Department of Toxic Substances Control

Maureen F. Gorsen, Director
5796 Corporate Avenue
Cypress, California 90630

Linda S. Adams
Secretary for
Environmental Protection

Arnold Schwarzenegger
Governor

STATEMENT OF BASIS

Proposed Remedy for Soil and Soil Gas

at

Toppan Electronics, Inc.
San Diego, California

Proposed By

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

July 18, 2006

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SECTION 1 INTRDUCTION

The California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) has prepared this Statement of Basis (SOB) as part of its public participation responsibilities under the Corrective Action Program for Toppan Electronics, Inc. (Toppan) facility located at 7770 Miramar Road in San Diego, California (the site). In addition to this Statement of Basis (SOB), DTSC has prepared the following documents as part of the public review process to facilitate public comments on Corrective Measure Study/Remedy Selection/Corrective Measure Implementation Workplan (CMS):

- Fact Sheet that summarizes the proposed corrective measures and provides a notice of public comment period.
- Notice of Exemption under the California Environmental Quality Act (CEQA).

Toppan has completed the investigation and proposed corrective measures at the site. DTSC has provided regulatory oversight for the project under Corrective Action Consent Agreement pursuant to section 25187 of the California Health and Safety Code. The proposed corrective measures will reduce the risk of exposure from the contaminated soil at the site. In addition, if required depending on the results of the characterization of potential human health risk assessment to be conducted after implementation of the selected alternative, DTSC will impose a Land Use Control (LUC) on the property. The LUC will limit future land uses to those consistent with the risk assessment.

The proposed soil and soil gas corrective measures and other relevant information summarized in the SOB can be found at the information repository indicated in the Fact Sheet.

SECTION 2 SUMMARY OF PROPOSED CORRECTIVE MEASURES

The primary purpose of the Corrective Measure Study/Remedy Selection (CMS/RS) is to identify, screen, evaluate, and select the most appropriate corrective measure in achieving site cleanup standards. For this site, the primary cleanup standard is to remediate soil impacted with elevated concentration of metals and VOCs to mitigate unacceptable levels of potential risk to human health and the environment.

The proposed Corrective Measure for the soil and soil gas at the site is the Deep, Extensive Excavation of contaminated areas and soil gas Monitoring. This includes Excavation and off-site treatment/disposal of soil impacted with metals to a maximum depth of 15 feet; Excavation and off-site treatment/disposal of soil impacted with formaldehyde; Excavation and off-site treatment/disposal of soil impacted with VOCs to a maximum depth of 30 feet; Extensive, deep excavation and off-site treatment/disposal of soil impacted with VOCs in generalized, suspected source areas to a maximum depth of 40 feet to reduce risk and address unacceptable risk posed by VOCs in the soil vapor; and Implementation of a soil vapor monitoring program, consisting of four semi-permanent, multi-depth, soil vapor monitoring probes. Monitoring would be conducted to document that concentrations of VOCs in soil vapor remain stable or are decreasing and that VOCs in soil vapor no longer pose a potential unacceptable human health risk.

To ensure protection of the public health and the environment, the proposed activity would also include Land Use Control (LUC), if required depending on the results of the characterization of potential human health risk conducted after implementation of the selected alternative, would be expected to consist of a deed restriction to limit land use to commercial/industrial use, consistent with current land use in the area.

A more detailed discussion of the proposed corrective measures is included in the following sections:

SECTION 3 FACILITY BACKGROUND

3.1 PROJECT SUMMARY

3.1.1 Background

Toppan is located in an industrial area of San Diego, California. Toppan manufactured printed circuit boards for various markets, including original equipment manufacturers and contract assemblers in the communications, computer, industrial, instrumentation and automotive industries, and operated the Facility until 2003. Toppan engaged in the management of hazardous waste during operations at this facility under Permit by Rule.

As part of a Facility Investigation (FI), environmental conditions of the site were assessed. DTSC identified 20 Solid Waste Management Units (SWMUs) based on the results of a site inspection and review of further information. DTSC concluded that further investigation was needed at the site to evaluate the nature and extent of potential hazardous waste or hazardous waste constituents from the SWMUs. A Corrective Action Consent Agreement (Consent Agreement) was signed by the DTSC on to facilitate corrective action process and ensure that the facility is investigated and remediated under the oversight of DTSC. In Consent Agreement DTSC identified metals, volatile and semi-volatile organic compounds (VOCs and SVOCs), pH, and total petroleum hydrocarbons (TPH) as the constituents of concern (COCs).

3.1.2 Site Description

The site encompasses approximately 5.5 acres and is located at 7770 Miramar Road (Figure 1). A two-story building of approximately 125,000 square feet is located on the site and formerly housed Toppan’s offices and most manufacturing operations. The areas outside of the building were used primarily for wastewater treatment and chemical storage operations, as well as employee parking. With the exception of the driveway entrances, front landscaped areas, and parking areas along Miramar Road to the south; the site is enclosed by a six-foot-high chain-link fence topped with barbed wire.

The site is bounded by Miramar Road to the south, commercial properties to the east and west, and a railroad spur and other commercial property to the north. The Marine Corps Air Station at Miramar is located south of Miramar Road. The site is generally flat with an approximately 4- to 6-foot drop to the railroad spur elevation at the northern edge of the property and an approximately 4- to 8-foot rise to the adjacent retail property to the east. Approximately 95% of the site is covered by the building footprint and asphalt or concrete paving, except for small landscaped areas along Miramar Road. The general site vicinity is highly commercialized with no residences located within an approximately 0.4-mile radius of the site. Also, no other sensitive receptors were identified within 0.4-mile radius of the site except for a gymnastics school and training facility located to the north of the site at 7698 Miramar Road.

