Date:  June 30, 2015

Subject:  Addendum Number Three (3) to City of Palo Alto Invitation for Bids (IFB) Number 159083.

Project Title:  Mayfield Soccer Complex Synthetic Turf Project

Department:  Community Services Department, Golf and Parks Division

New Bid Due Date:  3:00 P.M., Tuesday, August 14, 2015

Please note the following changes, corrections, and clarifications that are hereby incorporated to the requirements of the IFB.

RESPONSE TO RFI

The City is extending the dates of this Invitation for Bids to allow more time for the required sample testing and re-testing as necessary and at the same time to allow time for the City to evaluate those samples already received before the final results are made available to all bidders.

Sample and Testing Data submittal Requirements reads:

“Bidder must submit manufacturer’s samples of synthetic turf and infill, as well as independent testing data and certificate that the products comply with requirements of the project specifications (see Section 32 18 13, 1.3 (A&B) SUBMITTALS and Appendix A) – copy attached to this addendum. Samples and testing data due by:

Thursday, July 30, 2015 – deliver to the address below:

City of Palo Alto
Purchasing and Contract Administration
250 Hamilton Avenue, Mail Stop MB
Palo Alto, CA 94301”
Part of the submittal per the Specifications requires that you provide a cover letter from an independent environmental consulting like Dudek or equal. The section says:

3. Independent testing data must be accompanied by a cover letter from an independent environmental consulting with over ten (10) years’ experience in evaluating laboratory test results and comparing results to the above listed standards.

   a. Independent environmental consulting firm shall summarize lab results and verify that the material is not hazardous to the public or environment. The letter from the environmental consulting firm can be prepared by Dudek or equal:

   i. Dudek
      605 Third Street, Encinitas, Ca 92024
      Phone: 760-942-5147

Note this Addendum has changed the Bid Opening Date to the date and time specified above.

To assure that all Bidders have received each addendum issued, Bidder’s are required to acknowledge receipt of Addenda by completing the BID FORM AND BIDDER’S DOCUMENTS, Paragraph "D". Failure to acknowledge receipt of Addenda may be considered as an irregularity in the Bid.

Jose Arreola
Jose Arreola
(650) 329-2319
City of Palo Alto
Contracts Administrator (Temp)

Cc: Peter Jensen, Project Manager
    Daren Anderson, Project Manager

Attachment: Specification Section 32 18 13 Synthetic Turf Playing Field

A copy of this addendum can be downloaded from our website at:

http://www.cityofpaloalto.org/depts/asd/current_solicitations.asp
PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. It shall be the responsibility of the contractor to provide all labor, materials, equipment and tools necessary for the complete removal of the existing synthetic turf and the installation of the new synthetic turf. The installation of all materials shall be performed in strict accordance with the manufacturer’s installation instructions and in accordance with all approved shop drawings.

B. The general extent of the products and installation as shown on the Drawings and may include, but is not limited to:
   1. Removal and disposal of the existing synthetic turf field
   2. Retention of the existing brock base pad, with minor areas of replacement
   3. Repair of local areas of base rock displacement.
   4. Installation of the new landscape synthetic turf base.
   5. Installation of the new synthetic turf playing field.
   6. Installation of the new Landscape synthetic turf.

1.2 QUALITY ASSURANCE

A. The Synthetic Turf Contractor shall have the experience (if applicable to this project specification) of five (5) installations with full size fields (minimum 65,000 sq. ft.) using TPE (Thermoplastic Elastomer) performance infill and synthetic turf within the last 10 years. A list of applicable installations must be available upon request by owner.

1.3 SUBMITTALS

A. Product Data

   1. Submit manufacturer's sample synthetic turf and infill including catalog cuts, material safety data sheets (MSDS), brochures, specifications; preparation and installation instructions and recommendations; storage, handling requirements and recommendations.

   2. After notice of award Synthetic Turf Contractor shall provide a sample manufacturer’s warranty and third party warranty per specification requirements.

   3. Contractor shall provide independent testing data and certificate that product complies with requirements of project specifications one week prior to the due date.
      a. Pile Height, Face Weight & Total Fabric Weight ASTM D5848
      b. Primary Backing Weight, ASTM D5848
      c. Tuft bind, ASTM D1335

   Samples and testing data now due by July 31, 2015
B. Product Testing

1. The synthetic turf and infill shall be analyzed to evaluate the potential for these materials to adversely affect human health and water quality through their normal use. The lab test results and summary letter of lab results performed by a consultant shall be submitted to the City’s Purchasing Department one week prior to the bid due date. After the City reviews and accepts conformance to the Project specifications, the contractor may submit a bid. 

