



Linda S. Adams  
Secretary for  
Environmental Protection



## Department of Toxic Substances Control

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April 5, 2010

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### REQUIREMENT TO SUBMIT INFORMATION ON TRICHLORETHENE IN GROUNDWATER, WELL INJECTION, AND WELL INFORMATION FOR WS-09 AND WS-10, SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY

Dear Messrs. Gallacher, Elliott, and Backous:

The Department of Toxic Substances Control (DTSC) reviewed the historical work plan titled Groundwater Monitoring Plans for Rocketdyne Division's Santa Susana Field Laboratory, Rockwell International, (1982 RCRA Plan) dated September 28, 1982 as part of an ongoing review of the Group 3 Remedial Investigation Report dated May 2009. The results of this review are attached and summarized below.

Based on its review of the 1982 RCRA Plan, DTSC has determined that:

- Chlorinated solvents including trichloroethene (TCE) were detected in facility supply wells as early as 1960. The monitoring and detection of TCE in water supply wells as early as 1960 is contrary to numerous subsequent reports and documents that indicate TCE was first discovered in facility water supply wells in 1984.
- The facility injected imported water into water supply wells in April 1965 to December 1966 time period. The 1982 RCRA Plan also indicates by reference that leach fields were used for waste water disposal in the 1958 time period.
- Data for wells WS-09 and WS-10 appear to be irregular and inconsistent with known hydrogeologic conditions. The irregular information includes: incomplete (e.g., discrepancies in the well total depth) or missing drilling logs; statements that wells were dry; and information indicating that WS-10 was an operational facility well in the 1960 to 1963 time period.

DTSC considers this recently discovered information to be relevant and potentially significant to the current understanding of the distribution of TCE in facility groundwater. The issue of historical water disposal into leach fields and water injection into facility supply wells may require revision of the site conceptual model of groundwater contamination and associated numerical modeling. The irregular information associated with WS-9 and WS-10 may require physical investigation to depths of approximately 1800 feet to address data gaps associated with these historic wells.

To address the data gaps outlined above and update the groundwater conceptual site model, Boeing is hereby directed to perform the following within 60 days:


- Conduct a thorough review of historical chlorinated solvent monitoring and TCE detections in facility production wells and provide the findings of this review. Future documents/reports that present a chronology of groundwater monitoring and TCE detection must correctly reflect that TCE contaminated groundwater was found at the facility as early as 1960, or earlier if supported by historical records.
- Evaluate and correct the data record on water injection and infiltration at the facility. In addition, provide the Killingsworth 1958 a report referenced in the 1982 RCRA Plan along with the Master Disposal Plan and leach field locations referenced by C.C. Killingsworth (1958b).

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- Provide information on the historical groundwater injection or wastewater disposal. This information shall include an analysis of the implication of new information on the existing facility conceptual site model of groundwater contaminant release and transport, and associated numerical modeling.
- Address the irregular information identified at WS-9 and WS-10 in writing and include an analysis of the implication of new information on the existing facility site conceptual model in the response.
  - Perform a rigorous search for all WS-10 well location, drilling/construction documentation, and well destruction documentation. Provide the results of that search in writing to DTSC.
  - If the WS-9 evaluation is not able to resolve the existing discrepancies (e.g., depth, ability to produce water), prepare and submit a work plan to physically evaluate WS-9 total well depth. The workplan shall include well development activities to clear the well to its original depth.

Thank you for your expeditious attention to these critical issues and please submit the requested information to my attention. If you have any questions about DTSC's findings or the attached comments, please contact Mr. Buck King at (510) 540-3955.

Sincerely,



Mark Malinowski  
SSFL Project Manager

Attachment

cc: See next page

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cc: Mr. Dave Dassler  
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## Department of Toxic Substances Control



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To: Gerard Abrams, C.H.G.  
Senior Engineering Geologist  
Geologic Services Branch

From: Buck King, C.H.G. *Buck King*  
Senior Engineering Geologist  
Geologic Services Branch

Date: January 21, 2010

Re: 1982 RCRA Groundwater Monitoring Plan Review

PCA: 22120

Site Code: 530033-48

MPC: 37

### DOCUMENT REVIEWED

Staff from the Geological Service Unit (GSU) of the Geologic Services Branch of the Department of Toxic Substances Control (DTSC) reviewed the historical work plan titled *Groundwater Monitoring Plans for Rocketdyne Division's Santa Susana Field Laboratory, Rockwell International, (1982 RCRA Plan)* dated September 28, 1982. The 1982 RCRA Plan was prepared by Rockwell International for the California Regional Water Quality Control Board No. 4.

