

STATE OF CALIFORNIA  
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION

STAFF SUMMARY REPORT (David Barr)  
MEETING DATE: July 9, 2008

**ITEM:** 10.C

**SUBJECT:** **Siliconix, Inc., for the property located at 2201 Laurelwood Road, Santa Clara, Santa Clara County – Adoption of Final Site Cleanup Requirements**

**CHRONOLOGY:** February 1989 – Site Cleanup Requirements adopted.  
February 1991 – Amended Site Cleanup Requirements Adopted

**DISCUSSION:** This site was initially developed in 1969 as a silicon wafer manufacturing facility. It has been owned and occupied by Siliconix since that time. Groundwater beneath the site is polluted with the solvent trichloroethene (TCE) and its breakdown products. The solvent has been used and stored at the site.

Groundwater extraction and treatment began at the site in 1990. In 2005, Board staff approved a proposal by Siliconix to redesign the groundwater extraction system to increase the efficiency of remediation. The new system has been operating since 2007. The groundwater pollutant removal rate has been increased significantly. The proposed cleanup plan consists of continued use of the expanded groundwater extraction system. The Tentative Order (Appendix A) includes tasks for evaluating the new system's effectiveness and reduction of the groundwater pollutant plume.

We received comments on the Tentative Order from both Siliconix and a down-gradient neighbor, Intel (Appendix B). The Tentative Order has been revised in response to comments. We expect this item to remain uncontested.

**RECOMMEN-  
DATION:** Adoption of the Revised Tentative Order.

File No. 43S0236 (DIB)  
Appendices: A. Revised Tentative Order  
B. Correspondence

APPENDIX A

REVISED TENTATIVE ORDER

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION

REVISED TENTATIVE ORDER

ADOPTION OF FINAL SITE CLEANUP REQUIREMENTS AND RESCISSION OF ORDER  
NOs. 89-027 AND 91-024 FOR:

SILICONIX, INC.

for the property located at

2201 LAURELWOOD ROAD  
SANTA CLARA  
SANTA CLARA COUNTY

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

1. **Site Location:** Siliconix, Inc. (Siliconix) owns and operates a semiconductor wafer manufacturing facility located at 2201 Laurelwood Road in the City of Santa Clara (Site), (See Figure 1). The Site is about twelve acres and consists of three buildings, parking areas and landscaping. The surrounding land use is commercial/industrial and there are a number of large computer and electronics industry facilities nearby. The Site is located near the intersection of the Montague Expressway and the 101 Freeway. San Tomas Aquinas Creek is a short distance from the west side of the Site. The Site and surroundings are in an area of flat to gentle relief in the Southern San Francisco Bay region at the northern end of the Santa Clara Valley.
2. **Site History:** The Siliconix facility began operation in 1969. Prior to construction of the facility, the Site, like much of the surrounding area, was agricultural. Siliconix has been the owner of the Site since it was developed. The facility is a semiconductor manufacturing facility. There have been contaminant releases to soil and groundwater at the facility. Materials released include gasoline and solvents.
3. **Named Dischargers:** Siliconix is named as the discharger because Siliconix is the owner and operator of the Site now and during the time of the activity that resulted in discharges of gasoline and solvents to soil and groundwater, has knowledge of the discharge or the activities that caused the discharge, and has the legal ability to control the discharge.

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 those parties' names to this order.

4. **Regulatory Status:** This site has been subject to the following Board Orders:
  - o Site Cleanup Requirements (Order No. 89-027), adopted February 15, 1989
  - o Amendment to Site Cleanup Requirements (Order No. 91-024), adopted February 15, 1991and remains subject to the following Board Order:
  - o NPDES General Permit (Order No. R2-2004-0055), adopted on July 21, 2004
5. **Site Hydrogeology:** The Site is located in the Santa Clara Valley, a structural basin filled with marine and alluvial sediments. The coarser deposits are probably the result of deposition in or near stream channels that drain the surrounding highlands. Finer grain deposits result from a variety of conditions with the eventual result of a heterogeneous sequence of interbedded sands, silts, and clays. Municipal water supply wells tap an extensive deep regional confined aquifer that lies generally greater than 200 feet below ground surface (bgs). A thick relatively impermeable aquitard separates this deep confined aquifer from a complex series of discontinuous aquifers and aquitards that may extend up to within a few feet of the ground surface. At the Site, the three first encountered water bearing zones have been investigated. The uppermost water bearing zone, the A zone, is first encountered at depths of about 10 to 18 feet bgs and ranges from 3.5 to 16 feet in thickness. The next encountered water bearing zone, the B zone, averages about five feet thick and is first encountered at depths of about 27 to 34 feet. The B zone is separated from the A zone by at least three feet of clay and silt and up to 16 feet of clay and silt. The next encountered water bearing zone, the C zone, is separated from the B zone by at least five feet of clay and silt. The C zone is at least 5.5 feet thick and is first encountered at about 50 feet bgs. Groundwater flow in the A and B water bearing zones is to the northwest. The presumed direction of flow in the C zone is to the northwest as well. Activities during the construction of the buildings at the Site are believed to have resulted in penetration of the aquitard between the A and B zones.
6. **Remedial Investigation:** Investigation at the Site began in 1987 as a result of cleanup activities for a fuel tank leak at an adjacent, downgradient site which found evidence of solvent pollution in groundwater. The possibility that this pollution might be originating offsite led to the initial investigation at Siliconix. During the initial review of the available data, it was discovered that soils polluted with trans-1,2-dichloroethylene (trans-1,2-DCE) and gasoline and gasoline related compounds had been detected at Siliconix in 1984. The source area for the gasoline and related compounds is believed to be the former location of three underground gasoline storage tanks at the Site, which were removed in 1983. This area is now underneath Building 3 (see Figure 2), which was constructed in 1984. There are several VOC source areas also under this building. These areas were formerly the sites of two waste neutralization sumps, solvent storage areas, and a solvent cleaning area for machine parts. Investigation of these areas has

