutants to impact surface water have historically been implemented at the SSFL facility in accordance with facility and project-specific Storm Water Pollution Prevention Plans (SWPPPs) and Best Management Practices Plans (BMPPs). BMPs have consisted of chemical use reduction or elimination, spill prevention, installation of berms or other containment structures, installation of sediment basins, continuous training on appropriate materials handling and storage and spill response, and remediation of known areas of chemicals and pollutants. Specific BMPs that have been implemented in 2004:
All Outfalls - installed telemetry systems to provide improved flow monitoring capability

- Outfall 003 - installed a stainless steel sample box and vermiculite and activated carbon filters to control sediment
- Outfall 004 - trees/brush were cleared, plastic sheeting/tarp was repaired or replaced, sand bags and silt fencing were replaced, and installed additional silt fencing, vermiculite and activated carbon filters
- Outfall 005 - replaced plastic sheeting/tarp and sand bags added vermiculite and activated carbon filters
- Outfall 006 - installed a stainless steel sample box, replaced plastic sheeting/tarp, sand bags, silt fencing, and installed additional silt fencing and added vermiculite and activated carbon filters
- Outfall 007 - installed a stainless steel sample box and replaced silt fencing
- Outfall 008 - subsequent to completing interim remedial measures to remove perchlorate-impacted sediment and bedrock in early 2004, a water-filled dam was placed at Outfall 008 to decrease sediment transport and better enable surface water samples to be collected. Due to the remoteness and difficult terrain in the vicinity of Outfall 008, an all-terrain vehicle is now being used to access this location
- Outfall 010 - interim measures were completed to remove mercury-impacted sediment on the hill slope above the outfall location. A sediment-settling basin, stainless steel sample box, and sediment control systems including vermiculite filters were installed
- Outfall 018 - a sediment trap pilot study is ongoing to evaluate its effectiveness at minimizing sediment transport and removing potential pollutants from surface water

In addition to these already implemented BMPs, other sediment control structures may be placed at Outfalls 003, 004, 005, 006, and 010 to further minimize sediment transport and remove potential pollutants from surface water.

Based on the results of the 2004 surface water sampling, the implemented BMPs are providing controls to minimize the migration of pollutants in surface water. However, continued evaluation, implementation, and improvement of the BMPs will be performed. To address the specific exceedences during 2004, the following corrective actions will be implemented:

- TCDD concentrations will continue to be monitored in accordance with the NPDES permit. Based on comparison to MCLs, the concentration of TCDD detected in surface water does not pose a health risk. However, further evaluation of the impacts of the Piru and other Southern California fires and the relationship between TCDD concentrations and TSS and settleable solids in surface water will be performed. Evaluation of BMPs and their implementation, including sediment control measures, will be conducted and implemented as necessary and appropriate.

- Mercury concentrations will continue to be monitored in accordance with the NPDES permit. Based on comparison to MCLs, the concentration of mercury detected in surface water does not pose a health risk. However, further evaluation of the relationship between mercury concentrations and TSS and settleable solids in surface water will be performed. Evaluation of BMPs and their implementation, including sediment control measures, will be conducted and implemented as necessary and appropriate.
- Copper concentrations will continue to be monitored in accordance with the NPDES permit. A specific corrective action has not been identified for the one-time exceedence at Outfall 004. However, BMPs will be reviewed, evaluated, and implemented as necessary.

- The range of pH values will continue to be monitored in accordance with the NPDES permit. An ambient rain water sample collected in Area III of the SSFL on December 28 indicated a pH value of 4.9. Additional ambient rainfall samples will be collected and analyzed to further evaluate the potential affect of rainwater on pH of surface water samples. As a corrective action, for the pH exceedences at Outfalls 003, 006, 010, 012, and 018 BMP improvements at the Outfalls involving the use of concrete or mortar type products will be rinsed after the material has been cured and the water will be collected and disposed of properly. In addition, every attempt will be made to control the algae growth and associated elevated pH levels in the ponds. Occasional exceedences of the lower limit may be unavoidable due to the low pH of the ambient rainfall. As always, BMPs will added as necessary and appropriate.

CONCLUSIONS

Of the above referenced permit exceedences, none appear to have resulted from an industrial process or historical contamination. The occurrence of TCDD and mercury in surface water samples is likely naturally occurring as the result of numerous brush fires that occurred in the vicinity of the SSFL. The single exceedence of copper, at a concentration not significantly greater than the permit limit, is likely a reflection of variability in naturally occurring concentrations of copper. The pH exceedences during the year are linked to elevated alkalinity resulting from freshly cured mortar and concrete, naturally occurring variability of pH values in soils and sediment, and potentially from naturally occurring acidic rainwater.

BMPs will continue to be reviewed and evaluated to minimize the potential for pollutants, whether naturally occurring or not, to impact surface water at the SSFL.

FACILITY CONTACT

If there are any questions regarding this report or it enclosures, you may contact Mr. Bill McIlvaine of Rocketdyne at (818) 586-9228.

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 a fine and imprisonment for knowing violations.
Executed on the 1\textsuperscript{st} day of March 2005 at the Boeing Company, Rocketdyne Propulsion & Power, Santa Susana Field Laboratory Facility.

Sincerely,

\begin{center}
\textbf{Steve Lafflam} \\
Division Director \\
Safety, Health and Environmental Affairs
\end{center}

Table 1 2004 Rainfall Summary
Table 2 2004 Liquid Waste Shipment Summary
Table 3 2004 Summary of Permit Limit Exceedences
Figure 1 Storm Water Drainage System and Outfall Locations

Attachments:

Section 1  Outfall 001  South Slope below Perimeter Pond
Section 2  Outfall 002  South Slope below R-2 Pond
Section 3  Outfall 003  RMHF
Section 4  Outfall 004  SRE
Section 5  Outfall 005  FSDF-1
Section 6  Outfall 006  FSDF-2
Section 7  Outfall 007  Building 100
Section 8  Outfall 008  Happy Valley (and HV#1 and HV#2)
Section 9  Outfall 009  WS-13 Drainage
Section 10 Outfall 010  Building 203
Section 11 Outfall 011  Perimeter Pond Flume
Section 12 Outfall 012  Alfa Test Stand
Section 13 Outfall 018  R-2 Spillway
Section 14 Analytical Laboratory Methods, Method Detection Limits, Reporting Limits, QA/QC Procedures, and ELAP Certifications

cc:  State Water Resources Control Board-DMR Processing Center
     Jim Pappas, Department of Toxic Substances Control
     Barbara Coler, Department of Toxic Substances Control
     Robert Marshall, California State University – Northridge, Library
     Dale Redfield, Simi Valley Library
     Lynn Light, Platt Branch, Los Angeles Library

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