



**Matthew Rodriguez**  
Secretary for  
Environmental Protection



## Department of Toxic Substances Control

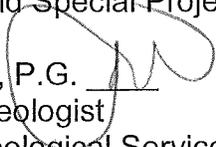
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**Edmund G. Brown Jr.**  
Governor

### MEMORANDUM

TO: Peter Ruttan, P.G.  
Engineering Geologist  
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FROM: Todd Wallbom, P.G.   
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CONCUR: Craig Christmann, P.G.   
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Chatsworth Geological Services Unit

DATE: March 6, 2014

SUBJECT: Technical Review of Off-Site Soil Sampling Report  
Exide Technologies, Inc. Site  
2700 South Indiana Street  
Vernon, California 90058  
Prepared by Advanced GeoServices Corp. (AGC)

PCA: 22120 Site Code: 300214 Phase: 48 Log No: 20022573

As requested, Geological Services Unit (GSU) staff has performed a technical review of the *Off-Site Soil Sampling Report* (Report), dated February 18, 2014, for the purposes of Corrective Action (CA) activities. The Report was submitted by AGC on behalf of the Exide Technologies Corporation (Exide) facility (Site), located at the address listed above.

The Exide facility in the City of Vernon is an actively operating battery recycling facility. Prior to 1922, a portion of the property was occupied by a meat rendering plant while other areas were quarried for gravel. Since 1922, lead smelting and metals processing operations have occurred onsite.

Contaminants-of-concern (COCs) at the Site include volatile organic compounds (VOCs); primarily trichloroethene (TCE), and inorganics; primarily antimony, lead, arsenic, cadmium, and zinc. Elevated sulfate, inorganics, VOCs, and low pH (acidic) conditions also continue to occur in groundwater.

GSU staff reviewed Exide's *Work Plan for Off-Site Soil* (Work Plan), dated November 13, 2013, and recommended that the Work Plan be revised. In response to DTSC's comments, the Work Plan was revised and resubmitted to DSTC on November 15, 2013, and approved by DTSC on November 18, 2013.

The objective for this effort was to determine if soils at residential properties and two school sites within the Northern and Southern Assessment Areas, selected based on air dispersion modeling conducted by Environ International Corporation (Environ) to estimate the locations of the Maximum Exposed Individual Resident (MEIRs), contain metals and other COCs and constituents-of-potential-concern (COPCs) that exceed background concentrations and/or Residential Soil Screening Levels (SLs). As part of the implementation of the Work Plan, a background study was performed for metals in an area selected by Exide and approved by DTSC.

Based on our review of the Report, GSU recommends that Exide perform the following action items:

1. Since most of the composited samples reported lead above the SLs, discrete lateral and vertical soil sampling should occur at each residence to determine the area of impact. To limit the number of discrete samples needed to characterize each affected area, archived discrete soil samples could be analyzed for lead provided that sufficient volume remains, and holding times (typically six months from the collection date for metals) are not exceeded.
2. In partial fulfillment of the project data quality objectives (DQOs) for off-site characterization of lead exceeding the SL in soil, Exide should expand the sample areas outward to at least double the sample areas of the MEIRs. Composite soil sampling is acceptable, provided that Exide understands that discrete soil sampling may become necessary later on.
3. A concentration of lead above the hazardous-waste level (1,000 mg/kg) was initially detected in a composite sample at one residence during the study. While Exide re-analyzed this sample and re-reported this sample at a much lower concentration, albeit still above SLs, Exide has failed to adequately rationalize why the

initial sampling effort is not representative. Exide must immediately re-assess this property and perform interim measures to mitigate this threat to the residence.

We also recommend that the Report be revised in accordance with the comments provided in this memorandum and resubmitted. Our comments on the Report are as follows:

**GENERAL COMMENTS:**

1. Exide's Report seems to attribute much of the lead detected in the residential areas to lead-based-paint (LBP) and to a lesser degree on lead from leaded gasoline. In fact, very little discussion focuses on stack emissions from the Facility, or what contributions to lead in residential soil have occurred from Exide. Given the overall nature of the urban environment for the Greater Los Angeles (GLA) area, the GSU never expected Exide to be the only source of lead to the Northern and Southern Assessment Areas (or, for the purposes of this memorandum; MEIRs). However, the results of our evaluation of their data do suggest that Exide is a major contributor. Our opinion is based on the following factors:
  - The sampling protocol appeared to have been consistently followed between the Background Area (BA) and the two MEIRs.
  - The sampling protocol was specifically designed to be sensitive to avoiding soils that could be tainted by LBP (i.e., five-feet away from housing drip-lines, entry-ways, and paved surfaces to the extent practicable).
  - In general, lead concentrations are significantly greater in the two MEIRs than in the BA.
  - In nearly all instances, lead detections exceeded the soil screening level for lead (80 mg/kg) at the two MEIRs. In one residence in the Northern MEIR, lead was detected at a maximum concentration of 2,030 mg/kg. Note: as stated above, Exide re-analyzed this sample and re-reported this sample at a much lower concentration. However, Exide has failed to adequately rationalize in the Report why the initial sampling effort is not representative.
  - For the MEIRs, the average lead concentration was 187 mg/kg for soil samples that were sieved. For unsieved samples, the average lead concentration was lower at 168 mg/kg. By comparison, the average lead concentration in the BA was 82 mg/kg for sieved samples, and slightly lower at 80 mg/kg for unsieved samples.