been difficult because of the access problems posed by the building and process equipment.

Groundwater investigation has identified a groundwater pollutant plume originating at the Site that extends downgradient offsite about 750 feet. The primary pollutants are TCE, DCE and their breakdown products. Both the A zone and the B zone have been impacted. It is believed that contamination was inadvertently carried down to the B zone during the construction of footings for Building 3. TCE is currently found at up to 490 ug/l, and cis-1,2-DCE at up to 3,800 ug/l. These high concentrations are found adjacent to Building 3 near the source area. The C zone has not been impacted.

7. **Adjacent Sites:** The Intel Santa Clara 7 Facility (formerly known as Intel Fab 1) is across Juliette Lane from the Site in the downgradient direction. Pollution from the Site may have commingled with groundwater pollution from a release on the Intel Santa Clara 7 site (Intel SC 7). A groundwater cleanup was performed at the Intel SC 7 site. Pollutant levels are relatively low and the site has been issued a “no further action” letter.
8. **Interim Remedial Measures:** Groundwater remediation at the Site began in June 1990. The groundwater remediation system consisted of two A zone extraction wells and one B zone extraction well. One of the A zone extraction wells was located offsite at an adjacent property. This well was destroyed in 1997 due to construction of a new building. It was replaced with another extraction well nearby. The groundwater extraction system was effective in containing the pollutant plume and there has been a reduction in pollutant levels in the area of the plume away from the presumed source area. In the source area, however, pollutant levels had remained stable or declined only slowly. The groundwater extraction system has been redesigned and expanded as discussed in Finding 11, Remedial Action Plan.
9. **Environmental Risk Assessment:**
  - a. **Screening Levels:** A screening level environmental risk assessment was carried out to evaluate potential environmental concerns related to identified soil and groundwater impacts. Chemicals evaluated in the risk assessment include TCE, cis-1,2-DCE, trans-1,2-DCE, and Vinyl Chloride, the primary chemicals of concern identified at the site.

As part of the assessment, site data were compared to Environmental Screening Levels (ESLs) compiled by Board staff. The presence of chemicals at concentrations above the ESLs indicates that additional evaluation of potential threats to human health and the environment is warranted. Screening levels for groundwater address the following environmental concerns: 1) drinking water impacts (toxicity and taste and odor), 2) impacts to indoor air, and 3) migration and impacts to aquatic habitats. Screening levels for soil address: 1) direct exposure, 2)

impacts to indoor air, 3) leaching to groundwater, and 4) nuisance issues. Screening levels for drinking water are based on the lowest of toxicity-based standards (e.g., promulgated Primary Maximum Contaminant Levels (MCLs) or equivalent) and standards based on taste and odor concerns (e.g., Secondary MCLs or equivalent). Chemical-specific screening levels for other human health concerns (i.e., indoor-air and direct-exposure) are based on a target excess cancer risk of  $1 \times 10^{-6}$  for carcinogens and a target Hazard Quotient of 0.2 for noncarcinogens. Groundwater screening levels for the protection of aquatic habitats are based on promulgated surface water standards (or equivalent). The Board considers a cumulative excess cancer risk of  $1 \times 10^{-5}$  and a target Hazard Index of 1.0 to be generally acceptable for human health concerns at commercial and industrial properties. Soil screening levels for potential leaching concerns are intended to prevent impacts to groundwater above target groundwater goals (e.g., drinking water standards). Soil screening levels for nuisance concerns are intended to address potential odor and other aesthetic issues.