SECTION 4 SUMMARY OF FACILITY INVESTIGATION

Soil and soil gas FI fieldwork were conducted in accordance with workplans approved by DTSC. Samples were analyzed for heavy metals, cyanide, pH, semi-volatile and volatile organic compounds (VOCs). Field soil and soil vapor sampling work were conducted during November and December 2003 and January, February, April, June, July, and August 2005. A total of 138 soil borings and 40 soil vapor borings completed and 426 soil samples and 120 soil vapor samples were collected. The results from this field sampling were presented in the Final FI Report, dated February 6, 2006.

SECTION 5 SUMMERY OF RISK AND CLEAN UP STANDARDS

Cleanup standards for this site are established to protect human health and the environment. The cleanup standards are based on site-specific media of concern, identified Contaminant of Concern COCs, exposure routes and receptors, and identification of acceptable concentrations or range of concentrations for each exposure route. The media of concern for this site are limited to soil and soil vapor. The primary COCs for this site are Metals (primarily arsenic and lead- soil only), VOCs ((primarily 1,1-dichloroethene; methylene chloride and 1, 2-dichloethane- soil and soil vapor).

Cleanup goals for the site are:

- Reduce the concentration or eliminate the exposure pathway to soil with concentrations of arsenic exceeding the maximum background concentration of 11.5 mg/kg.
- Reduce the concentration or eliminate the exposure pathway to soil with concentrations of lead exceeding the threshold value of 150 mg/kg, based on the DTSC Lead pread 7 model.
- Reduce the concentration or eliminate the pathway to exposure to soil with concentrations of metals or VOCs that exceed their combined potential human health risk of $1x10^{-4}$ to $1x10^{-6}$ or HI of 1 to 3 based on exposure via dust inhalation, incidental ingestion, or dermal contact.
- Reduce the concentration or eliminate the pathway to exposure to soil or soil vapor with concentrations of VOCs that exceed their combined potential human health risk of $1x10^{-4}$ to $1x10^{-6}$ or HI of 1 to 3 based on exposure via vapor inhalation, especially for indoor air via vapor intrusion.

SECTION 6 SCOPE OF CORRECTIVE MEASURES

6.1 DEVELOPMENT OF CORRECTIVE MEASURE ALTERNATIVES

The alternatives are identified as follows:

- Alternative 1 – No Action
- Alternative 2 – Source Removal, Vapor Intrusion Control, and Monitoring
- Alternative 3 – Deep, Extensive Excavation and Monitoring
- Alternative 4 – Extensive Shallow Excavation, Soil Vapor Extraction (SVE), and Monitoring

Each of the alternatives above may also include appropriate LUCs, such as a deed restriction to restrict land use to commercial/industrial use, consistent with current land use. The need for a LUC will depend on the results of the characterization of potential human health risk conducted after implementation of the selected alternative. Monitoring of soil vapor was included to verify that the cleanup standards for the vapor intrusion pathway are achieved with implementation of the selected corrective measure alternative. Monitoring would be conducted to verify that the concentration of VOCs in soil vapor remain stable or decrease over time. Confirmation sampling of soil following excavation is also included as part of each alternative. A description of each alternative is provided below.

6.1.1 Alternative 1 - No Action

In accordance with National Contingency Plan and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, Alternative 1 has been included to provide a baseline for comparison to other remediation alternatives. This alternative includes no administrative or engineering controls, no removal or treatment of soil, and no monitoring. No cost is associated with this alternative. Additionally, since contaminated media remains on site, CERCLA requires review of site conditions every 5 years.

6.1.2 Alternative 2 – Source Removal, Vapor Intrusion Control, and Monitoring

Alternative 2 includes the following elements:

- Excavation and off-site treatment/disposal of soil impacted with metals that exceed residential, construction, and commercial worker RBCs to a maximum depth of 15 feet bgs. Below that depth, the pathway to exposure is considered incomplete.
- Excavation and off-site treatment/disposal of soil impacted with formaldehyde that exceeds residential, construction, and commercial worker RBCs under the FI Report.
- Excavation and off-site treatment /disposal of soil impacted with VOCs that exceed residential, construction, and commercial worker RBCs, and extended to the deeper soils in SWMU2a to a maximum depth of 25 feet bgs to reduce risk.
- Implementation of vapor control measures and/or demolition of the portions of the existing building to eliminate the pathway to the soil vapor plume that exceed commercial worker RBCs. Vapor control would be provided by either enhanced building ventilation or installation of a physical barrier to vapor migration. A LUC would be established to ensure long-term monitoring and maintenance of the vapor control measure and/or prohibition of building construction over the designated areas of the site.
- Implementation of a soil vapor monitoring program, consisting of four semi-permanent, multi-depth, soil vapor monitoring probes. Annual monitoring would be conducted to document that concentrations of VOCs in soil vapor remain stable or are decreasing.

Excavation and Off-site Treatment/Disposal

Soil excavation and off-site treatment/disposal is a developed technology for remediation of metal and VOC-impacted soil. It provides a means of direct removal of soil with concentrations of COCs exceeding the cleanup standards from the site for possible treatment and disposal at a properly licensed facility.

Treatment prior to disposal, if necessary, would consist of either stabilization (metal-impacted soil) or thermal destruction (VOC-impacted soil). Transportation of the soil would be conducted under appropriate waste manifests using covered dump trucks.

Prior to excavation, necessary permits would be obtained (e.g., grading permits for the excavation and building permits for possible shoring and/or demolition) and underground utilities would be located by contacting Underground Service Alert (USA) and conducting other utility locating techniques, including review of available facility drawings. During excavation, dust and VOC monitoring would be conducted to protect worker and community safety. Monitoring data would be compared to criteria established in the Site-specific Health and Safety Plan (HSP) and evaluated to confirm compliance with San Diego Air Pollution Control District (SDAPCD) requirements under Rule 50, Visible Emissions, and Rule 51, Nuisance. If dust and VOC concentrations exceeded the established criteria, excavation work would be stopped until engineering controls could be implemented to reduce the exposure to acceptable levels. After excavation, confirmation soil samples would be collected and analyzed for the corresponding COCs (e.g., metals and VOCs) to confirm that cleanup standards for soil have been achieved.