Samples and testing data now due by July 31, 2015

Solids and leachable concentrations of the product shall be tested and evaluated. Leachable concentrations are evaluated with the following extraction using the Synthetic Precipitation Leaching Procedure (SPLP). Metals, Volatile organic compounds (VOCs,) and Semi-volatile organic compounds (SVOCs) may impact stormwater quality, groundwater quality, and/or human health through leaching, direct contact with the synthetic turf, or erosion and release of the infill materials.

a. A state certified independent testing lab can be Eurofins Calscience or equal:
   i. Eurofins Calscience
      5063 Commercial Cir # H, Concord, CA 94520
      T: 760-942-5147

b. Samples of proposed infill and synthetic turf to be tested for solids and leachable concentrations (aqueous):
   i. Total metals by EPA method 6010B/7471A,
   ii. VOCs by EPA method 8260B, and
   iii. SVOCs by EPA method 8270C.

2. Laboratory solid and leachable concentrations sample results will be compared to the following standards:

   a. For human health standards – Comparison of solids analysis to EPA Regional Screening Levels (RSL) and Cal-EPA California Human Health Screening Levels (CHHSL).
      i. Compare lab results to the corresponding commercial and industrial scenario levels from the Cal-EPA California Human Health Screening Levels (CHHSL) Table, see Appendix A - Table CHHSL.

      ii. Compare lab results to the corresponding industrial soil screening levels from the U.S. EPA Regional Screening Level (“RSL”) Summary Table, see Appendix A – Table EPA RSL.

   b. For groundwater and surface water quality – Comparison of Synthetic Precipitation Leaching Procedure (SPLP) extract to Maximum Contaminant Levels (MCLs).
      i. Compare lab results to the corresponding MCLs from the U.S. EPA and California MCLs for Drinking Water, see Appendix A – Table MCL.
ii. Compare lab results to the corresponding secondary MCLs from the California Code of Regulations, Title 22, Division 4, Chapter 15, Article 16, Secondary Water Standards, Section 64449, see Appendix A – Table Secondary MCL.

c. For surface water quality – Comparison of Synthetic Precipitation Leaching Procedure (SPLP) extract to RWQCB Environmental Screening Levels (ESLs) for surface water screening levels for fresh water habitats.

i. Compare lab results to the corresponding final surface water screening levels from San Francisco Bay Regional Water Quality Control Board, Environmental Screening Levels (ESLs), see Appendix A - Table RWQCB F-2a.

3. Independent testing data must be accompanied by a cover letter from an independent environmental consulting with over ten (10) years’ experience in evaluating laboratory test results and comparing results to the above listed standards.

a. Independent environmental consulting firm shall summarize lab results and verify that the material is not hazardous to the public or environment. The letter from the environmental consulting firm can be prepared by Dudek or equal:

i. Dudek
605 Third Street, Encinitas, Ca 92024
T: 760-942-5147

b. Testing data shall be provided and summarized in tables similar to the following:

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Constituent</th>
<th>Sample Results</th>
<th>RSL Standard</th>
<th>CHHSL Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Type</td>
<td>xxx</td>
<td>xx mg/kg</td>
<td>xx mg/kg</td>
<td>xx mg/kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Constituent</th>
<th>SPLP Result</th>
<th>ESL Standard</th>
<th>MCL Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Type</td>
<td>xxx</td>
<td>xx μg/L</td>
<td>xx μg/L</td>
<td>xx μg/L</td>
</tr>
</tbody>
</table>

A. Shop Drawings for:

1. Seaming plan showing both sheared and sewn seams.
2. Installation details; edge detail, utility box detail, etc.
3. Striping plan, including field line layouts (including colors), etc

B. Product samples
   1. Specified TPE Infill material
   2. Specified Sand Infill material
   3. Specified Infill materials mixed as installed as part of the synthetic turf system.
   4. Submit four (4) one foot squares of the specified fiber and attached backing.