- b. **Soil Assessment:** Contaminated soil underlies Building 3 on the Site; however, the extent of the contaminated soil is not fully known due to the difficulty of performing investigation activities. The building is a silicon chip fabrication plant. Solvents are used in the manufacturing process and any impact to indoor air from contaminated soil or groundwater is not significant compared to the VOCs present in the building due to manufacturing operations. The building is ventilated in accordance with the need for sufficient air exchanges due to manufacturing operations.
  
- c. **Groundwater Assessment:** Groundwater VOC concentrations exceed several screening criteria including drinking water, volatilization to indoor air, and aquatic habitat; however, under current conditions only volatilization of VOCs from groundwater to indoor air is of concern. Shallow groundwater is not currently used and groundwater investigation activities have shown that the pollutant plume does not extend to San Tomas Aquinas Creek, which borders the site. Contaminated groundwater underlies Building 3 on the Site; however, environmental controls such as ventilation rates necessary for the manufacturing process effectively control the contaminated groundwater/indoor air potential exposure. The offsite portion of the groundwater VOC plume extends under an office building on the adjacent Intel SC 12 property. Soil gas samples have been collected from soil gas monitoring probes adjacent to the SC 12 building and a risk assessment using these soil gas concentrations and site specific building data has been performed. The risk level has been within acceptable limits for the current SC 12 land use.

Chemicals of Concern	Maximum Reported Concentration (ug/L)	Results of Screening Assessment *		
		Potential Drinking Water Concerns	Potential Indoor-Air Concerns	Potential Aquatic Habitat Concerns
TCE	490	X	X	X
cis-1,2 DCE	3,800	X		X
trans-1,2 DCE	24	X		
Vinyl Chloride	650	X	X	X

\* Note: an "X" indicates that respective Environmental Screening Level was exceeded

- d. **Conclusions:** Due to excessive risk that will 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 sub-surface contamination, prohibits sensitive uses such as residential, and prohibits the use of shallow groundwater beneath the Site as a source of drinking water until cleanup standards are met.
10. **Feasibility Study:** The discharger performed a review of the environmental conditions and the remediation system at the Site in 2004 and 2005. Groundwater extraction had not reduced groundwater concentrations as expected, and the review considered options for increasing the efficiency of cleanup including other remedial strategies. Based on the review of the Site, the discharger proposed expanding the groundwater extraction system by adding larger diameter wells and increasing the pumping rate as the cleanup strategy best suited to the Site.
11. **Remedial Action Plan:** The discharger proposed the replacement of the original groundwater extraction wells with new larger diameter wells that allow for a significantly increased groundwater extraction rate. These wells were proposed to be screened across the A and B zones. Board staff approved the plan in 2005, and the new wells have since been installed and have been extracting groundwater since February 2007. VOC removal rates have increased substantially, with over 88 pounds of VOCs extracted in the last half of 2007. The new extraction wells are located adjacent to the source area, which is where the previous extraction wells were. The offsite extraction well located on the Intel SC 12 property is not part of the new extraction system. The discharger believes the source area wells' influence will extend to the SC 12 building and concentrations of VOCs on the SC 12 site will be remediated over time through operation of the new extraction wells. If the data do not support this, then additional remedial measures may be required, pursuant to Task C. 4 of this Order.

## 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. The previously-cited remedial action plan confirms the Board's initial conclusion that background levels of water quality cannot be restored. This Order and its requirements are consistent with Resolution No. 68-16.

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 Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Board and approved by the State Water Resources Control Board, U.S. EPA, and the Office of Administrative Law where required.

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
- o Freshwater replenishment to surface waters



At present, there is no known use of shallow groundwater underlying the Site for the above purposes.

The existing and potential beneficial uses of San Tomas Aquinas Creek include:

- o Groundwater recharge
- o Water contact and non-contact recreation
- o Wildlife habitat
- o Cold freshwater and warm freshwater habitat
- o Fish migration and spawning
- o Estuarine habitat
- o Shellfish harvesting
- o Preservation of rare and endangered species

- 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 U.S. EPA and California primary maximum contaminant levels (MCLs). Cleanup to this level will protect beneficial uses of groundwater and will result in acceptable residual risk to humans.
  - d. **Basis for Soil Cleanup Standards:** The soil cleanup standards for the Site are shown in section B.3. below. Cleanup to this level is intended to prevent leaching of contaminants to groundwater and will result in acceptable residual risk to humans. Contaminated soil is present in inaccessible areas under and adjacent to Building 3 on the Site. The Order includes a task for assessing whether additional work can be done regarding contaminated soil in these areas.
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 the 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 discharger 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 that 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:** California Water Code Section 13304 authorizes the Board to issue orders requiring a discharger to cleanup and abate waste where the discharger has 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 discharger is 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 discharger 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 discharger (or its 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. REMEDIAL ACTION PLAN AND CLEANUP STANDARDS**