For this alternative, approximately 3,632 cubic yards (or, 4,722 tons at 1.3 tons per cubic yard) of soil would be excavated from the areas illustrated in Figure 6. The estimated quantities of soil to be excavated are detailed in Table 4 by SWMU and exposure area. Soil would be excavated to a maximum depth ranging from approximately 5 to 25 feet bgs. Additional quantities of soil outside of the boundaries illustrated in Figure 6 may also have to be excavated and handled to provide suitable sloping, where necessary, especially for the deeper areas of excavation, to provide a stable excavation and access for excavation equipment or in possible combination with shoring. However, this soil could possibly be used for backfill at the site.

Excavation would be accomplished using a combination of a trackhoe and backhoe. Focused, deeper excavations may be accomplished using a large-diameter bucket auger. A front-end loader would be used to transfer the excavated soil to designated soil-stockpile areas for characterization sampling and analysis. After completion of soil characterization sampling and analysis, a front-end loader would be used to load the soil into covered dump trucks for transportation to a properly licensed treatment/disposal facility. All wastes would be transported under an appropriate waste manifest as a non-hazardous, California hazardous, or Resource Conservation and Recovery Act (RCRA) hazardous waste, as appropriate. Waste characterization would be based on the combined analytical datafrom the FI and new characterization sampling results obtained from the soil stockpiles. Assuming a capacity of approximately 22 tons per dump truck, a total of approximately 213 truck loads would be required to transport excavated soil from this site. Assuming that the excavation work could be completed within 4 weeks, approximately 11 trucks per day would be loaded. A similar number of trucks would be required to transport backfill soil to the site.

The deep excavation at this site would be difficult to accomplish, primarily because of the proximity to the building. Shoring or extensive sloping may be required along the perimeter of the excavation facing the building walls to protect the structural integrity of the building. As indicated above, additional quantities of soil may also have to be excavated for sloping, as necessary. These techniques would require a structural analysis to plan necessary shoring, bracing, or other suitable building stabilization techniques. Excavation may also be complicated by the presence of any existing subsurface utilities (e.g., electrical conduit, water piping, waste drain piping). Existing utilities would have to be located and protected and/or replaced.

After completion of excavation activities, confirmation samples would be collected from the sidewalls and bottom of the excavation areas to confirm that the excavation was successful in removing soil with concentrations of metals and VOCs exceeding the cleanup standards established for the site. Confirmation samples would be collected on an approximately 30 foot grid spacing.

After completion of the excavation work and evaluation of analytical results from the confirmation sampling, the excavation areas would be backfilled with imported, clean soil. Backfilling operations would require compaction and compaction testing to provide a suitable base for resurfacing and surface loads.

After completion of the excavation work and receipt of analytical reports and waste disposal documentation, construction and corrective measure completion reports would be prepared and submitted to DTSC to document the satisfactory completion of the corrective measure.

Vapor Control

Vapor control would consist of engineering and administrative controls to eliminate the pathway to exposure via vapor intrusion. Vapor control would consist of enhanced building ventilation, a physical barrier, or prohibition of building over the portions of the site where the concentration of VOCs exceed RBCs for vapor intrusion and result in an unacceptable human health risk. Approximately 19,000 square feet of the existing building would require vapor control, with options described below.

Enhanced building ventilation would require a detailed engineering analysis and corresponding building ventilation system modifications to provide sufficient and consistent positive pressure or number of air changes to prevent accumulation of VOCs in indoor air at concentrations that exceed risk-based criteria. After implementation of the modifications, testing would be required to verify system performance. Testing may include indoor air monitoring for VOCs. An O&M Plan would be prepared and implemented to ensure long-term reliability of this method.

Implementation of a physical barrier would also require a detailed engineering design to select the most appropriate configuration and establish requirements for installation. Installation would likely require demolition of the existing concrete floors, preparation, and application of the barrier. An example of an appropriate barrier material is the spray-on membrane coating developed by Liquid Boot, Inc. After application of the barrier, the concrete floors would be restored. After implementation of the modifications, sampling and analysis would be required to verify performance, including possible indoor air monitoring for VOCs. An O&M Plan would be prepared and implemented to ensure long-term reliability of this method, including modification of the barrier consistent with possible modifications to site development.

Prohibition of building over the soil vapor plume would require partial demolition of the existing building and prohibition of new construction in the areas at which the concentrations of VOCs exceed risk-based criteria.

Land Use Controls

This alternative also includes implementation of a LUC. The LUC would consist of a deed restriction to limit land use to commercial/industrial use, consistent with current land use in the area and identify the requirements for O&M of continued vapor control measures.

Soil Vapor Monitoring

A Soil Vapor Monitoring O&M Plan would identify the requirement for O&M for short-term soil vapor monitoring using the four soil vapor monitoring wells. This data would be used to verify that concentrations of VOCs in soil vapor are stable or decreasing. This data would also be used to evaluate the effectiveness of the limited excavation conducted under this alternative in controlling the potential for further off-site migration of VOCs in soil vapor.

