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Via Facsimile &
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CAY1298/295
WBS# 48

December 15, 1998

Mr. Gerald J. Thibeault
Executive Officer
California Regional Water Quality Control Board
Santa Ana Region
3737 Main Street, Suite 500
Riverside, California 92501-3339

Subject: **Quarterly Report – September through November 1998**
Cleanup and Abatement Order No. 97-58
Order Item 1
Lockheed Martin Corporation

Dear Mr. Thibeault:

This Quarterly Report is for the quarter including the months of September, October, and November 1998. The report is submitted in accordance with Board Order No. 97-58 and the approved 15 August 1997 Workplan and Schedule. This update summarizes activities accomplished this quarter organized by each major work task presented in the 15 August 1997 Workplan.

1.0 Perchlorate Sampling

Technical data associated with Water Supply Contingency Policy sampling was submitted to the CRWQCB under separate cover in September and October. The reports are entitled, "Production Well Sampling Report, Water Supply Contingency Plan, Crafton Redlands Plume Project", and give the results of samples collected in August and September.

Results of 1998 comprehensive sampling of Crafton-Redlands plume area wells were submitted to the Regional Board under separate cover in November 1998. The submittal was entitled, "1998 Data Report, Comprehensive Sampling Program, Crafton-Redlands Plume Project".

2.0 Additional Monitoring Wells Proposed for the Leading Edge Area

LMC installed three multiport wells (LMW 3, 6, and 7) earlier this year under "Task 3" plume characterization work completed in cooperation with Order No. 94-37. A meeting has been scheduled for January 1999 to discuss the future of plume characterization activities.

3.0 Modeling of Perchlorate Migration and Potential Impacts

LMC is currently planning to update the Perchlorate Plume Model initial condition to take advantage of the most recent data collected. The update will be based on new information, including that obtained from the 1998 comprehensive sampling event and the "Task 3" plume characterization work completed in cooperation with Order No. 94-37. Predictive simulations will be run and documented in a report that will be submitted to the Regional Board in 1999.

4.0 Treatment Technology Applicability Review

This update presents the information we have gathered this quarter from technology company contacts, public agency contacts, universities, and current technical literature regarding ongoing research efforts to treat and remove perchlorate from drinking water.

4.1 Ion Exchange

4.1.1 Testing Sponsored by the Main San Gabriel Basin Watermaster

The Main San Gabriel Watermaster conducted a small-scale pilot test of the Calgon Carbon Corporation Ion Separation system (ISEP) during the summer of 1998.

The objective of the pilot test was to evaluate the capability of the ISEP process to remove perchlorate in groundwater to the detection limit of 4 parts per billion (ppb) in the presence of other groundwater constituents (e.g. nitrates, sulfates, etc.). The pilot program reported success in completing all of the proposed objectives.

Calgon is currently conducting a similar pilot test of the ISEP process at a groundwater well with perchlorates at the Jet Propulsion Laboratory (JPL) in Pasadena, California. During this phase of testing, Calgon is sending the waste brine solution off-site for disposal. A second test is slated to begin in December 1998 to test a catalytic reduction system to recycle the waste brine.

The Main San Gabriel Basin Watermaster and California Polytechnic University, Pomona completed a report in June entitled, "Perchlorate Removal Study". The study researched the provisionary action limit and possible treatment alternatives for the removal of perchlorate.

The report focused on biological treatment methods, ion exchange, and reverse osmosis. Biological treatment was successful in reducing the perchlorate concentration in water, but the addition of microrganisms to public drinking water system is an obvious health concern. Ion exchange was found to be the most effective treatment alternative in development now, with a reference to Calgon's pilot study at Big Dalton. Reverse osmosis was determined to be an applicable solution; however, this treatment method produces a large volume of concentrated brine waste that requires additional handling and disposal.

4.1.2 Testing Sponsored by Lockheed Martin

In early August 1998, Lockheed Martin began a column test (designed by the Oak Ridge National Laboratory) on several ion exchange resins thought to be highly selective for perchlorate removal. The field test was conducted on groundwater from Sacramento, California and was completed in November 1998.

4.2 Biological Treatment (Testing Sponsored by Aerojet)

Aerojet is planning on conducting additional pilot tests to evaluate the feasibility of using the biological reduction process for drinking water applications. The test will use the fluidized-bed biological reactor by US Filter/Envirex followed by membrane filtration to limit the transfer of bacteria and organic material into the treated water. This test will be conducted in cooperation with the California Department of Health Services (DHS) to determine if this technology is ultimately suitable for drinking water applications.