PART 2 - PRODUCTS

2.1 ATHLETIC FIELD SYNTHETIC TURF SYSTEM

A. Athletic field Synthetic Turf
   1. A complete synthetic turf system consisting of a combination of 2.00” minimum UV stabilized monofilament polyethylene and parallel slit film fiber system capable of meeting the following specifications:

<table>
<thead>
<tr>
<th>Method</th>
<th>Minimum/Maximum</th>
<th>ASTM D Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finished Pile Height</td>
<td>2.00” Minimum</td>
<td>D 5823</td>
</tr>
<tr>
<td>Denier- Slit Film</td>
<td>5,000 Minimum</td>
<td>D 1577</td>
</tr>
<tr>
<td>Denier- Mono</td>
<td>10,000 Minimum</td>
<td>D 1577</td>
</tr>
<tr>
<td>Thickness-Slit Film</td>
<td>100 Micron Minimum</td>
<td>D 3218</td>
</tr>
<tr>
<td>Thickness-Mono</td>
<td>235 Micron Minimum</td>
<td>D 3218</td>
</tr>
<tr>
<td>Finished Pile Weight</td>
<td>44 oz/yd²</td>
<td>D 5823</td>
</tr>
<tr>
<td>Product Weight (total)*</td>
<td>Min 66 oz/yd²</td>
<td>D 5848</td>
</tr>
<tr>
<td>Primary Backing Weight*</td>
<td>Min 6.5 oz/yd²</td>
<td>D 5848</td>
</tr>
<tr>
<td>Secondary Coating Weight**</td>
<td>16 oz/yd²</td>
<td>D 5848</td>
</tr>
<tr>
<td>Tuft Gauge</td>
<td>3/8” Minimum</td>
<td>D 5793</td>
</tr>
<tr>
<td></td>
<td>3/4” Maximum</td>
<td></td>
</tr>
<tr>
<td>Grab Tear Strength</td>
<td>Minimum 200 lb-F</td>
<td>D 5034</td>
</tr>
<tr>
<td>Tuft Bind (Avg)*</td>
<td>9 lb- Minimum</td>
<td>D 1335</td>
</tr>
</tbody>
</table>
2. Known brand name or trade name products used as the basis for the base bid specification and are capable of meeting the Athletic field synthetic turf specifications are as follows.

a. Field Turf 2” 45 oz- Vertex XMR-50
   i. Contact Andrew Rowley- T:707-586-2066

b. Shaw 2”-44 oz-Legion
   i. Contact Craig Edwards- T: 916-880-8747

c. Astroturf 2”-44 oz-Q-44
   i. Contact John Burke- 916-275-1098

d. Greenfields- 2”-48 oz-Slidemax XP-50
   i. Contact Jasen Deniz- 530-742-7429

e. Edel Grass 2”-51 oz Hybrid blade
   i. Contact Alex Chan- 615-669-8668

b. Synthetic turf companies or brand names not listed within specification may bid as an equal product so as they provide the required product samples and testing data and meet all aspects of the project specifications.
   i. Or-equal submitted product must be a standards product carried by manufacturer and meet all quality assurance and project requirements.

c. The carpet’s primary backing shall be a minimum double-layered polypropylene fabric treated with UV inhibitors. The secondary backing shall consist of an application of a heat-activated urethane to permanently lock the fiber tufts in place. The entire backing shall be coated with holes perforated throughout the backing at the Synthetic Turf Manufacturer’s recommended interval to allow for drainage.

d. The carpet shall be delivered in 15’ wide rolls. The rolls shall be of sufficient length to go from sideline to sideline. Head seams, other than at sidelines, will not be acceptable.

e. Sewing seams of turf/panels shall be required. Glued seems will not be accepted

f. Glue for inlaying lines and markings shall be as recommended by the Synthetic turf council. Inlaid markings (that cannot be tufted into the fabric), shall be installed by means of shearing out the existing green fiber and laying in a new piece of colored fabric into a bed of suitable “hot melt” adhesive placed directly on the original turf backing material. Inlaid markings may not be installed by means of cutting through the fabric and adhering the colored turf to a separate
reinforcing tape or cloth. Systems that cut through the turf fabric for inlaid lines are not acceptable due to the fact that such a procedure shall weaken the structural integrity of the turf fabric backing.

B. ATHLETIC FIELD INFILL

1. A resilient infill system, consisting of graded dust-free silica Sand and Top dressed with a 0.50” final layer of TPE. Infill system shall consist of a minimum of 0.50” TPE, with no location having less than 0.50” of TPE. The infill shall be filled so that there is a void of a maximum of ¾” to the top of the fiber at time of installation.

