CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. 97-145

ADOPTION OF FINAL SITE CLEANUP REQUIREMENTS AND RESCISSION OF ORDER NO. 97-011 FOR:

LOCKHEED MARTIN CORPORATION (MISSILES & SPACE) AND SOBRATO DEVELOPMENT COMPANIES

for the property located at

1235 ELKO DRIVE
SUNNYVALE
SANTA CLARA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter Board), finds that:

1. **Site Location**: The site is located in the northern portion of the City of Sunnyvale, Santa Clara County, California. It is situated on the north side of Elko Drive, approximately 1-1/4 miles north of Interstate Highway 101 and about 1/4 miles south of Highway 237.

   The site and the surrounding area are relatively flat, lying at an elevation of between 5 and 8 feet above mean sea level. The land use in the vicinity was predominantly agricultural, prior to the 1960s. Most development dates from 1960s or later and consists of industrial facilities with associated offices. There are no residential areas between the site and San Francisco Bay.

2. **Site History**: Sobrato Development Companies (Sobrato) owns the property located at 1235 Elko Drive. The property was developed in 1967, and Lockheed Missiles & Space Company, Inc. (now Lockheed Martin Corporation, Missiles and Space (LMMS)) used the property from 1968 until 1992, first as a machine shop and later as a product development shop. Both the machine shop and the product development used similar equipments and chemicals. LMMS terminated leasing the property in August 1992.

   The manufacturing activities at the building included grinding, shearing, cutting, and other machine shop operations. The northwest corner of the building was used as a welding area until 1975. There were six shallow machine sumps in the building. The sumps were not used as primary containment for hazardous materials. Most of the liquid hazardous

materials used at the site were stored in small quantities of less than five gallons and stored in chemical cabinets. Larger quantities of liquid chemicals were stored in 55-gallon drums which were located in a concrete bermed storage facility on the west side of the building. The volatile organic compounds (VOCs) used at the site were mainly Freon-113, methyl ethyl ketone (MEK), TCE, and isopropyl alcohol (IPA).

3. **Named Dischargers**: LMMS is named as a discharger because it used VOCs during its occupancy of the site from 1968 to 1992. LMMS most likely released VOCs at the site because the same VOCs were found in soil and groundwater underneath the site.

   Sobrato is named as discharger because it is current owner of the site. Sobrato will be responsible for compliance only if the Board or Executive Officer finds that other named dischargers have failed to comply with the requirements of this order.

   If additional information is submitted indicating that other parties caused or permitted any waste to be discharged on the site where it entered or could have entered waters of the State, the Board will consider adding that party's name to this order.

4. **Regulatory Status**:

   This site was formerly subjected to the following Board order:

   - Site Cleanup Requirements (Order No. 97-011) adopted January 15, 1997

5. **Site Hydrogeology**: Surface water bodies in the vicinity of the site include San Francisco Bay, tidal creeks and estuarine wetlands adjacent to the bay that flow from ephemeral freshwater streams from the Santa Cruz mountains to San Francisco Bay. Surface runoff in the site vicinity is controlled by the City of Sunnyvale storm drain system.

   The shallow subsurface deposits in the area are fine grained estuarine deposits consisting of unconsolidated, plastic clays and silty clay, which are rich in organic material and contain lenses and stringers of well-sorted silt and sand, as well as beds of peat.

   Groundwater generally exists in the permeable sand and gravel and alluvial fans deposited by east-flowing streams descending from the Santa Cruz Mountains. The regional groundwater gradient, as observed by other studies in the site vicinity, is northerly. The first shallow water-bearing zone ("A" zone) at the site is encountered at a depth of approximately 8-1/2 feet and extends to about 20 feet below ground surface (bgs). The intermediate water-bearing zone ("B" zone) is encountered between 80 to 85 feet bgs. The A and B water-bearing zones are separated by about 55 feet thick silty-clay aquitard.

6. **Remedial Investigation**: Sobrato and LMMS performed soil and groundwater investigation at the site in the early 1990s.

Soil: Sobrato conducted soil investigation in the vicinity of the former hazardous materials storage area in November 1990. Soil samples from five soil borings were analyzed for VOCs using EPA Method 8010. Analytical results indicated the presence of low levels of TCE, 1,2-DCE and Freon-113.

Additional soil investigation was conducted by LMMS in August 1992, as part of closure activities for the building. Soil samples collected from the potential source areas including the hazardous materials and hazardous waste storage areas, near sumps and adjacent to machine locations. Soil samples beneath the two sumps and associated piping in the northwest corner of the building indicated elevated levels of TCE and trans-1,2-DCE. Where practical, all contaminated soils containing VOCS above cleanup levels were excavated in 1992.