- Leaded gasoline (tetraethyl lead or TEL) was banned in early 1996 by the U.S.EPA. The use of TEL was being steadily phased out well before then and was already banned for sale in California by January 1, 1994 by the California Air Resources Board. Therefore, it is highly unlikely that lead impacts from TEL, particularly in surface and near-surface soil, would still show significant impacts after more than two decades. Regardless, we would consider any residual TEL to already be part of the urban lead footprint or background lead.

The Relative Percent Differences (RPD) for the average lead value between the BA and the MEIRs is also significant for samples that were sieved. The RPD for the BA was calculated at 2.5 while the RPD for the MEIRs was 10.7. The higher RPD at the MEIRs suggests that a larger proportion of lead occurs in the finer fraction (i.e., the fraction that passes through a No. 60 sieve) in soil samples collected from the MEIRs than in the BA.

Furthermore, comparing the sieved to the unsieved samples using linear regression analysis and adding a 'best-fit' line to data points plotted on an x,y graph, the r-squared value for the slope-intercept line was 0.54 for the MEIR samples versus an r-squared of 0.98 for the BA samples. The difference in r-squared results show a poor correlation between the MEIR sieved versus unsieved lead results while the BA results clearly show excellent correlation between the two data sets. This provides another line of evidence that the MEIRs are significantly more contaminated by fine lead than in the BA.

The data also seems to suggest that a greater proportion of fine lead dust occurs in the upper inch of soil. This can be seen at composite soil sample 'SS-MEIR-N-04-1' where the sieved lead result was 338 mg/kg and the unsieved result was only 164 mg/kg. The %RPD between these two values is 69 percent. In contrast, the next lower sample interval (1-3 inches) reported a higher lead result in the unsieved sample (330 mg/kg) than in the sieved sample (243 mg/kg) with a %RPD of 30 percent.

The data also shows greater differences between the Northern MEIR sieved versus unsieved lead results and the Southern MEIR. In the Southern MEIR, the highest %RPD is 24 ('SS-MEIR-S-13-3') whereas, as already mentioned above, the highest %RPD for the Northern MEIR (and for the study in general) was 69 percent ('SS-MEIR-N-04-1'). This suggests that a greater proportion of lead dust occurs to the north of the Facility than to the south. This is not unexpected since the predominant wind direction for most of the GLA area is from the southwest (SW) to the northeast (NE). The data also suggests that a

significant contribution of fine lead dust being deposited on the MEIR soil is relatively recent and likely ongoing. However, these are preliminary findings only and additional data will be needed before a more definitive assessment can be made. Exide is free to utilize various lead-fingerprinting techniques to help determine if the lead came from sources other than stack emissions (e.g., LBP, TEL). Without this kind of level of effort, we cannot agree that the lead is not coming from Exide.

2. In their Report, Exide appears to discount the background data by attributing much of the lead detected in the soil in the MEIRs to LBP. Exide selected the Background Area (BA) on the basis of, as described in Section 2.4 ('Define the Study Boundaries') of the approved Work Plan, "proximity to major freeways, a historically industrial area absent the Exide Facility or other secondary lead smelter, and a sizable rail yard with intermodal facility and switching yard. The housing stock is similar in age, size and density to the assessment areas and was constructed on areas that were previously farmland".