2. Infill materials shall be properly applied in numerous lifts using special broadcasting equipment. The synthetic turf shall be raked and brushed properly as the mixture is applied. The infill material shall be installed to a settled depth of approximately 1-1/4 inches maximum. The infill materials can only be applied when the synthetic turf fabric is dry.

3. The sand shall be dust free silica sand meeting a 20-40 mesh, and being round/sub-round sand.

4. TPE to be 100% virgin Green TPE infill with no toxic fillers, capable of meeting UV of 200k Langley/year.

5. TPE shall have a maximum of 0.5% passing a sieve size of 20

6. TPE shall have no agglomeration of stickiness to pellet below 239 degrees.

7. Known brand name or trade name products used as the basis for the base bid specification and known to be capable of meeting the Athletic field synthetic turf infill specifications are as follows.
   a. Soft.er: Forgrin GT TPE
   b. Target Technologies: Pro Max 37 TPE
   c. Products listed meet the performance specification requirements listed and are listed as part of their company’s standard product lines. However, products listed still need to meet and comply with all requirements of specifications and drawings including product testing requirement for bid.
   d. Infill products/companies or brand names not listed within specification may bid as an equal product so as they provide the required testing data and meet all aspects of the project specifications.
      i. As-equal submitted product must be a standard product carried by manufacturer and meet all quality assurance and project requirements.

8. TPE manufacturer is to provide an 8 year warranty along with a certificate validating TPE meets all project specifications.

9. Certificate of origin required
10. Manufacturer shall supply letter certification stating compatibility from turf manufacturer with polyethylene fibers.

11. Manufacturer to provide MSDS Sheets

1.2 COMPOSITE PAD REPLACEMENT

A. Synthetic turf contractor to plan on repairing and replacing approximately 100 sf of existing Brock SP-14 composite base pad with new composite pad.

1.3 LANDSCAPE SYNTHETIC TURF SYSTEM

A. Landscape Turf

1. A complete synthetic turf system consisting of a combination of a dual color, texturized monofilament thatch combined with and spined/ridged monofilaments. UV stabilized monofilament polyethylene and texturized thatch system capable of meeting the following specifications:

<table>
<thead>
<tr>
<th>METHOD</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Finished Pile Height</td>
<td>1.50” Minimum</td>
</tr>
<tr>
<td>Denier- Mono</td>
<td>10,000 Minimum</td>
</tr>
<tr>
<td>Denier- Texturized Mono</td>
<td>5,600 Minimum</td>
</tr>
<tr>
<td>Finished Pile Weight</td>
<td>62 oz Minimum</td>
</tr>
<tr>
<td>Total Weight</td>
<td>92 oz/yd²</td>
</tr>
<tr>
<td>Tuft Gauge</td>
<td>3/8” Maximum</td>
</tr>
<tr>
<td>Tuft Bind (Avg)*</td>
<td>9 lb- Minimum</td>
</tr>
<tr>
<td>Infill weight</td>
<td>2 lb- Minimum</td>
</tr>
</tbody>
</table>

2. The carpet’s primary backing shall be a minimum double-layered polypropylene fabric treated with UV inhibitors. The secondary backing shall consist of an application of a heat-activated urethane to permanently lock the fiber tufts in place. The entire backing shall be coated with holes perforated throughout the backing at the Synthetic Turf Manufacturer’s recommended interval to allow for drainage.
B. Landscape Infill

1. Infill materials shall be properly applied in numerous lifts using special broadcasting equipment. The synthetic turf shall be raked and brushed properly as the mixture is applied. The infill materials can only be applied when the synthetic turf fabric is dry.

2. The infill shall be dust free silica sand meeting a 20-40 mesh, and being round/sub-round sand.

PART 2 - EXECUTION

2.1 INSTALLATION OF TURF SYSTEM

A. Install in accordance with Manufacturer's instructions. The Turf Contractor shall strictly adhere to the installation procedures outlined under this section. Any variance from these requirements must be accepted, in writing, by the onsite representative of the Manufacturer/Installer, and submitted to the Architect verifying that the changes do not in any way affect the warranty or performance of the system. Infill materials shall be approved by the Architect and installed in accordance with the Synthetic Turf Council standard procedures.

B. The turf manufacturer, installation subcontractor and city representative must accept the integrity of the existing composite base system prior to the installation of the synthetic grass system.