Groundwater: Sobrato conducted groundwater investigation at the site in 1990. Groundwater samples were analyzed for VOCs using EPA Method 8240. Results of these analyses indicated that PCE and TCE were detected above drinking water standards. Other VOCs such as 1,1-DCE, 1,2-DCE, chloroform, methylene chloride, Freon-113, and toluene were also detected. LMMS also performed groundwater investigation in 1992 and 1993. Water samples were collected within the excavated area and analyzed for VOCs by EPA Methods 8240. Analytical results indicated elevated concentrations of TCE and 1,2-DCE at and near the former sumps at the northwest corner of the site.

LMMS conducted additional groundwater investigation to delineate the lateral extent of VOCs at the site in 1993 and 1994. LMMS installed two additional monitoring wells, two extraction wells and four piezometers at the site. Groundwater data indicated presence of elevated concentrations of TCE up to 1900 ppb and cis-1,2-DCE up to 160 ppb along the northern boundary of the property. Given the limited presence of VOCs in soil and groundwater at the site and due to existing data generated for nearby sites, determination of the vertical extent of VOCs is not needed for the site.

7. **Adjacent Sites:**

Former Western Microwave, Inc. (WMI) Facility: This site is located at 1271 Reamwood Avenue, downgradient and north of the LMMS site. WMI discovered a VOC release at its site in 1985. The indicator chemicals are PCE and its breakdown products (TCE and cis- and trans-1, 2-DCE), dichlorobenzene isomers, ethylbenzene and xylenes. VOC concentration were substantially higher both in soil and in groundwater at the WMI site than at the LMMS site. In 1995-1996, WMI conducted extensive source removal and implemented a groundwater extraction and treatment system. The Board adopted initial site cleanup requirements for WMI in May 1993 and amended them in July 1995. Final site cleanup requirements were adopted in April 1997. Since the LMMS site is upgradient of the WMI site, pollutants from the LMMS site have probably migrated off-site and may

have commingled with the WMI's VOC plume, particularly at the southern portion of the WMI site.

Former Intersil Facility: This site is located at 1276 Hammerwood Avenue, Sunnyvale, downgradient and north of the LMMS site. VOC releases were first discovered at this site in 1982. Subsurface investigations at the Intersil site revealed the presence of chlorinated organic solvents in soil and groundwater. TCE, DCE and other breakdown products and Freon-113 are the primary chemicals at this site. The Board adopted waste discharge requirements for the Intersil site in October 1986, and final site cleanup requirements in November 1993. Intersil operated a groundwater extraction and treatment system from 1987 to 1995. Intersil shifted to a passive remediation system in 1995. Due to the proximity of the two sites, VOCs that originated at the LMMS site may have migrated to the Intersil site, prior to curtailment of Intersil's groundwater extraction system.

Data collected during quarterly monitoring events at the LMMS site have revealed very low VOC concentrations in groundwater at the southern boundary, upgradient of the site. The source is presently not known.

8. **Interim Remedial Measures:**

Soil Excavation: LMMS conducted appropriate source control activities in 1992. These activities include identification and removal of soils containing VOCs above preliminary cleanup goals (1 parts per million (ppm)), where practical, in the northwest corner of the building. The excavated area encompassed the floor drains, piping and sumps, the apparent sources of the soil contamination. About 350 cubic yards of soil was excavated at this time. The excavation extended to about 14 feet deep, but excluded the building foundation to protect the structural integrity of the building. LMMS also properly swept, rinsed and filled in with concrete to floor level all of the sumps. Confirmation soil samples were collected on August 11 and 12, 1992 from the soil left in place adjacent to the excavation. Based on the confirmatory soil samples, no additional soil remediation is needed for the site.

Groundwater: LMMS implemented groundwater interim remedial measures (IRMs) at the site in 1994. The IRMs consist of two shallow groundwater extraction wells. The combined average rate is less than or equal to about 1.5 gpm. The extracted groundwater is discharged to the City's sanitary sewer. Based on the IRMs evaluation data, the two extraction wells have been reasonably reducing VOC concentrations on-site; however, they have not been able to fully contain the VOCs detected at the northern property boundary due to low pumping rates. The system has extracted about 2.2 pounds (1 kilogram) of VOCs since it began operation. There are four monitoring wells and four piezometers at the site.

9. **Feasibility Study**: LMMS developed and evaluated a list of possible alternatives for remediating the contaminated shallow groundwater underneath the 1235 Elko Drive site. The screening of technologies was based on their applicability to site characteristics, on the properties of the chemicals, and on reliability and performance of treatment technologies. The remaining technologies include: a) "no action", b) groundwater extraction and discharge to sanitary sewer (existing IRMs), c) extraction trench, d) groundwater extraction/air sparging and treat with granular activated carbon or air stripping, and e) permeable barrier. These technologies were further evaluated on the basis of implementability, effectiveness and environmental and public health impacts. LMMS selected the existing groundwater extraction and discharge to the sanitary sewer as a final remedy for the site due to reliability, implementability, performance, institutional and community acceptability, and cost effectiveness.