1. **Implement Remedial Action Plan:** The discharger shall implement the remedial action plan described in Finding 11.
2. **Groundwater Cleanup Standards:** The following groundwater cleanup standards shall be met in all wells identified in the Self-Monitoring Program:

Constituent	Standard (ug/l)	Basis
Trichloroethene	5	MCL*
Cis-1,2-dichloroethene	6	MCL
Trans,1,2-dichloroethene	5	MCL
Vinyl chloride	0.5	MCL

\* Drinking water maximum contaminant level

3. **Soil Cleanup Standards:** The following soil cleanup standards shall be met in all on-site vadose-zone soils:

Constituent	Standard (mg/kg)	Basis
Trichloroethene	0.46	ESL - gw protection*
Cis-1,2-dichloroethene	0.19	ESL - gw protection
Trans-1,2-dichloroethene	0.67	ESL - gw protection
Vinyl chloride	0.019	ESL - gw protection

\* Environmental Screening Level – Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Interim Final February 2005. San Francisco Bay Regional Water Quality Control Board.

The discharger may propose alternate soil cleanup standards, acceptable to the Executive Officer, which are protective of human health and the environment, including the beneficial uses of groundwater. Any alternate soil cleanup standards will not take effect until this order is amended or revised accordingly.

## C. TASKS

1. **WORKPLAN FOR SOIL INVESTIGATION**

COMPLIANCE DATE: November 1, 2008

Submit a report evaluating the feasibility of conducting further investigations of the presence of contaminated soils in areas near or under Building 3. If further investigation is feasible, the report shall include a work plan, acceptable to the Executive Officer, for performing additional investigation to delineate any areas of impacted soil and for evaluation and selection of remedial measures. The workplan should describe all significant implementation steps and should include an implementation schedule.

2. **IMPLEMENTATION OF SOIL INVESTIGATION**

COMPLIANCE DATE: April 1, 2009

Submit a technical report, acceptable to the Executive Officer, documenting completion and status of necessary tasks identified in the Task 1 workplan. This report shall be required only if it has been determined that additional investigation is feasible. The report should include a workplan for soil remediation if it has been determined that remediation is feasible. The workplan should describe all significant implementation steps and should include an implementation schedule.

3. **IMPLEMENTATION OF SOIL REMEDIATION**

COMPLIANCE DATE: September 1, 2009

Submit a technical report, acceptable to the Executive Officer, documenting completion and status of necessary tasks identified in the Task 2 workplan. This report shall be required only if it has been determined that additional remediation is feasible. For ongoing actions, such as soil vapor extraction, the report should document system startup (as opposed to completion) and should present initial results on system effectiveness (e.g., area of influence).

4. **IMPLEMENTATION OF GROUNDWATER REMEDIAL ACTION PLAN**

COMPLIANCE DATE: December 1, 2009

Submit a technical report, acceptable to the Executive Officer, documenting the effectiveness of the expanded groundwater extraction system. Should the report demonstrate that containment and treatment of the pollutant plume is not satisfactory, a proposal for additional remedial measures should be submitted.

5. **PROPOSED INSTITUTIONAL CONSTRAINTS**

COMPLIANCE DATE: December 1, 2008

Submit a technical report acceptable to the Executive Officer documenting procedures to be used by the discharger to prevent or minimize human exposure to soil and groundwater contamination prior to meeting cleanup standards. Such procedures shall include a deed restriction prohibiting sensitive uses such as residential, and prohibiting the use of shallow groundwater as a source of drinking water.

6. **IMPLEMENTATION OF INSTITUTIONAL CONSTRAINTS**

COMPLIANCE DATE: 60 days after Executive Officer approval

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

7. **FIVE-YEAR STATUS REPORT**

COMPLIANCE DATE: June 30, 2013, and every five years thereafter

Submit a technical report acceptable to the Executive Officer evaluating the effectiveness of the approved remedial action 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.

8. **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.

9. **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 8.

10. **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 remedial action plan of revising one or more cleanup standards in response to revision of drinking water standards, maximum contaminant levels, or other health-based criteria.

11. **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 that bears on the approved remedial action plan and cleanup standards for the 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 to the approved remedial action plan or cleanup standards.

12. **Delayed Compliance:** If the discharger is delayed, interrupted, or prevented from meeting one or more of the completion dates specified for the above tasks,

the discharger shall promptly notify the Executive Officer and the Board or Executive Officer 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 discharger 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 discharger 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 discharger 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 discharger 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 discharger.

5. **Self-Monitoring Program:** The discharger 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 U.S. 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 Santa Clara
  - b. Santa Clara County 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 discharger 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 discharger shall report such discharge to the Board by calling (510) 622-2369 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 State's Office of Emergency Services required pursuant to the Health and Safety Code.