Despite following the same sampling protocol for both the BA and the MEIRs, (i.e., staying away from drip-lines, downspouts, entry-ways, paved surfaces, etc.), Exide states that the LBP content in the soil is likely higher in the MEIRs than it is for the BA due to the difference in the median age of the houses. We believe that this evaluation should be made on a case-by-case (i.e., house-by-house) basis, and not by using the median age. Our reasons for this are as follows:

- Not all the houses in the BA were built after World War II (WWII). In fact, the oldest residence in the BA was built in 1929, and the highest lead detected there was only 64 mg/kg ('SS-BG-06-6'). In contrast, the most recent house in the two MEIRs is dated 1991 (Northern MEIR), or more than a decade after the U.S. Consumer Product Safety Commission (USCPSC) banned the use of LBP for residences (1978). The highest lead detected there was 109 mg/kg ('SS-MEIR-N-15-6'). Given the remote possibility that LBP was used at this property, we believe that most of the lead detected here came from lead dust particulate.
- Unfortunately, neither of the above-mentioned samples was sieved to determine the concentration of the fine lead fraction. However, composite sample 'SS-MEIR-N-09-1' was collected from a post-WWII residence (built in 1951) and sieved. The sieve lead result was 202 mg/kg and the unsieved result was 163 mg/kg, with a %RPD of 21 percent. For the BA, 'SS-BG-08-1' was collected from a residence built in 1938 and this sample was also sieved. The sieved lead result was 136 mg/kg and the unsieved lead result was

132 mg/kg. The RPD between these two results is approximately 3 percent. These results suggest that there's very little difference between the lead concentrations in the sieved sample versus the unsieved at this background location with a pre-WWII-constructed house.

The data also shows that the MEIR sample has a significantly greater amount of fine lead particulate, which, given the sample depth (0-1 inch), was probably recently deposited, and is more likely related to fallout from stack emissions from Exide than it is from LBP or TEL.

- The highest detection of lead in the BA was 195 mg/kg ('SS-BG-08-3') at a residence with a house built in 1929. In contrast, the highest lead detected in the two MEIRs was 2,030 mg/kg ('SS-MEIR-N-14-6') at a residence with a house that was built in 1922, or not much older than the background house with the highest lead result.

In conclusion, comparing the sieved to unsieved sample results seem to lend further credence that the area selected to represent background for Exide was appropriate. It also suggests that there is little evidence in this case to support Exide's argument regarding using the median age of the housing as a basis for attributing the presence of lead detected in soil in the MEIRs to LBP.

3. According to Section 2.2, '*Identify the Decision*' in Exide's Work Plan, "If the comparison shows that detected COPCs in soil exceed background and the applicable RSL or LAUSD arsenic soil screening level, and are consistent with emissions from the Exide Vernon facility, then the next phase of sampling will be conducted as defined in an amendment to this Work Plan to determine the lateral extent of impact. If the comparison shows that the constituents in the soil are below background or the applicable RSL or LAUSD arsenic soil screening level, then no further sampling is required". Since the data clearly shows lead above the 80 mg/kg background/SL, and, as discussed in the above comment, appears to be generally consistent with stack emissions from the Facility, then it stands to reason that the next step would be for Exide to proceed with the next phase of sampling. Therefore, we request that Exide submit a Work Plan amendment to the department that addresses this next phase.
4. In addition to the individual property sketches (already included in Appendix B), Exide should include, for each MEIR and the BA, new figures that more clearly show the sampled areas. These figures should show, at a minimum, the major streets, the sample locations,

the sample location identifications, and boxes presenting the analytical results (presenting lead concentrations only is acceptable) detected in the soil samples for each sample depth interval.

5. The Report is missing a section that discusses quality analysis/quality control (QA/QC) procedures that were followed. The Report only states (Section 5.0, '*Sampling Results and Data Evaluation*') that they performed a Level I review and data validation, but did not provide any detail on the data review. Report is also missing a discussion on how the project DQOs listed in the Work Plan were met.
6. The Report should also discuss any deviations from the Work Plan. For instance, Figure 5 in the Work Plan, titled '*Northern School Sample Locations*', shows six proposed sample locations while the Report shows only four. Figure 6 in the Work Plan, titled '*Southern School Sample Locations*', shows a different distribution of proposed soil sample locations on the property than is shown in the Report. The Work Plan also states that five subsamples will be collected at each school (Section 3.0, '*Sample Location and Frequency*', page 3-1) when only four samples were composited at the Northern School ('Volunteers of America, Salazar Park Head Start Pre-School'). We request that Exide provide supporting documentation indicating prior concurrence from DTSC for these apparent deviations from the Work Plan in the revised Report.