10. **Cleanup Plan**: The site cleanup requirements (Order No. 97-011) required LMMS to submit a draft remedial action (RAP) by May 31, 1997. LMMS submitted a RAP on May 30, 1997. LMMS submitted RAP addenda in September and October in response to Board staff comments. The RAP and its addenda summarize the remedial investigation and interim remedial measures, evaluate cleanup alternatives and risk to human health, propose health based cleanup levels, and propose groundwater extraction and discharge to sanitary sewer as a final remedy.

    The proposed remedy, groundwater extraction and discharge to the sanitary sewer, will partially contain off-site migration of the plume. A minor increase in the extraction rate is needed to fully contain the VOCs detected along the northern property boundary. The RAP and its addenda address all required topics. However, some statements in the RAP are inconsistent with the technical evidence or Board policy for groundwater remediation, particularly regarding VOCs detected along the northern property boundary, off-site migration, cleanup alternatives for VOCs along the property boundary, and proposed cleanup levels. In light of the deficiencies and in the interest of time, it is appropriate for the Board to modify the RAP - see Agency Addendum (attached).

11. **Risk Assessment**: The shallow groundwater underneath the site is not currently used for domestic supply. Nonetheless, LMMS's September 29 and October 21, 1997, risk assessment addenda assumed that the shallow groundwater beneath the site would in future be used as a domestic water supply by on-site worker. Two scenarios were used to address this issue. Scenario 1 evaluated current site conditions using most recent maximum groundwater VOC concentrations. Scenario 2 evaluated future conditions using final cleanup goals (MCLs). The assessment determined the primary chemicals of interest and their toxicity and identified potential exposure pathways for both scenarios. Then, the assessment computed risks for carcinogenic and non-carcinogenic chemicals in the groundwater, and compared them to the EPA recommended risk range.

Toxicity Classification for Chemicals of Interest: The risk assessment included eleven compounds that have been consistently or infrequently detected in shallow groundwater beneath the site. These compounds are: 1,1-DCA, 1,2-DCA, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, PCE, Freon 11, Freon 113, 1,1,1-TCA, TCE, and vinyl chloride. TCE was the main compound that was widely and consistently found at significant levels.

Five of the indicator chemicals are classified as carcinogens: 1,2-DCA, 1,1-DCE, PCE, TCE, and vinyl chloride. Based on EPA's classification, vinyl chloride is class "A" carcinogen (sufficient human evidence). PCE, TCE, and 1,2-DCA are class "B2" carcinogens (inferring probable human carcinogen, with inadequate human evidence and sufficient evidence from animal experiments). 1,1-DCE is a class "C" carcinogen (possible human carcinogen, limited evidence of carcinogenicity in animals with inadequate human data). The rest of the compounds such as 1,1-DCA, cis-1,2-DCE, trans-1,2-DCE, Freon 11, Freon 113, and 1,1,1-TCA are non-carcinogens (class "D" or lower).

Exposure Assessment: Under current use of the site, there appear to be no complete exposure pathways. Contaminant concentrations in the shallow aquifer are greater than drinking water standards; however, the shallow aquifer is currently not being used for drinking water. The deeper aquifer that is used for drinking water has not been impacted by VOCs.

The assessment assumed that a hypothetical domestic well would be screened in the shallow aquifer for future uses by on-site worker. Two potential pathways of exposure were recognized to evaluate the risk assessment. The first hypothetical pathway is the use of shallow groundwater underneath the site as a source of drinking water. Quantification of exposure from this pathway assumes ingestion as an exposure route. The second hypothetical exposure route is inhalation of VOC vapors diffused from groundwater to buildings above. Both exposure routes assume an on-site worker scenario. The ingestion exposure route also assumes exposure of drinking 2 liters of water per day by 70-kilogram person.

Baseline Risk: LMMS used a conservative (Reasonable Maximum Exposure) and a more realistic (Most Likely Exposure) approaches when calculating potential incremental cancer risks and adverse non-cancer health effects for this scenario. The current VOC concentrations at the site will pose threat to human health if the shallow groundwater is used for domestic use pending remediation. The excess cancer risk for on-site worker for the conservative approach was estimated to be 1.6×10^{-4} or about 1.6 excess cancer cases in a population of 10,000. A total hazard index (HI) for the conservative approach was determined to be about 6.17, with TCE alone accounting for most of the HI.

For comparison, the Board considers the following risk to be acceptable at remediation sites: a hazardous index of 1.0 or less for non-carcinogens, and an excess cancer risk of 10^{-4} or less for carcinogens.