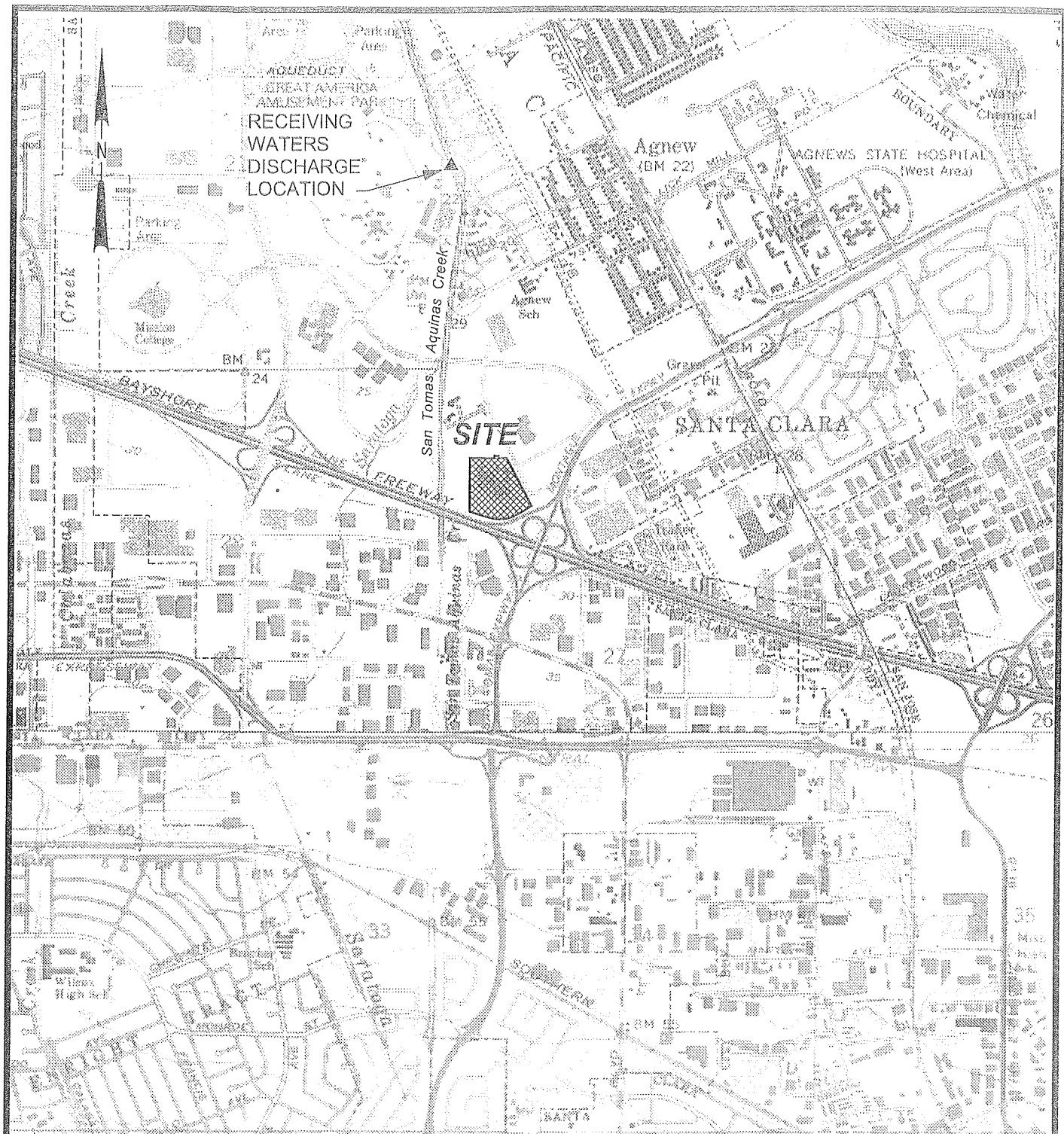
- 11. **Rescission of Existing Order:** This Order supercedes and rescinds Order Nos. 89-027 and 91-024.
- 12. **Periodic SCR Review:** The Board will review this Order periodically and may revise it when necessary.

I, Bruce H. Wolfe, 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 \_\_\_\_\_.

\_\_\_\_\_  
Bruce H. Wolfe  
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: Figure 1 – Location Map  
Figure 2 – Site Map  
Self-Monitoring Program



SCALE: 0 2,000 4,000 FEET



Base map: USGS 7.5' quadrangle of Milpitas, California (1961, photorevised 1980) and San Jose West, California (1961, photorevised 1980).