C. The carpet rolls are to be installed directly over the composite pad. Extreme care should be taken to avoid disturbing the existing pad and underlying rock base in regard to compaction and planarity. It is suggested that a 2-5 ton static roller be placed on site and made available to repair and properly compact any disturbed areas of the base.

D. The carpet shall be delivered in 15-foot wide rolls. The full width rolls shall be laid out across the field with the same grain direction. Turf shall be of sufficient length to permit full cross-field installation (from sideline to sideline). No “head” or cross seams will be allowed in the main playing area between the sidelines, per standard turf installation procedures. Utilizing standard state of the art sewing procedures, each roll shall be attached to the next. When all of the rolls of the playing surface have been installed, the sideline areas shall be installed at right angles to the playing field turf.

E. This is a sewn installation. Gluing of fabric rolls shall not be acceptable. Minimal gluing will be permitted and only to repair problem areas, corner completions, and install logos or inlaid lines as required by the specifications. All seams shall be sewn using double bagger stitches and polyester thread. Seams shall be flat, tight, and permanent with no separation or fraying.

F. Infill materials shall be applied in thin lifts. The turf shall be brushed as the mixture is applied. The infill material shall be installed to a depth of 1.25 inch minimum within the fiber matrix. The mix shall be uniform and even in thickness to assure proper playing characteristics.
G. The infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional. The infill installation consists of a base layer of sand followed a final application of specifically sized TPE to complete the system.

H. Infill density may change between TPE vendors used so no less than ¾” of TPE shall be used to top dress the field.

1. Typically a 1.25” infill section with 0.50” of TPE will provide a combination of 2 lb TPE and over 5 lb of sand. Synthetic turf contractor to provide required sand quantity based on their product system to provide a maximum of ¾ exposed fiber.

I. Synthetic turf shall be attached to the existing perimeter edge nailer.

2.2 FIELD MARKINGS

A. The field will have the following lines tufted, inlaid or painted as specified according to the project plans.

B. Soccer: Soccer lined to replace existing lines in kind as shown on the contract drawings. Color shall be white and blue, except where noted.

1. Side lines
2. End lines
3. Goal Box
4. 6-yard box
5. Corner Kick markings
6. Center Circle markings
7. Penalty Kick Markings 10-yard hash marks (from corners)
8. Fire lane
9. Non-tufted or non-inlaid lines and markings shall be applied with paint approved by the synthetic turf Manufacturer.

2.3 COMPOSITE PAD REPLACEMENT

A. Contractor to remove damaged brock panels in soccer penalty areas.

B. Upon removal of composite pad, existing base rock is to be re-graded and compacted to 92% prior to installation of new composite pad.

2.4 INSTALLING THE SYNTHETIC TURF

A. The turf manufacturer and installation subcontractor must accept the condition of the existing composite base prior to the installation of synthetic grass system.

B. Any areas of concern for planarity or compaction shall be brought to the attention of the
City representative for review, prior to installation of the synthetic grass system

1. Synthetic turf contractor shall bid at minimum the removal of the existing brock pad, remediation of base rock for planarity, compaction of existing base rock and replacement of brock pad for of approximately 400 sf.

2.5 PROJECT RECORD DOCUMENTS

A. Record actual locations of seams, drains or other pertinent information.

1. Warranty:
   a. Submit Manufacturer Warranty and ensure that forms have been completed in City's name and registered with Manufacturer and Insurance Carrier. The manufacturer’s warranty shall include general wear and damage caused from UV degradation.

   b. Submit information confirming that 3rd Party Insurance Policy as described below is in effect covering this installation. Insurance carrier must confirm that the policy is in force and premiums paid. Must have a 3rd party insured, non-prorated and NON-CANCELEABLE warranty pre-paid for 8 years from no lower than an 'A' rated insurance company listed in the A.M. Best Key Rating Guide The policy must include a minimum annual aggregate of $3,000,000 per year and be based on claims arising from fields installed and completed only during the policy year. The policy must include an unlimited amount per claim up to the maximum aggregate. The policy cannot have any epidemic failure limitations or restrictions. The policy must not have any deductible and the coverage must be for labor, materials and any other costs to repair or replace each field per the warranty certificate.