The baseline risk assessment did not identify soil as an exposure medium. The potential sources of VOCs in soil have been removed in the proximity of the former sump areas and associated pipelines.

Due to excessive risk that may be present at the site pending full remediation, institutional constraints are appropriate to limit on-site exposure to acceptable levels. Institutional constraints include a deed restriction that notifies future owners of subsurface contamination and prohibits the use of shallow groundwater beneath the site as a source of drinking water until cleanup standards are met.

Post-Remediation Risk: LMMS conducted risk assessment considering drinking water standards (MCLs) of VOCs as a final cleanup goal for all pollutants at the site. This approach would protect future beneficial uses of the shallow groundwater underneath the facility. The assessment evaluates the potential health risk for use of shallow groundwater at the site as a domestic supply for on-site worker once MCLs are achieved. For the carcinogenic chemicals, the excess cancer risk predicted by the conservative analysis is about 3.4×10^{-5}, or less than 4 in a population of 100,000. This cancer risk level lies within the EPA's recommended risk range. Likewise, the total HI for all non-carcinogenic compounds was found to be 0.12, significantly below the 1.0 level.

12. Basis for Cleanup Standards

a. **General**: State Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," applies to this discharge and requires attainment of background levels of water quality, or the highest level of water quality which is reasonable if background levels of water quality cannot be restored. Cleanup levels other than background must be consistent with the maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of such water, and not result in exceedance of applicable water quality objectives.

State Board Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304," applies to this discharge. This order and its requirements are consistent with the provisions of Resolution No. 92-49, as amended.

b. **Beneficial Uses**: The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on June 21, 1995. This updated and consolidated plan represents the Board's master water quality control planning document. The revised Basin Plan was approved by the State Water Resources Control Board and the Office of Administrative Law on July 20, 1995, and November 13, 1995, respectively. A summary of regulatory provisions is

contained in 23 CCR 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface waters and groundwaters.

Board Resolution No. 89-39, "Sources of Drinking Water," defines potential sources of drinking water to include all groundwater in the region, with limited exceptions for areas of high TDS, low yield, or naturally-high contaminant levels. Groundwater underlying and adjacent to the site qualifies as a potential source of drinking water.

The Basin Plan designates the following potential beneficial uses of groundwater underlying and adjacent to the site:

- o Municipal and domestic water supply
- o Industrial process water supply
- o Industrial service water supply
- o Agricultural water supply

At present, there is no known use of groundwater underlying the site for the above purposes. The immediate off-site area is also an active site where Western Microwave continues to conduct a groundwater extraction under Board order. Generally, the site and its environs are zoned for commercial and light-industrial use, and this use is unlikely to change in the future. Conversion to residential use is even less likely.

c. **Basis for Groundwater Cleanup Standards**: The groundwater cleanup standards for the site are based on applicable water quality objectives and are the more stringent of EPA and California primary maximum contaminant levels (MCLs). Cleanup to this level will result in acceptable residual risk to humans.

13. **Future Changes to Cleanup Standards**: The goal of this remedial action is to restore the beneficial uses of groundwater underlying and adjacent to the site. Results from other sites suggest that full restoration of beneficial uses to groundwater as a result of active remediation at this site may not be possible. If full restoration of beneficial uses is not technologically nor economically achievable within a reasonable period of time, then the dischargers may request modification to the cleanup standards or establishment of a containment zone, a limited groundwater pollution zone where water quality objectives are exceeded. Conversely, if new technical information indicates that cleanup standards can be surpassed, the Board may decide if further cleanup actions should be taken.

14. **Reuse or Disposal of Extracted Groundwater**: Board Resolution No. 88-160 allows discharges of extracted, treated groundwater from site cleanups to surface waters only if it

has been demonstrated that neither reclamation nor discharge to the sanitary sewer is technically and economically feasible.

15. **Basis for 13304 Order**: The dischargers have caused or permitted waste to be discharged or deposited where it is or probably will be discharged into waters of the State and creates or threatens to create a condition of pollution or nuisance.

16. **Cost Recovery**: Pursuant to California Water Code Section 13304, the dischargers are hereby notified that the Board is entitled to, and may seek reimbursement for, all reasonable costs actually incurred by the Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this order.

17. **CEQA**: This action is an order to enforce the laws and regulations administered by the Board. As such, this action is categorically exempt from the provisions of the California Environmental Quality Act (CEQA) pursuant to Section 15321 of the Resources Agency Guidelines.

18. **Notification**: The Board has notified the dischargers and all interested agencies and persons of its intent under California Water Code Section 13304 to prescribe site cleanup requirements for the discharge, and has provided them with an opportunity to submit their written comments.

