Highlights and notes by Phase-1 Environmental

10:54 am, Sep 24, 2007

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October 18, 2002 001-07962-01-061

DRAFT

Mr. Michael Stephens
California Environmental Protection Agency
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, California 95826-3200

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Subject: Responses to Comments on Draft Remedial Action Work Plan, Batarse Site, Southeast of 104th Avenue and East 14th Street, Oakland, California **[should subject line match draft RAW title?]**

Dear Mr. Stephens:

LFR Levine·Fricke (LFR) was retained by the Oakland Unified School District (OUSD) to prepare a Remedial Action Work Plan (RAW) for the Batarse School Project Site located south of 104th Avenue and east of East 14th Street in Oakland, California. The draft RAW, entitled "Draft Remedial Action Work Plan, Batarse Site, Southeast of 104th Avenue and East 14th Street, Oakland, California," was issued on March 26, 2002.

The California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC) submitted comments on the draft RAW to Mr. Timothy White of the OUSD in a letter dated May 17, 2002. The DTSC letter also contained comments made by the Human and Ecological Risk Division of Cal-EPA. On behalf of OUSD, LFR has prepared responses to these comments in the attached document.

If you have any questions regarding these responses, please contact Lita Freeman at (510) 596-9628.

Sincerely,

Lita D. Freeman, R.G., R.E.A. II
Senior Geologist

Alan D. Gibbs, R.G., C.HG., R.E.A. II
Principal Hydrogeologist
California New School Siting Program Manager

Attachment

Responses to Comments by California Environmental Protection Agency Department of Toxic Substances Control on the "Draft Remedial Action Work Plan, Batarse Site, Southeast of 104th Avenue and East 14th Street, Oakland, California"

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DTSC Comments on the Draft Remedial Action Work Plan (RAW)

LFR Levine·Fricke (LFR) has prepared the following responses to California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC) comments on the work plan entitled "Draft Remedial Action Work Plan, Batarse Site, Southeast of 104th Avenue and East 14th Street, Oakland, California," dated March 26, 2002, on behalf of the Oakland Unified School District (OUSD). The Batarse School Site ("the Site") is located on the eastern side of East 14th Street and the southern side of 104th Avenue in Oakland, California.

DTSC GENERAL COMMENTS

No volumes of contaminated soil are mentioned in the text of the report, but rather are incorporated into the Sampling and Analyses Plan (SAP) located in Appendix F. Information pertaining to planned remedial activities should be provided in Section 8.0, Remedial Action Workplan. It is difficult to assess from the information provided how costs for the three remedial alternatives were determined. The report states that shallow groundwater at the site has been adversely impacted, and that the preferred remediation alternative will lead to unrestricted land use. However, the preferred alternative does not address groundwater contamination, therefore it is unlikely that land use will be unrestricted, even though it is doubtful that shallow groundwater would be used as a drinking water source in the near future.

RESPONSE

The following text was added to the end of Section 5.0 to provide information on the volumes of affected soil:

> Areas of Concern
>
> TPH (in five locations), chromium (in one location), and arsenic (in two locations) were reported at concentrations above the RAOs in soil samples collected from the southern and central portions of the Site. The concentrations of TPH, chromium, and arsenic may present a significant risk to human health via the inhalation or ingestion/dermal-contact pathways. Because of access constraints by the existing on-site businesses, the lateral and vertical extent of affected soil was not fully defined at each of the locations. However, the extent of affected soil will be characterized more fully during the building demolition, construction, and soil excavation process.

TPH-Affected Soil

Soil containing TPH in concentrations greater than the RAOs is present in five locations on the southern and central portions of the Site (designated as Areas 1, 5 and 6 on Figure 2). These locations include: beneath the maintenance building near boring BASB031; east of the service building near boring BASB036; in the central portion of Area 1 near boring BASB077; near the northwest corner of Area 5 at boring BASB022; and at the west end of Area 6 at boring BASB002.

Current Work plan is limited to Areas 1 and 5 only.

The total volume of TPH-affected soil is estimated to be approximately 150 bank cubic yards based on information obtained during the PEA. This quantity is based on excavating soil from five areas centered on borings BASB031, -036, -077, -022, and -002.

LFR assumes that the excavation at boring BASB031 will be limited to an area of approximately 12 by 12 feet laterally and to a depth of approximately 10 feet bgs vertically. These measurements are based on the analytical results of soil samples collected from boring BASB031 and step-out borings BASB070 and -071 which indicate that soil with TPH concentrations above the RAOs is limited to the area around BASB031. **TPH concentrations above the RAOs extent to a depth of approximately 15 feet bgs at this location; however, the excavation total depth will depend on site conditions noted during field work, risk considerations, and discussions with the DTSC and RWQCB. LFR anticipates that the excavation will extend to a depth of approximately 10 feet bgs.** TPH detected in the soil in this area appears to be related to the hydraulic lifts in this area.

The extent of TPH-affected soil at boring BASB036 is assumed to be limited to an area of about 10 by 10 feet laterally and about 4 feet bgs vertically and that the excavation will measure 10 by 10 feet laterally and about 5 feet bgs vertically. These measurements are based on the analytical results of soil samples collected from borings BASB036 and step-out boring BASB037 which indicate that soil with TPH concentrations above the RAOs is limited to the area around BASB036 to a depth of approximately 4 feet bgs. **TPH detected in the soil in this area appears to be related to the past chemical storage in this area.**

The extent of TPH-affected soil at boring BASB077 is assumed to be limited to an area of about 10 by 10 feet laterally and about 4 feet bgs vertically and that the excavation will measure 10 by 10 feet laterally and about 5 feet bgs vertically. These measurements are based on the analytical results of soil samples collected from this boring which indicate that soil with TPH concentrations above the RAOs are limited to a depth of approximately 4 feet bgs. The lateral extent is assumed to be limited based on leakage from vehicles being the likely source.