   c. Upon completion of the field, the turf manufacturer will supply evidence that the policy is in effect, fully funded and that the installation is added to the policy upon completion and acceptance. Policy shall guarantee coverage of a minimum of $7.00 per square foot of turf installed. Any policy that includes self insured participation or deductible amounts shall be deemed non compliant. Policy must be in force at time of bid; insurance carrier must confirm that the policy is in force and premiums paid.

   d. The warranty shall specifically exclude vandalism and Acts of God beyond the control of the City or the manufacturer.

   i. The turf contractor shall provide a warranty to the City that covers defects in the installation workmanship, and further warrant that the installation was done in accordance with both the manufacturer’s recommendations and any written directives of the manufacturer’s onsite representative.
ii. Turf shall have a maximum G-max of 110 upon initial installation and must maintain an ASTM 355 G-max of less than 160 for the life of the warranty.

iii. Turf manufacturer shall be responsible for G-max for the period of the 8 year warrantee. Testing shall be completed by an independent certified testing company at the time of installation and again at the 3rd, 5th, and 7th year of operations. These tests will be performed at no additional cost to the owner.

2.6 MAINTENANCE, SERVICE AND TRAINING

A. The Turf Contractor will train the City’s facility maintenance staff in the use of the Turf Manufacturer's recommended Groomer and sweeper within 30 days after completion of the installation process.

B. Manufacture shall provide a training session to the City for management and maintenance of the field prior to final turnover inspection.

C. Prior to Final Acceptance, the Contractor shall submit to the City:

1. Three (3) copies of Maintenance Manuals, which will include all necessary instructions for the proper care and preventive maintenance of the turf system, including painting and markings.

PART 4 -- MEASUREMENT AND PAYMENT

A. This item shall be measured and paid on a lump sum basis and included in Bid Schedule Item “Synthetic Turf”. Payment shall include full compensation for furnishing all testing, labor, equipment, tools, infill, and materials necessary to provide all the work involved in Synthetic Turf as shown on the plans and as specified in the specifications.

Appendix A Tables will follow after the end of the section.

END OF SECTION
SECTION 32 18 13
Appendix A – Tables

1. Table CHHSLs
   Reference: Office of Environmental Health Hazard Assessment, Risk Assessment - Soil and Soil Gas, Soil Screening Numbers (List of CHHSLs) – Updated Table, Table 1. Soil-and Soil-Gas-Screening Screening Numbers for Nonvolilatilie Chemicals Based on Total Exposure on Contaminated Soil: Inhalation, Ingestion and Dermal Absorption, September 2010).

2. Table EPA RSL
   Reference: U.S. EPA Regional Screening Level (“RSL”) Summary Table (TR=1E-6, HQ=1), May 2014.

3. Table MCL

4. Table Secondary MCL

5. Table RWQCB F-2a
   Reference: San Francisco Bay Regional Water Quality Control Board, Environmental Screening Levels (ESLs), Lookup Tables – Details, Table F-2a, Surface Water Screening Levels, Fresh Water Habitats, December 2013
### Risk Assessment - Soil and Soil Gas

**SOIL-SCREENING NUMBERS - UPDATED TABLE [09/23/10]**

Three updated tables of OEHHA Soil Screening Numbers.

Table 1 - Soil-Screening Numbers (mg/kg soil) for Nonvolatile Chemicals Based on Total Exposure to Contaminated Soil: Inhalation, Ingestion and Dermal Absorption.

**TABLE 1.**
**SOIL-AND SOIL-GAS-SCREENING NUMBERS (MG/KG SOIL) FOR NONVOLATILE CHEMICALS BASED ON TOTAL EXPOSURE TO CONTAMINATED SOIL: INHALATION, INGESTION AND DERMAL ABSORPTION**