19. **Public Hearing**: The Board, at a public meeting, heard and considered all comments pertaining to this discharge.

IT IS HEREBY ORDERED, pursuant to Section 13304 of the California Water Code, that the dischargers (or their agents, successors, or assigns) shall cleanup and abate the effects described in the above findings as follows:

A. PROHIBITIONS

1. The discharge of wastes or hazardous substances in a manner which will degrade water quality or adversely affect beneficial uses of waters of the State is prohibited.

2. Further significant migration of wastes or hazardous substances through subsurface transport to waters of the State is prohibited.

3. Activities associated with the subsurface investigation and cleanup which will cause significant adverse migration of wastes or hazardous substances are prohibited.

B. CLEANUP PLAN AND CLEANUP STANDARDS

1. **Implement Cleanup Plan:** The dischargers shall implement the cleanup plan described in finding 10 and modified by the Agency Addendum (attached).

2. **Groundwater Cleanup Standards:** The following groundwater cleanup standards shall be met in all wells identified in the Self-Monitoring Program:

Constituent	Cleanup Standard (ug/l)	Basis (Primary MCLs)
1,1-Dichloroethane	5	CALEPA
1,2-Dichloroethane	0.5	CALEPA
1,1-Dichloroethene	6	CALEPA
Cis-1,2-Dichloroethene	6	CALEPA
Trans-1,2-Dichloroethene	10	CALEPA
Freon 11	150	CALEPA
Freon 113	1200	CALEPA
Tetrachloroethene	5	EPA/CALEPA
1,1,1-Trichloroethane	200	EPA/CALEPA
Trichloroethene	5	EPA/CALEPA
Vinyl chloride	0.5	CALEPA

C. TASKS

1. **PROPOSED INSTITUTIONAL CONSTRAINTS**

COMPLIANCE DATE: March 15, 1998

Submit a technical report acceptable to the Executive Officer documenting procedures to be used and implemented by the dischargers to prevent or minimize human exposure to soil and groundwater contamination prior to meeting cleanup standards. Such procedures shall include a deed restriction prepared and filed by Sobrato (the owner) prohibiting the use of shallow groundwater as a source of drinking water.

2. **IMPLEMENTATION OF INSTITUTIONAL CONSTRAINTS**

COMPLIANCE DATE: 60 days after Executive Officer approval of the Institutional Constraints

Submit a technical report acceptable to the Executive Officer documenting that the proposed institutional constraints have been implemented.

3. **REMEDIATION AT NORTHERN PROPERTY BOUNDARY**

COMPLIANCE DATE: April 30, 1998

Submit a technical report acceptable to the Executive Officer documenting either (i) implementation and effectiveness evaluation of the adjusted pumping rates of the on-site extraction system to extend the zone of capture or (ii) collaboration with Western Microwave to effectively remediate the neutral zone between the two sites along LMMS's northern property boundary.

4. **FIVE-YEAR STATUS REPORT**

COMPLIANCE DATE: December 31, 2002

Submit a technical report acceptable to the Executive Officer evaluating the effectiveness of the approved cleanup plan. The report should include:

a. Summary of effectiveness in controlling contaminant migration and protecting human health and the environment
b. Comparison of contaminant concentration trends with cleanup standards
c. Comparison of anticipated versus actual costs of cleanup activities
d. Performance data (e.g. groundwater volume extracted, chemical mass removed, mass removed per million gallons extracted)
e. Cost effectiveness data (e.g. cost per pound of contaminant removed)
f. Summary of additional investigations (including results) and significant modifications to remediation systems
g. Additional remedial actions proposed to meet cleanup standards (if applicable) including time schedule

If cleanup standards have not been met and are not projected to be met within a reasonable time, the report should assess the technical practicability of meeting cleanup standards and may propose an alternative cleanup strategy.

5. **PROPOSED CURTAILMENT**

COMPLIANCE DATE: 60 days prior to proposed curtailment

Submit a technical report acceptable to the Executive Officer containing a proposal to curtail remediation. Curtailment includes system closure (e.g. well abandonment), system suspension (e.g. cease extraction but wells retained), and significant system modification (e.g. major reduction in extraction rates, closure of individual extraction wells within extraction network). The report should include the rationale for curtailment. Proposals for final closure should demonstrate that cleanup standards have been met, contaminant concentrations are stable, and contaminant migration potential is minimal.

6. **IMPLEMENTATION OF CURTAILMENT**

COMPLIANCE DATE: 60 days after Executive Officer approval

Submit a technical report acceptable to the Executive Officer documenting completion of the tasks identified in Task 5.