6.1.3 Alternative 3 – Deep, Extensive Excavation and Monitoring

Alternative 3 includes the following elements:

- Excavation and off-site treatment/disposal of soil impacted with metals that exceed residential, construction worker, and commercial worker RBCs to a maximum depth of 15 feet bgs. Below that depth, the pathway to exposure is considered incomplete.
- Excavation and off-site treatment/disposal of soil impacted with formaldehyde that exceed residential and construction/commercial worker RBCs under the FI Report.
- Excavation and off-site treatment/disposal of soil impacted with VOCs that exceed residential, construction worker, and commercial worker RBCs and extended to the deeper soils in SWMU2a to a maximum depth of 30 feet bgs to reduce risk.
- Extensive, deep excavation and off-site treatment/disposal of soil impacted with VOCs in generalized, suspected source areas to a maximum depth of 40 feet bgs to reduce risk and address unacceptable risk posed by VOCs in the soil vapor without the use of vapor control measures or SVE.
- Implementation of a soil vapor monitoring program, consisting of four semi-permanent, multi-depth, soil vapor monitoring probes. Monitoring would be conducted to document that concentrations of VOCs in soil vapor remain stable or are decreasing and that VOCs in soil vapor no longer pose a potential unacceptable human health risk.

The scope of the excavation for this alternative was designed to be successful in addressing the concentrations of VOCs in soil vapor contributing to an unacceptable level of human health risk to a maximum depth of 40 feet bgs without the use of vapor control measures. It appears that an insufficient mass of VOCs exist beyond the extent of the excavation proposed under this alternative to pose an unacceptable risk via the vapor intrusion pathway.

Excavation

Excavation will be conducted as described under Alternative 2; however, due to the increased lateral extent and depth of excavation, the estimated volume of soil increases to approximately 14,677 cubic yards (or, 19,080 tons at 1.3 tons per cubic yard). The estimated quantities of soil to be excavated are detailed in Table 4 (CMS/RS/CMI) by SWMU and exposure area. At 22 tons per truckload, a total of approximately 867 truck loads would be required to transport the soil off-site for disposal. Assuming that the excavation work could be completed within 6 weeks, approximately 29 trucks per day would be loaded. A similar number of trucks would be required to transport backfill soil to the site.

Because of the extent and depth of the planned excavation, building and worker protection during excavation is more complex than for Alternative 2. Accordingly, requirements for building protection would be extensive and costly. Therefore, implementation of this alternative would more likely require partial building demolition approximately 19,000 square feet. This portion of the building may not be re-built after excavation.

Land Use Controls

LUC, if required depending on the results of the characterization of potential human health risk conducted after implementation of the selected alternative, will be expected to consist of a deed restriction to limit land use to commercial/industrial use, consistent with current land use in the area

Soil Vapor Monitoring

A Soil Vapor Monitoring O&M Plan will identify the requirement for O&M for short-term soil vapor monitoring using the four soil vapor monitoring wells. This data would be used to verify that concentrations of VOCs in soil vapor are stable or decreasing. This data would also be used to evaluate the effectiveness of the limited excavation conducted under this alternative in controlling the potential for further off-site migration of VOCs in soil vapor. After confirmation that soil vapor poses no unacceptable risk under the current land use scenario, monitoring would be ended.

6.1.4 Alternative 4 – Extensive Shallow Excavation, SVE, and Monitoring

Alternative 4 includes the following elements:

- Excavation and off-site treatment/disposal of soil impacted with metals that exceed residential, construction worker, and commercial worker RBCs to a maximum depth of 15 feet bgs. Below that depth, the pathway to exposure is considered incomplete.
- Excavation and off-site treatment/disposal of soil impacted with formaldehyde that exceed residential and construction/commercial worker RBCs under the FI Report.
- Excavation and off-site treatment/disposal of soil impacted with VOCs that exceed residential, construction worker, and commercial worker RBCs.
- Extensive shallow excavation and off-site treatment/disposal of soil impacted with VOCs in generalized, suspected source areas to a maximum depth of 5 feet bgs to reduce risk and partially address unacceptable risk posed by VOCs in the soil vapor without the use of vapor control measures.
- Implementation of SVE to address unacceptable risk posed by VOCs in deep soil vapor without the future use of vapor control measures. SVE would include construction and O&M of 10 multi-screened interval SVE wells, a vapor treatment system, and interconnecting piping The SVE wells would be screened at multiple depth intervals, as described below.
- Implementation of a soil vapor monitoring program, consisting of four semi-permanent, multi-depth, soil vapor monitoring probes. Monitoring would be conducted to document that concentrations of VOCs in soil vapor remain stable or are decreasing and that VOCs in soil vapor no longer pose a potential unacceptable human health risk.

The combined scope of the excavation and O&M of the SVE system was designed to be successful in addressing the concentrations of VOCs in soil vapor contributing to an unacceptable level of human health risk to a maximum depth of 50 feet bgs. Below that depth, the future pathway to exposure is considered incomplete.

Excavation

Excavation would be conducted as described under Alternative 2; however, approximately 3,955 cubic yards (or, 5,142 tons at 1.3 tons per cubic yard) of soil would be excavated. The estimated quantities of soil to be excavated are detailed in Table 4 by SWMU and exposure area. At 22 tons per truckload, a total of approximately 236 truck loads would be required to transport the soil for off-site disposal. Assuming that the excavation work could be completed within approximately 4 weeks, approximately 12 trucks per day would be loaded. A similar number of trucks would be required to transport backfill soil to the site.

Soil Vapor Extraction

For this alternative, SVE is included to address VOCs in the deeper soil vapor. SVE is a developed technology and recognized as the preferred presumptive remedy for the remediation of VOCs in soil. SVE involves removal of VOCs from impacted soils with extracted soil vapor by applying a vacuum to extraction wells, constructed within the aerial boundary of the impacted soil at the site, using a blower and interconnecting piping. The SVE wells typically consist of slotted PVC casing installed in a vertical boring. The extraction wellfield design is based on economic optimization of the number and location of wells necessary to capture and remediate impacted soil in areas exceeding cleanup objectives. Occasionally, pilot testing is conducted to obtain data necessary for detailed wellfield design (e.g., radius of influence [ROI]), equipment selection (e.g., initial concentrations and soil vapor flowrates), and optimization of the design of a full-scale SVE system. Based on URS' past experience on sites with similar conditions, the ROI of an SVE well is estimated to be approximately 20 feet. A total of 10 SVE wells would be constructed.