**Conor Pacific**



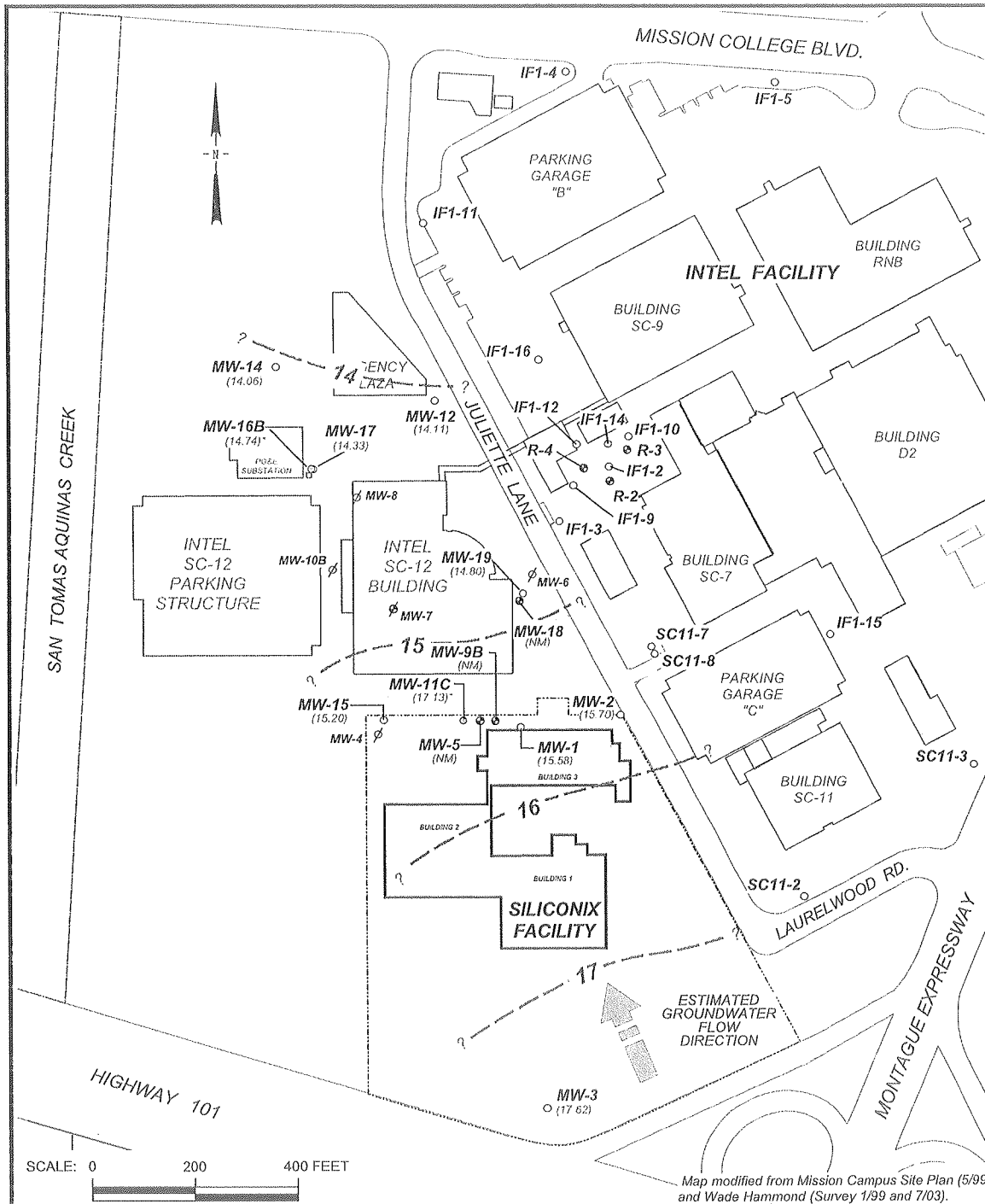
SILICONIX  
SANTA CLARA, CALIFORNIA

SITE LOCATION

FIGURE

1

PROJECT NO.  
SLX105



Map modified from Mission Campus Site Plan (5/99) and Wade Hammond (Survey 1/99 and 7/03).

**EXPLANATION**

- A-zone Groundwater Monitoring Well
- B-zone Groundwater Monitoring Well
- C-zone Groundwater Monitoring Well
- ⊕ Groundwater Extraction Well (color indicates zone)
- ∅ Decommissioned Groundwater Monitoring Well
- (17.62) Groundwater Elevation (feet, MSL); Siliconix wells measured on October 25, 2005.
- 18 Groundwater Elevation Contour (feet, MSL) (Contours based on A-zone monitoring wells)
- (NM) Not measured; MW-18, MW-9B, and MW-5 pumping
- Not used for contouring

**NOTE:**  
Well designation identifies facility:  
IF-, SC-, or R- = Intel Facility  
MW = Siliconix Facility



SILICONIX  
SANTA CLARA, CALIFORNIA  
GROUNDWATER ELEVATION CONTOURS (OCTOBER 2005)

FIGURE  
**2**  
PROJECT NO.  
053-7478

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM FOR:

SILICONIX, INC.

for the property located at

2201 LAURELWOOD ROAD  
SANTA CLARA  
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. XX-XXX (site cleanup requirements).
  