7. **EVALUATION OF NEW HEALTH CRITERIA**

COMPLIANCE DATE: 90 days after requested by Executive Officer

Submit a technical report acceptable to the Executive Officer evaluating the effect on the approved cleanup plan of revising one or more cleanup standards in response to revision of drinking water standards, maximum contaminant levels, or other health-based criteria.

8. **EVALUATION OF NEW TECHNICAL INFORMATION**

COMPLIANCE DATE: 90 days after requested by Executive Officer

Submit a technical report acceptable to the Executive Officer evaluating new technical information which bears on the approved cleanup plan and cleanup standards for this site. In the case of a new cleanup technology, the report should evaluate the technology using the same criteria used in the feasibility study. Such technical reports shall not be requested unless the Executive Officer determines that the new information is reasonably likely to warrant a revision in the approved cleanup plan or cleanup standards.

9. **Delayed Compliance**: If the dischargers are delayed, interrupted, or prevented from meeting one or more of the completion dates specified for the above tasks,

the dischargers shall promptly notify the Executive Officer and the Board may consider revision to this Order.

D. PROVISIONS

1. **No Nuisance:** The storage, handling, treatment, or disposal of polluted soil or groundwater shall not create a nuisance as defined in California Water Code Section 13050(m).

2. **Good O&M:** The dischargers shall maintain in good working order and operate as efficiently as possible any facility or control system installed to achieve compliance with the requirements of this Order.

3. **Cost Recovery:** The dischargers shall be liable, pursuant to California Water Code Section 13304, to the Board for all reasonable costs actually incurred by the Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this Order. If the site addressed by this Order is enrolled in a State Board-managed reimbursement program, reimbursement shall be made pursuant to this Order and according to the procedures established in that program. Any disputes raised by the dischargers over reimbursement amounts or methods used in that program shall be consistent with the dispute resolution procedures for that program.

4. **Access to Site and Records:** In accordance with California Water Code Section 13267(c), the dischargers shall permit the Board or its authorized representative:

   a. Entry upon premises in which any pollution source exists, or may potentially exist, or in which any required records are kept, which are relevant to this Order.

   b. Access to copy any records required to be kept under the requirements of this Order.

   c. Inspection of any monitoring or remediation facilities installed in response to this Order.

   d. Sampling of any groundwater or soil which is accessible, or may become accessible, as part of any investigation or remedial action program undertaken by the dischargers.

5. **Self-Monitoring Program:** The dischargers shall comply with the Self-Monitoring Program as attached to this Order and as may be amended by the Executive Officer.

6. **Contractor / Consultant Qualifications:** All technical documents shall be signed by and stamped with the seal of a California registered geologist, a California certified engineering geologist, or a California registered civil engineer.

7. **Lab Qualifications:** All samples shall be analyzed by State-certified laboratories or laboratories accepted by the Board using approved EPA methods for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control (QA/QC) records for Board review. This provision does not apply to analyses that can only reasonably be performed on-site (e.g. temperature).

8. **Document Distribution:** Copies of all correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the following agencies:

   a. City of Sunnyvale Department of Public Safety
   b. County of Santa Clara Department of Environmental Health
   c. Santa Clara Valley Water District

   The Executive Officer may modify this distribution list as needed.

9. **Reporting of Changed Owner or Operator:** The dischargers shall file a technical report on any changes in site occupancy or ownership associated with the property described in this Order.

10. **Reporting of Hazardous Substance Release:** If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, the dischargers shall report such discharge to the Regional Board by calling (510) 286-1255 during regular office hours (Monday through Friday, 8:00 to 5:00).

    A written report shall be filed with the Board within five working days. The report shall describe: the nature of the hazardous substance, estimated quantity involved, duration of incident, cause of release, estimated size of affected area, nature of effect, corrective actions taken or planned, schedule of corrective actions planned, and persons/agencies notified.

    This reporting is in addition to reporting to the Office of Emergency Services required pursuant to the Health and Safety Code.

11. **Secondarily-Responsible Discharger:** Within 60 days after being notified by the Executive Officer that other named dischargers have failed to comply with this order, Sobrato as property owner shall then be responsible for complying with this order.

12. **Rescission of Existing Order:** This Order supersedes and rescinds Order No. 97-011.

13. **Periodic SCR Review:** The Board will review this Order periodically and may revise it when necessary.

I, Loretta K. Barsamian, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on December 17, 1997.