The extracted soil vapor is treated before discharge to the atmosphere typically using vapor phase carbon adsorption (VPCA) or thermally, using a catalytic oxidizer (for chlorinated VOCs). Based on the comparatively low concentration of VOCs in the deep soil vapor, VPCA would likely be the most cost effective choice for vapor treatment. The SVE system would remove the VOCs within the vadose zone by creating movement of air through the impacted soil. As the air passes through the impacted soil, VOCs volatilize from the liquid to the vapor phase. The VOCs are destroyed or removed from the off-gas of the vacuum unit by a thermal oxidizer or using vapor phase carbon adsorption (VPCA), respectively. Regular monitoring of the SVE system includes measuring the concentrations of VOCs in the soil vapor stream as it is removed from the extraction wells and from effluent stream from the vapor treatment unit.

Startup and operation of the SVE system involved periodic sampling and analysis of soil vapor influent and effluent and recording key operational data. System operation also includes periodic optimization, maintenance, and reporting.

Based on URS' past experience on sites with similar conditions, it is expected that an SVE system at this site would need to be in operation for approximately 2 to 4 years to achieve the cleanup standards in the deep soil vapor. However, the low permeability soil at this site and potential for preferential flow paths to be established indicates that the rate of extraction from each well will be low, potentially increasing the time to achieve the cleanup standards. A high vacuum blower will be required thereby increasing electrical power costs for operation, and consistent levels of performance across the area to be remediated will be difficult to achieve. During this time the SVE system would require regular monitoring that may include system maintenance, system performance monitoring, sampling of the vapors being removed from the soil, and sampling of the vapors being discharged to the atmosphere. SVE system O&M is normally continued until cleanup objectives are met or until concentrations of VOCs in the extracted soil vapor reach asymptotic levels and the rate of mass reduction is considered minimal. This would be an indication that SVE has been operated to the approximate limits of its effectiveness and continued operation would not result in an appreciable reduction in concentrations of VOCs in the vadose zone or in human health risk.

Typically for SVE, after operational data and confirmation samples indicate that the cleanup standards have been achieved or asymptotic performance has been reached, a closure report is prepared and submitted to DTSC to document system performance and rationale for closure. For this site confirmation sampling would be expected to consist of soil vapor sampling and analysis for VOCs for comparison to the cleanup standards. After DTSC concurrence that cleanup objectives have been achieved, the SVE system is demobilized and the SVE wells properly abandoned.

Monitoring

Soil vapor monitoring would be conducted as described under Alternative 3.

Land Use Control

Similar to Alternative 3, the LUC, if required depending on the results of the characterization of potential human health risk conducted after implementation of the selected alternative, would be expected to consist of a deed restriction to limit land use to commercial/industrial use, consistent with current land use in the area. The LUC may also include requirements for continued O&M of the SVE system until cleanup objectives are achieved, or approximately 2 to 4 years. Again, because the design of this alternative is expected to address unacceptable human health risk resulting from soil vapor through a combination of excavation and SVE, O&M of separate vapor control measures would not be required.

6.2 EVALUATION OF CORRECTIVE MEASURE ALTERNATIVES

Each corrective measure alternative is evaluated in this section using the nine criteria listed below:

- *Be protective of human health and the environment*
- *Attain media cleanup standards*
- *Control the sources of release* - in order to reduce or eliminate, to the extent practicable, further releases of hazardous wastes that may pose a threat to human health and the environment
- *Comply with any applicable standards for management of wastes*
- *Short- and long-term effectiveness* – including threats during construction or during long term O&M
- *Reduction of toxicity, mobility, and/or volume*

- *Long-term reliability*
- *Implementability* - both technical (e.g., construction and operation) and administrative (e.g., permitting, public acceptance) feasibility and availability of necessary services and materials for implementation
- *Cost* – net present value of both capital and O&M costs

6.2.1 Alternative 1 - No Action

Be protective of human health and the environment – Alternative 1 would not be protective since the unacceptable level of potential human health risk resulting from current conditions are not addressed.

Attain media cleanup standards – Media cleanup standards are not achieved since no corrective action is undertaken.

Control the sources of release – Source areas in the shallow soil are not controlled since no corrective action is undertaken.

Comply with any applicable standards for management of wastes – No waste would be generated as no corrective action is undertaken.

Short- and long-term effectiveness – Because no corrective action is undertaken, protection of workers or the community during implementation are not required. Cleanup standards, however, are not met which represents a potential current and future human health risk.

Reduction of toxicity, mobility, and/or volume - Because no corrective action is undertaken, toxicity, mobility, and volume are not reduced.

Long-term reliability - Because no remedial actions are undertaken and cleanup standards are not achieved, long-term effectiveness and permanence are not achieved and risks are not reduced.

Implementability – There are no technical implementability issues, however, agency and community acceptance would not be obtained.

Cost – There is essentially no cost associated with this alternative.

6.2.2 Alternative 2 - Source Removal, Vapor Intrusion Control, and Monitoring

Be protective of human health and the environment – Alternative 2 would be protective since the shallow soil with concentrations of COCs that pose an unacceptable level of potential human health risk via outdoor exposure are removed and the vapor intrusion pathway is addressed using vapor control. The alternative, however, is based on continued commercial/industrial land use; therefore, an LUC would be required. Monitoring is also included to verify achievement of the cleanup standards for vapor intrusion.

Attain media cleanup standards – Media cleanup standards are achieved for the outdoor exposure pathway. Numerical cleanup standards for the vapor intrusion pathway are not attained; however, the pathway is controlled using vapor control measures.