2. **Monitoring:** The discharger shall measure groundwater elevations quarterly in all monitoring wells, and shall collect and analyze representative samples of groundwater according to the following table:

Well #	Sampling Frequency	Analyses	Well #	Sampling Frequency	Analyses
MW-1	Q	8010	MW-17	Q	8010
MW-2	Q	8010	MW-18	Q	8010
MW-3	SA	8010	MW-19	Q	8010
MW-5	Q	8010	MW-25B	Q	8010
MW-9B	Q	8010	MW-26B	Q	8010
MW-11C	SA	8010	MW-27B	Q	8010
MW-12	Q	8010	EW-1AB	Q	8010
MW-14	Q	8010	EW-2AB	Q	8010
MW-15	Q	8010	EW-3AB	Q	8010
MW-16B	Q	8010			

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

The discharger shall also measure water levels in wells MW-20AB, MW21AB, MW-22AB, MW-23AB, MW-24AB quarterly. Wells IF1-3, IF1-11, and IF1-12 shall have water levels measured annually.

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

3. **Semi-annual Monitoring Reports:** The discharger shall submit semi-annual monitoring reports to the Board no later than 30 days following the end of the reporting period (e.g., report for first half of the year due July 30<sup>th</sup>). The first semi-annual monitoring report shall be due on July 30, 2008. 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 discharger's 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 second semi-annual report 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 second semi-annual 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 last semi-annual report each year.

- e. **Status Report:** The semi-annual report shall describe relevant work completed during the reporting period (e.g., site investigation, interim remedial measures) and work planned for the following reporting period.
  
- 5. **Violation Reports:** If the discharger violates requirements in the Site Cleanup Requirements, then the discharger shall notify the Board office by telephone as soon as practicable once the discharger has knowledge of the violation. Board staff may, depending on violation severity, require the discharger to submit a separate technical report on the violation within five working days of telephone notification.
  
- 6. **Other Reports:** The discharger 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 discharger or his/her 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 his/her own initiative or at the request of the discharger. 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.

APPENDIX B  
CORRESPONDENCE



June 16, 2008

Mr. David Barr  
Regional Water Quality Control Board – San Francisco Bay Region  
1515 Clay Street, Suite 1400  
Oakland, California 94612

Re: **Comments regarding: TENTATIVE ORDER: ADOPTION OF FINAL SITE  
CLEANUP REQUIREMENTS AND RESCISSION OF ORDER NOS. 89-027  
AND 91-024 FOR SILICONIX, INC.**

Vishay Siliconix  
2201 Laurelwood Road at Juliette Lane  
Santa Clara, California 95054-1595

Dear Mr. Barr:

I have prepared this letter to present comments to the May 19, 2008 Regional Water Quality Control Board – San Francisco Bay Region (RWQCB) tentative order referenced above (Attachment A). The transmittal for the May 19, 2008 tentative order noted that written comments regarding the tentative order must be submitted to the RWQCB by June 19, 2008.

The comments presented herein are intended to address two specific provisions of the May 19, 2008 tentative order, namely the establishment of numeric soil cleanup standards, and the language identifying Siliconix as the named discharger.

### **Soil Cleanup Standards**

The May 19, 2008 RWQCB tentative order established soil cleanup standards for the subject Siliconix site based on the RWQCB Environmental Screening Levels (ESLs) identified in the RWQCB's "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater." ESLs have most recently been revised in a version identified as Interim Final - November 2007 (Revised May 2008). As outlined in the document, the cover memo and the RWQCB web-site, the general purpose of the ESLs is to provide extremely conservative default screening level numbers for over 100 chemicals that would be useful in determining whether a site requires cleanup activity.

The May 2008 and previous versions of the RWQCB guidance state that "This document is not intended to establish policy or regulation." The RWQCB guidance further states that "The Tier 1 ESLs presented in the lookup tables are NOT regulatory cleanup standards. Use of the ESLs and this document in general is intended to be entirely optional on the part of the regulated facility and subject to the approval of the case





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manager in the overseeing regulatory agency.” Based on these statements, and the overall purpose of the ELSs, it is appropriate for additional site-specific conditions to be considered in establishing site-specific soil cleanup standards.