Loretta K. Barsamian
Loretta K. Barsamian
Executive Officer

FAILURE TO COMPLY WITH THE REQUIREMENTS OF THIS ORDER MAY SUBJECT YOU TO ENFORCEMENT ACTION, INCLUDING BUT NOT LIMITED TO: IMPOSITION OF ADMINISTRATIVE CIVIL LIABILITY UNDER WATER CODE SECTIONS 13268 OR 13350, OR REFERRAL TO THE ATTORNEY GENERAL FOR INJUNCTIVE RELIEF OR CIVIL OR CRIMINAL LIABILITY

Attachments: Site Map
Agency Addendum
Self-Monitoring Program

Map Source: USGS 7.5', Milpitas, Calif., 1961, Photorevised: 1980
USGS 7.5', Mountain View, Calif., 1961, Photorevised: 1981

SCALE (FEET)

McLaren Hart
ENVIRONMENTAL ENGINEERING CORPORATION

FIGURE 1
SITE LOCATION MAP
FORMER LMMS BUILDING 821 SITE
SUNNYVALE, CA

AGENCY ADDENDUM FOR

LOCKHEED MARTIN CORPORATION (MISSILES AND SPACE) FINAL REMEDIAL ACTION PLAN

Lockheed Martin Corporation, Missiles and Space (LMMS) submitted a remedial action plan (RAP) on May 30, 1997. The Board approves the selected remedial alternative (groundwater extraction and discharge to a sanitary sewer) as a final remedy for the site with a minor increase in the extraction rate to fully capture the VOCs detected along the northern property boundary. The RAP and its addenda addressed all the required topics. However, some statements in the RAP are inconsistent with the technical evidence or Board policy for groundwter remediation. This Agency Addendum modifies certain sections of LMMS's RAP. Section numbers discussed in this Agency Addendum correspond to Sections of LMMS's RAP.

1. **VOCs Along the Northern Property Boundary (Section 5.5 and elsewhere):** The RAP concludes that VOCs (mainly TCE) detected in shallow groundwater along the northern property boundary (the boundary) were caused by an additional release at the boundary. We disagree with LMMS's interpretation for the following reasons:

   - LMMS's interpretation is not supported by actual investigation data; rather, it is based on theoretical fate and transportation analysis. LMMS did not conduct soil investigation along the boundary area to verify its interpretation. We would not expect groundwater concentrations at the boundary to decline rapidly if an additional source exists along the boundary. TCE concentrations have declined from 424 ppb to about 94 ppb in monitoring well MW-1 and from 1900 ppb to about 360 ppb in piezometer PZ-2 in the last two years. MW-1 is located about three feet downgradient from the boundary at the Western Microwave site, and PZ-2 is located about 11 feet upgradient from the boundary at the LMMS site.

   - The chemicals detected in groundwater at the boundary are indistinguishable from those detected at LMMS's on-site monitoring wells. TCE was the predominant chemical detected at significant levels at the LMMS site and at the boundary, but no PCE was detected in groundwater at either place. In addition to TCE, PCE and aromatic chemicals were detected at significant levels both in soil and groundwater at the Western Microwave site. Based on the chemical signatures, it appears that the VOCs detected at the boundary most probably originated from the LMMS site.

   - The presence of relatively high TCE concentrations along the boundary does not prove the existence of another source. The lithology underneath the site is not homogeneous. A significant amount of contaminated soil was excavated from the area at and near the former LMMS's sump area. Given the duration of LMMS's release, magnitude of VOCs in soil, shallow groundwater, and heterogeneous

lithology, detection of elevated TCE concentrations in groundwater along the boundary is not anomalous.

2. **Off-Site Migration (Section 3.3 and elsewhere):** The RAP concludes that the VOCs released at the subject site probably did not migrate off-site. We disagree. There was a significant release of VOCs at the subject site. The northern property boundary is only about 75 feet downgradient from the excavated source area (sump), and there is no physical barrier to prevent off-site migration of the plume. In nearby areas with similar hydrogeology, TCE and other VOCs have migrated over 300 feet from the source area. It would be difficult to quantify the magnitude of VOCs that have migrated off-site. However, we believe that TCE and other pollutants originating at the LMMS site have probably migrated off-site and may have commingled with the downgradient VOC plume originating at the Western Microwave site.

3. **Cleanup Alternatives (Section 5.4.2 and elsewhere):** The RAP proposes "no action" for VOCs in groundwater along the northern property boundary. Despite the presence of significant VOC concentrations in shallow groundwater along the northern property boundary of the site, the RAP proposes no action to contain or reduce the VOC concentrations in the area. Coincidentally, the existing on-site extraction system partially captures the VOC plume along the property boundary. LMMS may not need to install additional extraction wells due to the proximity of the area of concern to the existing extraction wells. However, LMMS should either adjust the pumping rates of its extraction system to extend the zone of capture or collaborate with Western Microwave to effectively remediate the area between the two sites.