#### **SPECIFIC COMMENTS:**

1. Section 1, Introduction, Page 1: The date for the approved Work Plan appears to be a typographical error. The actual date of the approved plan is November 15, 2013, not November 13.
2. Section 5.2.1, Inorganic Constituents, Page 5-5: Exide states only that, for hexavalent chromium, all results "were below the detection limit". The SL for hexavalent chromium is 0.29 mg/kg. To be clear, Exide should identify the laboratory detection limit in the text and/or table or state in the text that all hexavalent chromium results were below the 0.29 mg/kg SL in the revised Report.
3. Section 6.0, Conclusions, Pages 6-1 to 6-5: We have several comments on this section of the Report. These are as follows:
  - Item No 3, Page 6-1: Exide states that no lead in the top one-inch exceeded the California Department of Public Health (CDPH) "hazard level for bare soils where children play of 400 mg/kg". As a result, Exide states, there is "no need for immediate action based on the observed results". GSU defers to the project toxicologist as

far as the cleanup level, and if immediate action, are warranted. However, we still recommend that additional investigations occur to determine the lateral and vertical extent of lead in soil above the SL.

- Item No. 5, Page 6-2: We disagree with Exide's rejection of the 2,030 mg/kg lead result, which they refer to as 'anomalous'. An outlier, certainly, but Exide provides no reason why this result is not representative of 3-6 inch depth soil conditions at this property. There were no issues reported by the analytical laboratory with this sample result. In our experience, it is not uncommon, given the general heterogeneous nature of inorganics in soil, to produce widely-varied results from the same sample interval. Therefore, we recommend that this result be included in the data evaluation. As stated earlier in this memorandum, we also recommend that lead in soil at the residence where this detection occurred be immediately mitigated so it no longer poses a human-health hazard.
- Item No 6, Pages 6-2 to 6-3: As previously noted, GSU disagrees with Exide's use of median home age as an indicator of the source of lead in soils. In addition, Exide's statement that the Northern MEIR has "more heavily trafficked secondary roads" is confusing since they do not state what areas are being comparing to the Northern MEIR. This also appears to be purely speculative since they do not support this statement with data.
- Item No. 7, Page 6-3 (1<sup>st</sup> and 2<sup>nd</sup> Bullets): As previously noted in the above comment (please see General Comment No. 2, above), when comparing the BA sample data to the MEIRs, lead does appear to accumulate in the finer fraction or the fraction that passes through a No. 60 sieve. The data also suggests that fine lead particles are more prevalent in the surface (0-1 inch) than at deeper sample intervals. We recommend that Item No. 7 be revised as a result.
- Item No. 7, Page 6-3 (3<sup>rd</sup> Bullet): We disagree with Exide's conclusion that there is no discernable pattern to the data. Instead, our evaluation of the data shows that lead concentrations do decrease with distance from the Facility. As presented on Figure 6 (*'Relationship between Surface Soil Lead and Distance from the Facility'*) in the Report, the Northern MEIR, located between 3,500 and 4,000 feet north of the Exide Facility, reported several detections of surficial lead significantly greater (up to 342 mg/kg) than reported for the Southern MEIR (no detections greater than 174 mg/kg), located between 3,500 and 4,500 feet to the south. The Northern MEIR reported a median lead concentration of 162

mg/kg. The Northern School, located approximately 6,400 feet to the north, reported lead less than 100 mg/kg. The Southern MEIR reported median lead level at 134 mg/kg. The Southern School, San Antonio Elementary School, located 9,500 feet south-southwest, reported lead less than 80 mg/kg.

Taking into account the spread in distances of the four sample areas relative to the Facility, the prevailing wind direction (SW-NE), and the soil sample results for lead collected during the prior off-site dust and soil investigation (ongoing) from several sample points strung out between the Facility and the MEIRs, the data does show decreasing concentrations overall with distance from Exide.

To conclude, we disagree with Exide's request to postpone additional residential soil sampling until the step-out sampling and risk assessment calculations are completed. Exide's statement that there is no "clear relationship between the observed soil concentrations and the facility" is unsupported by the data. The residential areas north and south of the Facility have not been adequately characterized for lead above the SL. Therefore, the current data set is insufficient and does not satisfy the project DQOs. Until additional sampling occurs, GSU considers the completion of a risk assessment to be premature. Instead, we believe that Exide should proceed with the next step; which, as shown on Exide's '*Decision Tree for Evaluation of MEIR Data*' (Figure 4 of the Work Plan), is to prepare an amendment to the Work Plan for additional work.

4. Table 10, Sieved and Unsieved Samples Soil Lead Results: Rather than lumping data sets from the BA study with the MEIRs into one table and the calculating one set of average and median concentrations for lead, GSU recommends separating these two data sets and determining individual averages and median values for the BA and the two MEIRs. Likewise, Figure 4 of the Report, '*Sieved vs. Unsieved Sample Lead Concentrations*', should probably be split into two figures showing the distribution of each individual data set.

Questions regarding the memorandum should be directed to Todd Wallbom at (818) 717-6622.