Control the sources of release – Soil in the identified source areas are excavated.

Comply with any applicable standards for management of wastes – Wastes generated during implementation would be managed in accordance with applicable regulatory requirements, including those during excavation, temporary stockpiling, transport, and off-site treatment/disposal.

Short- and long-term effectiveness – Protection of workers and the community during implementation are included to address short-term risk. Potential short-term risks to on-site workers, the community, and the environment could result from vapors, dust, or particulates that may be generated during excavation and soil handling activities. These risks could be mitigated using personal protective equipment (PPE) for on-site workers and engineering controls, such as dust suppression and additional traffic control and equipment operating safety procedures, for protection of the surrounding community. Ambient air monitoring would be conducted to identify if criteria are exceeded. The alternative is expected to provide long-term effectiveness because soil exceeding human health risk criteria is removed, with the soil vapor intrusion pathway addressed through implementation of vapor control measures. Long-term effectiveness, however, will require future land owners to continue O&M of vapor control measures, modified where necessary based on future site development activities.

Reduction of toxicity, mobility, and/or volume – This alternative provides a significant reduction in the toxicity, mobility, and volume of contaminants at the site with excavation of over 3,600 cubic yards of impacted soil. Mobility and potentially, toxicity and volume, would be further reduced at the off-site treatment/disposal facility.

Long-term reliability – Long-term reliability of excavation and off-site disposal of impacted soil is high, as COCs are removed from the site. LUCs are required, however, to ensure that O&M of the vapor control measures are continued.

Implementability – Excavation and off-site disposal is a well-proven, readily implementable technology that is a common method for cleaning up hazardous waste sites. It is a relatively simple process, with proven procedures. Equipment and labor required to implement this alternative are uncomplicated and readily available. The generally shallow depths of the excavation are achievable; however, the physical properties of the soil at this site are expected to limit the rate of excavation. Agency and community acceptance would be high since the alternative would achieve the cleanup standards and because short-term risks associated with implementation of the alternative can be mitigated as described above.

Cost – Estimated costs for implementation of each alternative is included in Table 5 of CMS.

6.2.3 Alternative 3 – Deep, Extensive Excavation and Monitoring

Be protective of human health and the environment – Alternative 3 would be protective since the shallow and deep soil (and soil vapor) with concentrations of COCs that pose an unacceptable level of potential human health risk via outdoor exposure and the vapor intrusion pathway would be removed. The alternative, however, is based on continued commercial/industrial land use; therefore, a LUC would likely be required. Monitoring is also included to verify achievement of the cleanup standards for vapor intrusion.

Attain media cleanup standards – Media cleanup standards are achieved for the outdoor exposure and vapor intrusion pathway.

Control the sources of release – Soil in the identified source areas are excavated.

Comply with any applicable standards for management of wastes – Wastes generated during implementation would be managed in accordance with applicable regulatory requirements, including those during excavation, temporary stockpiling, transport, and off-site treatment/disposal.

Short- and long-term effectiveness – Protection of workers and the community during implementation are included to address short-term risk. Potential short-term risks to on-site workers, the community, and the environment could result from vapors, dust, or particulates that may be generated during excavation and soil handling activities. These risks could be mitigated using PPE for on-site workers and engineering controls, such as dust suppression and additional traffic control and equipment operating safety procedures, for protection of the surrounding community. Ambient air monitoring would be conducted to identify if criteria are exceeded. The alternative is expected to provide long-term effectiveness because soil exceeding human health risk criteria is removed. Long-term effectiveness, however, will require that remaining VOCs in soil vapor do not migrate to the imported backfill material to concentrations exceeding the cleanup standards as demonstrated through monitoring.

Reduction of toxicity, mobility, and/or volume – This alternative provides a significant reduction in the toxicity, mobility, and volume of contaminants at the site with excavation of approximately 15,700 cubic yards of impacted soil. Mobility and potentially, toxicity and volume, would be further reduced at the off-site treatment/disposal facility.

Long-term reliability – Long term reliability of excavation and off-site disposal of impacted soil is high, as COCs are removed from the site. LUCs may be required, however, to ensure that land use is limited to commercial/industrial purposes. However, monitoring will be required to demonstrate that residual concentrations of VOCs in deep soil gas do not pose an unacceptable human health risk after implementation.

Implementability – Excavation and off-site disposal is a well-proven, readily implementable technology that is a common method for cleaning up hazardous waste sites. It is a relatively simple process, with proven procedures. Equipment and labor required to implement this alternative are uncomplicated and readily available. The shallow depths of the excavation are achievable; however, the physical properties of the soil at this site are expected to limit the rate of excavation. Additionally, however, the deeper areas of excavation will require significant engineering analysis to ensure building stability and worker safety, during excavation. This analysis would select the most appropriate combination of shoring, partial building demolition, and/or modified excavation techniques to accomplish the planned excavation. Agency and community acceptance would be high since the alternative would achieve the cleanup standards and because short-term risks associated with implementation of the alternative can be mitigated as described above. However, there may be a greater sensitivity to the increased truck traffic resulting from the increased quantity of soil handled compared to Alternative 2.

Cost – Estimated costs for implementation of each alternative is included in Table 5 of CMS.

6.2.4 Alternative 4 – Extensive Shallow Excavation, SVE, and Monitoring

Be protective of human health and the environment – Alternative 4 would be protective since the shallow soil with concentrations of COCs that pose an unacceptable level of potential human health risk via outdoor exposure and the vapor intrusion pathway would be removed. SVE provides a means of extracting VOCs from the deeper soils. SVE will require O&M for a period of approximately 2 to 4 years, however, the low permeability soil results in uncertainty of the actual time required to achieve the cleanup standards. The alternative is based on continued commercial/industrial land use; therefore, a LUC would likely be required. Monitoring is also included to verify achievement of the cleanup standards for vapor intrusion.