### DISCUSSION OF GSU OBSERVATION

The Santa Susana Field Laboratory (SSFL) facility (facility) featured an engineered and actively managed water management system (groundwater extraction, storage, delivery, capture, reuse, treatment, and disposal). The construction and operation of such a system would normally have required the compilation of design and maintenance records. The data requirements for operation of a complex water management system would include maps, drawings, pump flow rates, pond and aquifer water levels, water chemistry data, water system operation and maintenance records, and water use and future needs studies. The expected facility information documenting the water management practices has not been provided and represents a significant data gap for the overall evaluation of facility water management practices.

During review of 1982 RCRA Plan for information regarding facility water supply wells and historical groundwater chemistry data, three significant issues regarding the facility historical record and potential data gaps in the investigation record were identified.

The 1982 RCRA Plan in conjunction with other project reports indicate: 1) SSFL was monitoring for chlorinated compounds including TCE in facility groundwater dating back to 1960; 2) water was injected into facility wells from April 1965 through December 1966; and 3) the historical records for wells WS-9 and WS-10 are incomplete and inaccurate.

The following is a description of the issues identified with general recommendations for additional information to address apparent data gaps.

#### **Historical Evidence of TCE in SSFL Groundwater**

The 1982 RCRA Plan indicates that the facility was monitoring for the presence of chlorinated hydrocarbons, including TCE in groundwater, from water supply wells. Analytical tables list Chlorinated Hydrocarbon analytical results for wells WS-5, 6, 8, 9A, 10, 11, 12, 13, and 14 dating back as early as 1960. Chemical detection of Chlorinated Hydrocarbons in facility groundwater was reported for 3 wells (WS-6, WS-8, and WS-10). Table 13-3 (page 13-6) indicates that well WS-8 had 20 µg/l TCE in 1960. Table 13-2a (page 13-5) indicates that well WS-6 contained 19.5 µg/l TCE in 1980, with a footnote indicating the TCE amount was an average of 4 samples. Table 13-5 (page 13-8) indicates that well WS-10 had 60 µg/l TCE in 1961.

**Recommendation 1.** The detection of TCE in groundwater water supply wells in the 1960s conflicts with current project description that TCE was first discovered in facility water supply wells in 1984 (date of Hargis and Associates Phase 1 Hydrogeologic Conditions Investigation). The data record on TCE monitoring and detection in facility water supply wells should be evaluated and corrected where possible.

#### **Historical Evidence of Water Injection into Wells and Leachfields**

Facility records indicate that the SSFL injected water into facility wells. Footnote 3 on Table 7-2 *Summary of Recent Water-Levels at SSFL Site* (page 7-4) of the 1982 RCRA Plan states: "All wells at SSFL site were artificially recharged from 4/65 to 12/66. After 12/66 well 9A was capped and has not been reopened". Additionally page 12-7 of the 1982 RCRA Plan has the following statement indicating water was injected into SSFL

wells: " Since the acquisition of a commercial water source, significant pumping has all but ceased. Since then, all wells have been artificially recharged during the period April 1965 to December 1966".

The 1982 RCRA Plan statements that facility wells were used for water injection between April 1965 to December 1966 is indirectly supported in the facility record by the anomalous absence of any reported flow rate data for any of the facility wells during that time (Table 8: *Known Groundwater Pumping at SSFL, MWH, 2007 Three Dimensional Groundwater Flow Modeling Report*).

Facility records supporting the water management concept of injecting water into SSFL water supply wells consists of the 1958 recommendations made by C.C. Killingsworth (C.C. Killingsworth 1958a\*) to initiate a program of water reuse, well field rehabilitation, and use of outside water supplies. The recommendations were made to address SSFL's declining groundwater levels and water supply observed during the 1949 to 1958 time period. The use of term "wellfield rehabilitation" implies aquifer recharge and groundwater replenishment.