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Soil-Screening Number (mg per kg of dry soil)</th>
<th>Residential Scenario</th>
<th>Commercial/Industrial Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Basis¹</td>
<td>Basis¹</td>
</tr>
<tr>
<td><strong>Organic Acidic Chemicals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2, 4-D</td>
<td>6.9E+02 (nc)</td>
<td></td>
<td>7.7E+03 (nc)</td>
</tr>
<tr>
<td>2,4,5-T</td>
<td>5.5E+02 (nc)</td>
<td></td>
<td>6.1E+03 (nc)</td>
</tr>
<tr>
<td>Pentachlorophenol</td>
<td>4.4E+00 (ca)</td>
<td></td>
<td>1.3E+01 (ca)</td>
</tr>
<tr>
<td><strong>Organic Neutral Chemicals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aldrin</td>
<td>3.3E-02 (ca)</td>
<td></td>
<td>1.3E-01 (ca)</td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>3.8E-02 (ca)</td>
<td></td>
<td>1.3E-01 (ca)</td>
</tr>
<tr>
<td>Chlordane</td>
<td>4.3E-01 (ca)</td>
<td></td>
<td>1.7E+00 (ca)</td>
</tr>
<tr>
<td>DDD</td>
<td>2.3E+00 (ca)</td>
<td></td>
<td>9.0E+00 (ca)</td>
</tr>
<tr>
<td>DDE</td>
<td>1.6E+00 (ca)</td>
<td></td>
<td>6.3E+00 (ca)</td>
</tr>
<tr>
<td>DDT</td>
<td>1.6E+00 (ca)</td>
<td></td>
<td>6.3E+00 (ca)</td>
</tr>
</tbody>
</table>

**Note:** Compare lab results to the corresponding commercial and industrial scenario levels.
<table>
<thead>
<tr>
<th>Chemical</th>
<th>1993</th>
<th>1999</th>
<th>1993</th>
<th>1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dieldrin</td>
<td>3.5E-02</td>
<td>(ca)</td>
<td>1.3E-01</td>
<td>(ca)</td>
</tr>
<tr>
<td>1,4-Dioxane</td>
<td>1.8E+01</td>
<td>(ca)</td>
<td>6.4E+01</td>
<td>(ca)</td>
</tr>
<tr>
<td>Dioxin (2,3,7, 8-TCDD)</td>
<td>4.6E-06</td>
<td>(ca)</td>
<td>1.9E-05</td>
<td>(ca)</td>
</tr>
<tr>
<td>Endrin</td>
<td>2.1E+01</td>
<td>(nc)</td>
<td>2.3E+02</td>
<td>(nc)</td>
</tr>
<tr>
<td>Heptachlor</td>
<td>1.3E-01</td>
<td>(ca)</td>
<td>5.2E-01</td>
<td>(ca)</td>
</tr>
<tr>
<td>Lindane</td>
<td>5.0E-01</td>
<td>(ca)</td>
<td>2.0E+00</td>
<td>(ca)</td>
</tr>
<tr>
<td>Kepone</td>
<td>3.5E-02</td>
<td>(ca)</td>
<td>1.3E-01</td>
<td>(ca)</td>
</tr>
<tr>
<td>Methoxychlor</td>
<td>3.4E+02</td>
<td>(nc)</td>
<td>3.8E+03</td>
<td>(nc)</td>
</tr>
<tr>
<td>Mirex</td>
<td>3.1E-02</td>
<td>(ca)</td>
<td>1.2E-01</td>
<td>(ca)</td>
</tr>
<tr>
<td>PCBs</td>
<td>8.9E-02</td>
<td>(ca)</td>
<td>3.0E-01</td>
<td>(ca)</td>
</tr>
<tr>
<td>Toxaphene</td>
<td>4.6E-01</td>
<td>(ca)</td>
<td>1.8E+00</td>
<td>(ca)</td>
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</table>

**Inorganic Chemicals**

<table>
<thead>
<tr>
<th>Chemical</th>
<th>1993</th>
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<th>1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony and compounds</td>
<td>3.0E+01</td>
<td>(nc)</td>
<td>3.8E+02</td>
<td>(nc)</td>
</tr>
<tr>
<td>Arsenic²</td>
<td>7.0E-02</td>
<td>(ca)</td>
<td>2.4E-01</td>
<td>(ca)</td>
</tr>
<tr>
<td>Barium and compounds</td>
<td>5.2E+03</td>
<td>(nc)</td>
<td>6.3E+04</td>
<td>(nc)</td>
</tr>
<tr>
<td>Beryllium and compounds</td>
<td>1.6E+01⁴</td>
<td>(nc)</td>
<td>1.9E+02⁴</td>
<td>(nc)</td>
</tr>
<tr>
<td>Beryllium oxide</td>
<td>1.6E+01⁴</td>
<td>(nc)</td>
<td>1.9E+02⁴</td>
<td>(nc)</td>
</tr>
<tr>
<td>Beryllium sulfate³</td>
<td>2.9E+00⁴</td>
<td>(ca)</td>
<td>6.3E+00⁴</td>
<td>(ca)</td>
</tr>
<tr>
<td>Cadmium and compounds</td>
<td>1.7E+00</td>
<td>(ca)</td>
<td>7.5E+00</td>
<td>(ca)</td>
</tr>
</tbody>
</table>