Attain media cleanup standards – Media cleanup standards are achieved for the outdoor exposure and vapor intrusion pathway.

Control the sources of release – Soil in the identified source areas are excavated.

Comply with any applicable standards for management of wastes – Wastes generated during implementation would be managed in accordance with applicable regulatory requirements, including those during excavation, temporary stockpiling, transport, and off-site treatment/disposal of soil as well as waste generated during O&M of the SVE system.

Short- and long-term effectiveness – Protection of workers and the community during implementation are included to address short-term risk. Potential short-term risks to on-site workers, the community, and the environment could result from vapors, dust, or particulates that may be generated during excavation and soil handling activities. These risks could be mitigated using PPE for on-site workers and engineering controls, such as dust suppression and additional traffic control and equipment operating safety procedures, for protection of the surrounding community. Ambient air monitoring would be conducted to identify if criteria are exceeded. The alternative is expected to provide long-term effectiveness because soil exceeding human health risk criteria is removed. Long-term effectiveness, however, will require that remaining VOCs in soil vapor do not migrate to the imported backfill material to concentrations exceeding the cleanup standards as demonstrated through monitoring.

Reduction of toxicity, mobility, and/or volume – This alternative provides a significant reduction in the toxicity, mobility, and volume of contaminants at the site with excavation of approximately 4,000 cubic yards of impacted soil and extraction of contaminated soil vapor using SVE. Mobility and potentially, toxicity and volume, would be further reduced at the off-site treatment/disposal facility.

Long-term reliability – Long term reliability of excavation and off-site disposal of impacted soil is high, as COCs are removed from the site through both excavation and SVE. LUCs may be required, however, to ensure that land use is limited to commercial/industrial purposes. However, monitoring will be required to demonstrate that residual concentrations of VOCs in deep soil gas do not pose an unacceptable human health risk after implementation.

Implementability – Excavation and off-site disposal is a well-proven, readily implementable technology that is a common method for cleaning up hazardous waste sites. It is a relatively simple process, with proven procedures. Equipment and labor required to implement this alternative are uncomplicated and readily available. The shallow depths of the excavation are achievable; however, the physical properties of the soil at this site are expected to limit the rate of excavation. Additionally, SVE is a developed technology for addressing VOCs in vadose zone soil. It is recognized as a presumptive remedy by EPA. Contractors and equipment are readily available and permits can be readily obtained, including a Permit to Construct/Permit to Operate issued by the SDAPCD.

Agency and community acceptance would be high since the alternative would achieve the cleanup standards and because short-term risks associated with implementation of the alternative can be mitigated as described above. However, there may be a greater sensitivity to the increased truck traffic resulting from the increased quantity of soil handled compared to Alternative 2. Noise from the SVE system would require abatement to satisfy occupants of the adjacent properties.

Cost – Estimated costs for implementation of each alternative is included in Table 5 of CMS.

6.3 RECOMMENDED CORRECTIVE MEASURE ALTERNATIVE

This section provides a comparative analysis and selection of the most appropriate corrective measure alternative. The comparative analysis is based on the nine criteria identified in Section 6.2 above. The alternatives were described and evaluated individually in Section 6.2. Following the discussion of the comparative evaluation is a numerical ranking of alternatives is provided based on the degree to which each of the four alternatives satisfies the evaluation criteria in comparison to each other. With respect to cost, values are assigned relative to the lowest ("4") to highest ("1") total estimated cost. Alternatives with comparable overall performance are assigned the same value. Absent other controlling factors, the alternative with the highest total rating (score) is considered to be the most appropriate.

6.3.1 Comparative Analysis

Be protective of human health and the environment – Alternative 1 is not protective of human health and the environment. Although the remaining three alternatives are considered to be protective of human health and the environment, Alternatives 3 and 4 provide a higher level of protection than Alternative 2 based on the increased mass of VOCs that would be removed from the site (primarily by excavation for Alternative 3 and by SVE for Alternative 4). Alternative 2 requires reliance on continued engineering controls for management of the vapor intrusion pathway with its configuration and O&M requirements dependent on future property development decisions. Alternative 4 requires O&M of an SVE system for a period of approximately 2 to 4 years. Alternatives 2, 3, and 4 are based on continued commercial/industrial land use; therefore, an LUC would be required, although this requirement would be verified for Alternatives 3 and 4 based on the results of the evaluation of potential human health risk conducted after implementation of the selected alternative. Monitoring is also required for all three alternatives to verify achievement of the cleanup standards for vapor intrusion.

Attain media cleanup standards – Media cleanup standards are not achieved for Alternative 1. Media cleanup standards are achieved for the outdoor exposure and vapor intrusion pathway for Alternatives 2, 3, and 4. However, the low permeability soils at the site will pose a challenge for successful application of SVE in achieving numerical cleanup standards. Low permeability soils result in a limited radius of influence and comparatively low flow rates of soil vapor. All three are subject to soil vapor monitoring to verify long-term performance.

Control the sources of release – Soil in the identified source areas are excavated for all alternatives except Alternative 1. Alternative 3 provides for an increased reduction in potential sources because of the increased quantity of soil excavated from the site as a consequence of addressing soil vapor primarily through direct excavation. Within the limits of the performance of the extraction wells, SVE would also be effective in providing an increased reduction.

Comply with any applicable standards for management of wastes – Wastes generated during implementation of Alternatives 2, 3, and 4 would be managed in accordance with applicable regulatory requirements, including those during excavation, temporary stockpiling, transport, and off-site treatment/disposal of soil as well as wastes generated during O&M of the SVE system under Alternative 4. No wastes are generated under Alternative 1.