Records indicating that facility leachfields were used to inject waste water consists of the statement by C.C. Killingsworth (C.C. Killingsworth, 1958b, page 15) "Dyes were added to the effluent entering large leaching fields identified on the Master Disposal Plan as B and C. Over a period of two (2) week, no traces have been detected in any of the producing wells".

**Recommendation 2.** The data record on water injection and infiltration at the facility must be evaluated and corrected. Unknown issues of injected water quality or potential waste water injection present a data gap in the site conceptual model of the groundwater system. The Killingsworth 1958a report should be located and supplied to DTSC for review. The Master Disposal Plan and leachfield locations referenced by C.C. Killingsworth 1958b should be identified.

#### **Inconsistent Data for WS-9 and WS-10**

The 1982 RCRA Plan contains data for wells WS-9 and WS-10 that is not consistent with known hydrogeologic conditions.

Table 12-1 *Site Vicinity Well Data* (1982 RCRA Plan, page 12-6) indicates that well WS-9 is dry. Additional information in the report indicating the well was dry is Figure 12-7 *Site Area Geohydrologic Cross Section*, which shows that well WS-9 referenced by final



portion of county well number "G1" is anomalously dry when compared to adjacent and site wide well water level data. The statement that well WS-9 was dry appears to be implausible and fundamentally impossible given the known saturated hydrogeologic conditions in this area of the site.

The well log for WS-9 is also incomplete. The WS-9 well log consists of a recorded log of lithology to a depth of 800 feet followed by no record for the 800 to 1800 feet. The absence of a record for the bottom 1,000 feet of the 1,800 foot well is inconsistent with data provided for other facility wells and not consistent with what would be expected given professional engineering practices of the time. The incomplete WS-9 well log is described in Well Compendium, Table A-175 *Lithologic Log of Well WS-9*, (Groundwater Resources Consultants Inc, 1995).

Water level and chemical monitoring data for well WS-10 conflicts with current facility description that well WS-10 was dry and subsequently destroyed.

Table 13-5 (1982 RCRA Plan, page 13-8) indicates that well WS-10 was actively monitored and sampled in 1960, 1961, 1962, and 1963. Figure 12-7 *Site Area Geohydrologic Cross Section* of the 1982 RCRA Plan shows that well WS-10 (referenced by final portion of county well number K1) exists and has a measurable water level. The 1982 RCRA Plan also lists Well WS-10 water level data measured in 1959 on Table 12-1 *Site Vicinity Well Data* (1982 RCRA GWMP, page 12-6).

Well WS-10 drilling depth is reported to be 1815 feet deep. No drilling log has been provided. The exact date and record of well destruction of WS-10 has not been provided.

**Recommendation 3.** The data record for WS-9 and WS-10 should be further evaluated and corrected where possible. The general data gaps in well construction and operational history should be further evaluated.

Mr. Gerard Abrams  
January 21, 2010  
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## REFERENCES

C.C. Killingsworth 1958a\*, Geology and Hydrologic Survey of the Undergroundwater Conditions at SSFL Facility. Document cited in 1982 RCRA Plan. Document text cited and referenced in multiple Groundwater Resources Consultant, Inc. SSFL project documents but not located in project files. Example of Groundwater Resources Consultant, Inc. reference located in Groundwater Remedial Action Plan, page 5 paragraph 2. Boeing Document Number HDMSPO01783727.

C.C. Killingsworth, 1958b Report of Findings of Geological and Hydrological Conditions at SSFL as related to Percolation dated November 12, 1958. Boeing Document Number BNA08657026.

Groundwater Resources Consultants Inc, Groundwater Remedial Action Plan, page 5 paragraph 2. Boeing Document Number HDMSPO01783727.

Groundwater Resources Consultants Inc, 1995 Well Compendium, Table A-175 *Lithologic Log of Well WS-9*. Report dated September 20. Boeing Document Number HDMS00007308)

MWH Americas Inc. 2007. Three Dimensional Groundwater Flow Modeling Report, Table 8 *Known Groundwater Pumping at SSFL*

Cc: File