[http://oehha.ca.gov/risk/chhsltable.html](http://oehha.ca.gov/risk/chhsltable.html)
<table>
<thead>
<tr>
<th>Substance</th>
<th>Screening Number 1</th>
<th>Basis</th>
<th>Screening Number 2</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium III</td>
<td>1.0E+05</td>
<td>(nc, max)</td>
<td>1.0E+05</td>
<td>(nc, max)</td>
</tr>
<tr>
<td>Chromium VI</td>
<td>1.7E+01</td>
<td>(ca)</td>
<td>3.7E+01</td>
<td>(ca)</td>
</tr>
<tr>
<td>Cobalt</td>
<td>6.6E+02</td>
<td>(nc)</td>
<td>3.2E+03</td>
<td>(nc)</td>
</tr>
<tr>
<td>Copper and compounds</td>
<td>3.0E+03</td>
<td>(nc)</td>
<td>3.8E+04</td>
<td>(nc)</td>
</tr>
<tr>
<td>Fluoride</td>
<td>4.6E+03</td>
<td>(nc)</td>
<td>5.7E+04</td>
<td>(nc)</td>
</tr>
<tr>
<td>Lead and lead compounds</td>
<td>8.0E+01</td>
<td>(nc)</td>
<td>3.2E+02</td>
<td>(nc)</td>
</tr>
<tr>
<td>Lead acetate</td>
<td>2.3E+00</td>
<td>(ca)</td>
<td>1.0E+01</td>
<td>(ca)</td>
</tr>
<tr>
<td>Mercury and compounds</td>
<td>1.8E+01</td>
<td>(nc)</td>
<td>1.8E+02</td>
<td>(nc)</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>3.8E+02</td>
<td>(nc)</td>
<td>4.8E+03</td>
<td>(nc)</td>
</tr>
<tr>
<td>Nickel and compounds</td>
<td>1.6E+03</td>
<td>(nc)</td>
<td>1.6E+04</td>
<td>(nc)</td>
</tr>
<tr>
<td>Nickel subsulfide</td>
<td>3.8E-01</td>
<td>(ca)</td>
<td>1.1E+04</td>
<td>(ca)</td>
</tr>
<tr>
<td>Perchlorate</td>
<td>2.8E+01</td>
<td>(nc)</td>
<td>3.5E+02</td>
<td>(nc)</td>
</tr>
<tr>
<td>Selenium</td>
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<td>(nc)</td>
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<td>(nc)</td>
</tr>
<tr>
<td>Silver and compounds</td>
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<td>(nc)</td>
<td>4.8E+03</td>
<td>(nc)</td>
</tr>
<tr>
<td>Thallium and compounds</td>
<td>5.0E+00</td>
<td>(nc)</td>
<td>6.3E+01</td>
<td>(nc)</td>
</tr>
<tr>
<td>Vanadium and compounds</td>
<td>5.3E+02</td>
<td>(nc)</td>
<td>6.7E+03</td>
<td>(nc)</td>
</tr>
<tr>
<td>Zinc</td>
<td>2.3E+04</td>
<td>(nc)</td>
<td>1.0E+05</td>
<td>(nc)</td>
</tr>
</tbody>
</table>

1 (ca) denotes that the screening number is based on a carcinogenic potency factor, (nc) denotes that the screening number is based on a reference level in Table 3 for chronic toxic effects other than cancer, (max) denotes the screening number is based on the maximum concentration allowed, 100,000 mg/kg, and not toxicity.

2 The screening numbers for arsenic are for contamination resulting from human activity. Concentrations of naturally occurring arsenic may be far above the screening number. When levels of arsenic at a site are a concern, the agency with authority over remediation decisions should be consulted.

http://oehha.ca.gov/risk/chhsltable.html
These metal salts are significantly (greater than 10-fold) more toxic than the values for the metals in general. If it is known that this chemical was used at the site, the screening number for this chemical should be used instead of the screening number for the metal and its compounds.

Revised in 2009

Added in 2010

While these CHHSLs are considered safe for exposure to perchlorate in soil, the potential for significant groundwater contamination from soil contaminated with perchlorate at the CHHSLs levels may exist, since the PHG level for drinking water is 6 ppb or 6 μg/L.