Short- and long-term effectiveness – Alternative 1 poses no short term risks, however, provide no long term effectiveness. Protection of workers and the community during implementation of Alternatives 2, 3, and 4 are included to address short-term risk. Potential short-term risks to on-site workers, the community, and the environment could result from vapors, dust, or particulates that may be generated during excavation and soil handling activities. These risks could be mitigated using PPE for on-site workers and engineering controls, such as dust suppression and additional traffic control and equipment operating safety procedures, for protection of the surrounding community. Ambient air monitoring would be conducted to identify if criteria are exceeded. These alternatives are expected to provide long-term effectiveness because soil exceeding human health risk criteria is removed. Long-term effectiveness of Alternatives 3 and 4, however, will require that remaining VOCs in soil vapor do not migrate to the imported backfill material to concentrations exceeding the cleanup standards as demonstrated through monitoring. Successful application of SVE in achieving numerical cleanup standards in low permeability soils, however, can be a challenge, thus resulting in uncertainty in the time required for O&M.

Reduction of toxicity, mobility, and/or volume – Alternative 1 provides no reduction in the toxicity, mobility, and volume of contaminants at the site. Alternatives 3 and 4 provide the greatest reduction with excavation of approximately 15,700 and 4,000 cubic yards of impacted soil, respectively, and extraction of deep contaminated soil vapor using SVE under Alternative 4. Mobility and potentially, toxicity and volume, would be further reduced at the off-site treatment/disposal facility.

Long-term reliability – Alternative 1 provides no long-term reliability. Long term reliability of excavation and off-site disposal of impacted soil under Alternatives 2, 3, and 4 is high, as COCs are removed from the site through excavation and also SVE, for Alternative 4. LUCs are likely required, however, to ensure that land use is limited to commercial/industrial purposes. Alternative 2 require proper O&M and management of vapor control measures to mitigate the vapor intrusion pathway. Monitoring will be required for Alternatives 2, 3, and 4 to demonstrate that residual concentrations of VOCs in deep soil gas do not pose an unacceptable human health risk after implementation. Monitoring for Alternative 2 would be especially important to evaluate the potential for continued off-site migration of soil vapor.

Implementability – Alternative 1 poses no technical implementability issues. Excavation and off-site disposal under Alternatives 2, 3, and 4 is a well-proven, readily implementable technology that is a common method for cleaning up hazardous waste sites. It is a relatively simple process, with proven procedures. Equipment and labor required to implement this alternative are uncomplicated and readily available. The shallow depths of the excavation are achievable; however, the physical properties of the soil at this site are expected to limit the rate of excavation. Additionally, the extensive deeper areas of excavation associated with Alternative 3 will require significant engineering analysis to ensure building stability and worker safety, during excavation. This analysis would select the most appropriate combination of shoring, partial building demolition, and/or modified excavation techniques to accomplish the planned excavation.

Additionally, SVE under Alternative 4 is a developed technology for addressing VOCs in vadose zone soil. It is recognized as a presumptive remedy by EPA. Contractors and equipment are readily available and permits can be readily obtained, including a Permit to Construct/Permit to Operate issued by the SDAPCD.

Agency and community acceptance of Alternatives 2, 3, and 4 would be high since the alternative would achieve the cleanup standards and because short-term risks associated with implementation of the alternative can be mitigated as described above. However, there may be a greater sensitivity to the increased truck traffic resulting from the increased quantity of soil handled under Alternative 3 compared to Alternatives 2 and 4. Noise from the SVE system under Alternative 4 would require abatement to meet local noise ordinances and satisfy occupants of the adjacent properties.

Cost – Estimated costs for implementation of each alternative is included in Table 5 of CMS.

Based on the discussion provided above, score values for each of the criteria were assigned as follows:

Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Be protective of human health and the environment	1	2	4	3
Attain media cleanup standards	1	2	4	3
Control the source of the release	1	2	4	3
Comply with applicable standards for management of wastes	1	2	4	3
Short- and long-term effectiveness	1	2	4	3
Reduction in toxicity, mobility, and volume	1	2	4	3
Long-term reliability	1	2	4	3
Implementability	1	4	2	3
Cost	4	3	1	2
Total Score	12	21	31	26

6.3.2 Selected Corrective Measure Alternative

Alternative 1 does not satisfactorily address the nine evaluation criteria and is not considered an appropriate alternative for this site. Alternative 2 satisfactorily addresses each of the nine evaluation criteria and is an appropriate alternative on that basis. However, this alternative relies more on long-term O&M measures (for mitigation of the vapor intrusion pathway) than Alternatives 3 and 4. Both Alternatives 3 and 4 satisfactorily address each of the nine evaluation criteria and are appropriate alternatives on that basis. However, Alternative 3 scored 31 in comparison to 26 for Alternative 4. The key difference between the two is in the method that is used to address VOCs in the deeper soil vapor. Alternative 3 relies on a more extensive excavation directly and quickly targeting VOCs in the deep soil. Alternative 4 relies on SVE in addressing these same areas. The performance of SVE in low permeability soils, however, is limited and successful removal of VOCs may require an extended period of operation. Therefore, Alternative 3 is preferred given its more certain performance compared to SVE and its ability to achieve the cleanup standards in a shorter period of time.

References

– *Facility Investigation Report* dated February 6, 2006, prepared by URS Corporation for *Toppan Electronics, Inc., 7770 Miramar Road, San Diego, California*

– *Baseline Risk Assessment* dated May 5, 2006, prepared by URS Corporation for *Toppan Electronics, Inc., 7770 Miramar Road, San Diego, California*

– *Draft Corrective Measures Study/Remedy Selection/Corrective Measure Implementation Workplan* dated August 21, 2006, , prepared by URS Corporation for *Toppan Electronics, Inc., 7770 Miramar Road, San Diego, California*