The ESLs established as the site-specific soil cleanup standards in the May 19, 2008 tentative order have generally been based on prevention of leaching of contaminants from soils to groundwater, for the protection of groundwater as a potential source of drinking water. Specifically, Paragraph 12.c. of the tentative order confirms that “cleanup to this level is intended to prevent leaching of contaminants to groundwater and will result in acceptable risk to humans.” Shallow groundwater occurs at a depth of approximately 8 feet below ground surface (bgs) in the vicinity of the Siliconix site, and soils occurring at depths greater than approximately 8 bgs are in continuous contact with groundwater. Therefore, contaminant concentrations in groundwater are appropriate to be used to protect the potential beneficial uses of groundwater and to quantify the extent of leaching of contaminants from soils that are in contact with groundwater.

Given the above considerations groundwater contaminant concentrations should be used to verify compliance with the order as to soil cleanup. This approach is adequately protective of current and reasonably anticipated future site uses under existing and likely expected zoning scenarios. Siliconix suggests that any site-specific numeric soil cleanup standards be limited in their application to soils occurring at depths shallower than approximately 8 feet bgs, the depth of first-encountered groundwater in the site vicinity.

### **Language Regarding Named Dischargers**

Siliconix also disputes, and respectfully requests deletion of, the following language from paragraph 3 (Named Dischargers) of the tentative order: “...had knowledge of the discharge or the activities that caused the discharge, and had the legal ability to prevent the discharge.” Siliconix does not dispute that it is the owner and operator of the site now and was during the time the activities that are the suspected caused of the discharges. Accordingly Siliconix has complied with the prior orders of the Board and it intends to continue to work proactively with the Board to implement the tasks under this tentative order (when finalized). However, there is insufficient factual basis upon which the Board can make a “finding” regarding Siliconix’s knowledge or ability to prevent the discharge. Such findings are superfluous and unnecessary to Siliconix’s continued compliance with the order yet could have far-reaching implications for Siliconix in the context of its



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pursuit of insurance coverage and in the event of other third party claims. Such language is new and was not present in prior orders, with which Siliconix has consistently complied.

Siliconix appreciates the continuing efforts by the RWQCB to work cooperatively with it, and looks forward to a response to these comments.

Sincerely,

A handwritten signature in black ink that reads "John Noftz".

John Noftz, MS, CIH, CSP  
Director EHS  
Vishay Siliconix  
2201 Laurelwood Road  
Santa Clara, CA 95040-1595  
(408) 567-8939

Attachments: Attachment A – RWQCB Tentative Order Dated May 19, 2008

cc: Mr. Timothy L. Ripp, Shaw Environmental, 2360 Bering Drive, San Jose, CA  
95131-1121  
Mr. Ron Vitug, Vishay Siliconix, P.O. Box 54951, Santa Clara, California  
95056-0951  
Mr. Armand DeBan, Vishay Intertechnology, Inc., 2160 Liberty Drive, Niagara  
Falls, NY 14304  
Ms. Jean McCreary, Esq., Nixon Peabody LLP, Suite 1100 Clinton Square,  
Rochester, NY 14604

June 16, 2008

Mr. Bruce Wolfe, Executive Director  
Regional Water Quality Control Board, San Francisco Bay Region  
1515 Clay Street, Suite 1400  
Oakland, California 94612

Attention: Mr. David Barr

Subject: Comments on the Tentative Order – Final Site Cleanup Requirements for Siliconix Inc., for property at 2201 Laurelwood Road, Santa Clara, Santa Clara County

We have the following comments on the Siliconix Inc Final Site Cleanup Requirements Tentative Order.

Page 3, reference number 7, Adjacent Sites: We suggest the addition of “*soil gas probes adjacent to SC-12 are being monitored to evaluate vapor intrusion potential*” to the end of the paragraph would clarify what is being done to evaluate the offsite pollution impact.

Page 4, reference number 11, Screening Levels, paragraph 2: Add in “*soil vapor*” between Chemical-specific and screening levels in fifth line from the top of the page.

Page 5, reference number 11, Remedial Action Plan, paragraph 1: In the last sentence the could should be changed to “*should*” and the considered should be changed to “*implemented*”. Expansion of the groundwater extraction system to pull back the plume that is currently beneath the Intel SC-12 facility was discussed in a meeting with the Board going back to 2004 and it was agreed then that if the proposed groundwater extraction system augmentation did not effectively pull back the plume then some more effective remedy such as the Intel proposed extraction well to be placed on the SC-12 site slightly northeast of monitoring well MW-24AB would be installed to mitigate the Siliconix plume.

Page 10, reference number 4, Implementation of groundwater remedial Action Plan: following the last word of the first sentence, before the period, add in “*including recovery of the downgradient plume beneath SC-12*”

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Page 11, reference number 4, Implementation of groundwater remedial Action Plan: Add in “*extended*” before pollution plume and “*including the offsite portion, underlying SC-12*” after pollution plume.

Please call us directly at 510-644-3123 if you have any questions.

Sincerely,

Stellar Environmental Solutions, Inc.



Richard S. Makdisi, R.G., R.E.A.  
President & Project Manager

cc: Tom Cooper - Intel