4. **Cleanup Standards (Section 7.1 and elsewhere):** The RAP proposes health based cleanup levels for the VOCs identified at the site. The proposed levels are higher than the established drinking water standards and are not consistent with the Board policy. The proposed levels assume inhalation as the only exposure pathway. Ingestion of groundwater has to be considered as a possible exposure pathway. The groundwater underneath the on-site area is considered as a potential source of drinking water. Cleanup standards above the established EPA and/or California drinking water standards will not be protective of human health or the environment. Therefore, LMMS's proposed cleanup levels are not acceptable and are replaced by the cleanup standards established by the Board in this Order.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM FOR:

LOCKHEED MARTIN CORPORATION (MISSILES & SPACE) AND
SOBRATO DEVELOPMENT COMPANIES

for the property located at

1235 ELKO DRIVE
SUNNYVALE
SANTA CLARA COUNTY

1. **Authority and Purpose**: The Board requests the technical reports required in this Self-Monitoring Program pursuant to Water Code Sections 13267 and 13304. This Self-Monitoring Program is intended to document compliance with Board Order No. 97-145 (site cleanup requirements).

2. **Monitoring**: The dischargers shall measure groundwater elevations quarterly in all monitoring wells and piezometer wells, and shall collect and analyze representative samples of groundwater according to the following table:

Error! Bookmark not defined. Well #	Sampling Frequency	Analyses	Well #	Sampling Frequency	Analyses
521-1	A	8010	MW-1	SA	8010
521-2	A	8010	PZ-1	A	8010
521-3	A	8010	PZ-2	SA	8010
521-4*	SA	8010	PZ-3	SA	8010
521-5*	SA	8010	PZ-4	SA	8010
* Extraction Wells					

Key: 8010 = EPA Method 8010 or equivalent
SA = Semi-Annually A = Annually

The dischargers shall sample any new monitoring or extraction wells quarterly and analyze groundwater samples for the same constituents as shown in the above table. The dischargers may propose changes in the above table; any proposed changes are subject to Executive Officer approval.

3. **Semiannual Monitoring Reports:** The dischargers shall submit semiannual monitoring reports to the Board no later than 30 days following the end of the second quarter (e.g. report for first semiannual is due July 31). The up coming semiannual monitoring report shall be due on January 31, 1998. The reports shall include:

   a. Transmittal Letter: The transmittal letter shall discuss any violations during the reporting period and actions taken or planned to correct the problem. The letter shall be signed by the dischargers' principal executive officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.

   b. Groundwater Elevations: Groundwater elevation data shall be presented in tabular form, and a groundwater elevation map should be prepared for each monitored water-bearing zone. Historical groundwater elevations shall be included in the annual report or second semiannual report for each year.

   c. Groundwater Analyses: Groundwater sampling data shall be presented in tabular form, and an isoconcentration map should be prepared for one or more key contaminants for each monitored water-bearing zone, as appropriate. The report shall indicate the analytical method used, detection limits obtained for each reported constituent, and a summary of QA/QC data. Historical groundwater sampling results shall be included in the fourth quarterly report each year. The report shall describe any significant increases in contaminant concentrations since the last report, and any measures proposed to address the increases. Supporting data, such as lab data sheets, need not be included (however, see record keeping - below).

   d. Groundwater Extraction: If applicable, the report shall include groundwater extraction results in tabular form, for each extraction well and for the site as a whole, expressed in gallons per minute and total groundwater volume for the quarter. The report shall also include contaminant removal results, from groundwater extraction wells and from other remediation systems (e.g. soil vapor extraction), expressed in units of chemical mass per day and mass for the quarter. Historical mass removal results shall be included in the fourth quarterly report each year.

e. Status Report: The semiannual report shall describe relevant work completed during the reporting period (e.g. site investigation, interim remedial measures) and work planned for the following quarter.

5. **Violation Reports**: If the dischargers violate requirements in the Site Cleanup Requirements, then the dischargers shall notify the Board office by telephone as soon as practicable once the dischargers have knowledge of the violation. Board staff may, depending on violation severity, require the dischargers to submit a separate technical report on the violation within five working days of telephone notification.

6. **Other Reports**: The dischargers shall notify the Board in writing prior to any site activities, such as construction or underground tank removal, which have the potential to cause further migration of contaminants or which would provide new opportunities for site investigation.

7. **Record Keeping**: The dischargers or their agent shall retain data generated for the above reports, including lab results and QA/QC data, for a minimum of six years after origination and shall make them available to the Board upon request.

8. **SMP Revisions**: Revisions to the Self-Monitoring Program may be ordered by the Executive Officer, either on her/his own initiative or at the request of the dischargers. Prior to making SMP revisions, the Executive Officer will consider the burden, including costs, of associated self-monitoring reports relative to the benefits to be obtained from these reports.

I, Loretta K. Barsamian, Executive Officer, hereby certify that this Self-Monitoring Program was adopted by the Board on December 17, 1997.

Loretta K. Barsamian

Loretta K. Barsamian
Executive Officer