4.3 AWWARF Perchlorate Research Contracts

The AWWARF has awarded seven additional Requests for Proposals (RFPs) since our last report. In all, eight research projects have been selected and are scheduled to begin once each investigator has received funding. Three additional analytically related projects are waiting to be awarded. Attachment A includes a summary of the current AWWARF research projects for perchlorate and the principal investigators.

4.4 Perchlorate Regulation and the Provisional Action Level

The EPA added perchlorate to the Contaminant Candidate List (CCL) on March 2, 1998. This list provides contaminants that will be considered for regulation by the States. Regulatory determination is not expected for perchlorate until 2001, as additional research is needed in the areas of health effects and treatment technologies.

Senate Bill 1033 was vetoed by the Governor on October 1, 1998, in the California State Legislature. However, the Governor did direct the California regulatory agencies to begin development of a standard for perchlorate in drinking water as soon as new data is

made available from the U.S. EPA. The provisional action level for perchlorate in California remains set at 18 ppb.

The U.S. EPA is currently reviewing results from perchlorate toxicological studies conducted in 1997 and 1998. Upon completion, a revised oral reference dose (RfD) for perchlorate is expected to be issued in draft. An external peer review is planned to occur 5 to 6 weeks after the EPA issues the revised, draft oral reference dose for perchlorate.

5.0 Water Supply Contingency Options

5.1 City of Riverside

The City of Riverside is currently able to blend perchlorate to levels far below the provisional action level.

5.2 City of Loma Linda

During this quarter, the City of Loma Linda brought the Richardson #3 well into service. The City of Loma Linda also initiated work at production well test boring #2 (near Mountain View #1 & also initiated test boring #3 (at the Interstate 10 eastbound freeway off-ramp). A series of test borings is being established to locate new production wells to add or replace groundwater production capacity for the City.

Mountain View #1 remained off-line much of the fourth quarter. Mountain View #2 experienced intermittent concentrations of perchlorate in excess of the provisional action level (i.e., > 18 ppb), and was also off-line several weeks of this quarter due to elevated bacteria counts. Working with the Department of Health Services, the City of Loma Linda developed an acceptable blend plan for continued use of Mountain View #2 (Mountain View #2 is blended with water boosted from a lower elevation zone, when needed).

5.3 Victoria Farms

Lockheed Martin continues to negotiate with Victoria Farms to resolve issues relating to the draft (July 1997) Water Supply Contingency Agreement. Victoria Farms currently receives water from the City of San Bernardino under a temporary water supply agreement.

5.4 City of Redlands

The City of Redlands is avoiding perchlorate through the active management of their surface water and groundwater resources.

5.5 Mountain View Power Company (formerly Southern California Edison)

No perchlorate has been detected in the Mountain View Power Company wells.

5.6 Loma Linda University

Perchlorate concentrations have been well below the provisional action level (and at times non-detect) in the Loma Linda University wells.

5.7 Gage Canal Company

As reported in the previous quarterly report, LMC connected the Gage Canal Company facility to the City of San Bernardino water supply for drinking water purposes.

6.0 Perchlorate Study Group

Perchlorate toxicity data from the recent battery of tests is scheduled to be published by the Interagency Perchlorate Steering Committee for public peer review in late December 1998, or early 1999.

In cooperation with the Perchlorate Study Group, Lockheed Martin has tested several chemical fertilizers for perchlorate. In November, LMC transmitted a report entitled: "Chemical Fertilizer as a Potential Source of Perchlorate" to the Regional Board. Five of the eight fertilizers initially tested contained significant concentrations (percentage level) of perchlorate. LMC will coordinate a multiple lab retest of the original fertilizers and LMC will also collect numerous untested fertilizers for analysis in 1999.

The next quarterly update will be submitted on or before March 15, 1999. If you have any questions, please contact me at (818) 847-0197 or Mr. Tom Blackman at (818) 847-0791.

Sincerely,

Carol Yuge

Carol Yuge

Attachment A: 1998 AWWARF Awarded Research Projects

cc: See attached distribution list

cc: Kalyanpur Baliga, Department of Health Services (San Bernardino)
Tom Bartol, USAF, Norton Air Force Base
Dodie Farmer, Victoria Farms Mutual Water Company
Wesley Danskin, United States Geological Survey
Gary Forth, City of Loma Linda
Douglas Headrick, San Bernardino Valley Water Conservation District
Mike Huffstutler, City of Redlands
Ross Lewis, Gage Canal Company
Kevin Mayer, U.S. EPA, Region IX
Steve Mains, Western Municipal Water District
Morris Matson, Loma Linda University
Eugene McMeans, Riverside Highland Water Company
Zahra Panahi, City of Riverside
Bob Reiter, San Bernardino Valley Municipal Water District
Toby Roy, Department of Health Services (San Diego)
Alain Sharp, Earth Technology Corporation
Joseph Stejskal, City of San Bernardino