LFR assumes that the excavation at boring BASB022 is assumed will be limited to an area of about 10 by 10 feet laterally and about 10 feet bgs vertically. These measurements are based on the analytical results of soil samples collected from this boring which indicate

that soil with TPH concentrations above the RAOs are limited to a depth of approximately 10 feet bgs. The lateral extent is assumed to be limited based on leakage from vehicles being the likely source.

The extent of TPH-affected soil at boring BASB002 is assumed to be limited to an area of about 10 by 10 feet laterally and about 3 to 4 feet bgs vertically and that the excavation will measure 10 by 10 feet laterally and about 5 feet bgs vertically. These measurements are based on analysis of the soil sample from this boring at the 2.5 to 3-foot depth interval which revealed TPH concentrations above the RAOs and the assumption that the vertical and lateral extents of TPH-affected soil are limited to a depth of approximately 3 to 4 feet bgs in the area immediately surrounding this boring. A limited vertical and lateral extent is assumed based on leakage from vehicles being the likely source.

Chromium-Affected Soil

Chromium-affected soil at concentrations greater than the RAOs is present in one location (boring BASB013) on the southern portion of the Site (within Area 4 on Figure 2). The volume of chromium-affected soil is estimated to be approximately 15 bank cubic yards. This quantity is based on the assumption that the extent of chromium-affected soil at boring BASB013 is limited to an area of about 10 by 10 feet laterally and 3 feet bgs vertically. These measurements are based on the analytical results of soil samples collected from this boring which indicate that soil with chromium concentrations above the RAOs are limited to a depth of approximately 3 feet bgs. The lateral extent is assumed to be limited based on analytical results from nearby borings (BASB012 and -016).

Arsenic-Affected Soil

Arsenic-affected soil at concentrations greater than the RAOs is present in two locations on the Site: at boring BASB023 on the southern portion of the Site (within Area 5 on Figure 2) and at boring BASB021 on the central portion of the Site (within Area 6 on Figure 2). The total volume of arsenic-affected soil is estimated to be approximately 24 bank cubic yards. This quantity is based on the assumption that the extent of arsenic-affected soil at each location is limited to an area of about 10 by 10 feet laterally and 1 to 2 feet bgs vertically. These measurements are based on the analytical results of soil samples collected from these borings which indicate that soil with arsenic concentrations above the RAOs are limited to a depth of approximately 1 to 2 feet bgs. The lateral extent is assumed to be limited based on the distribution of arsenic in shallow soils across the Site.

The following text was added to the end of Section 8.2 to provide information on planned remedial activities at the Site:

Soil excavation and groundwater natural attenuation, the preferred remedial alternative, will involve removal of TPH-, chromium-, and arsenic-affected soil identified in the RAW as

having concentrations of these constituents above their respective RAOs. TPH-affected soil is present in five locations within Areas 1, 5, and 6; chromium-affected soil is present in one location within Area 4; and arsenic-affected soil is present in two locations in Areas 5 and 6. Under this option, the volume, toxicity, and mobility of contaminants at the Site would be considerably reduced.

LFR estimates that approximately 150 bank cubic yards of TPH-affected soil will be removed from five locations on the southern and central portions of the Site (designated as Areas 1, 5, and 6 on Figure 2). These locations include: beneath the maintenance building near boring BASB031; east of the service building near boring BASB036; in the central portion of Area 1 near boring BASB077; near the northwest corner of Area 5 at boring BASB022; and near the west end of Area 6 at boring BASB002. LFR assumes that the excavation at boring BASB031 will measure approximately 12 by 12 feet laterally and will extend to a depth of approximately 10 feet bgs. Each excavation at borings BASB036, -077 and -002 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 5 feet bgs. The excavation at boring BASB022 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 10 feet bgs.

Metals of concern at the Site are chromium and arsenic. The approximate volume of chromium-affected soil located within Area 4 at boring BASB013 is estimated to be 15 bank cubic yards. This quantity is based on the assumption that the excavation at boring BASB013 will measure about 10 by 10 feet laterally and 4 feet vertically. The total volume of arsenic-affected soil is estimated to be approximately 24 bank cubic yards. This quantity is based on the anticipation that the excavations at boring BASB023 within Area 5 and boring BASB021 within Area 6 will each measure about 10 by 10 feet laterally and 3 feet vertically.

Conventional construction equipment such as backhoes and loaders will be used for soil excavation. The excavation contractor will be responsible for locating and protecting active underground utilities within the excavation areas. Underground utilities that could be encountered during the excavations include natural-gas lines, sewer mains and laterals, and water pipes. Excavation around exposed active utilities will be performed manually.

To ensure effective removal, the excavations will extend from impacted areas both laterally and vertically until confirmation samples indicate that residual concentrations are less than the RAOs (see Section 5.0). TPH-, chromium-, and arsenic-affected soil identified in the PEA will be excavated, temporarily stockpiled in roll-off bins, and transported to an appropriate landfill for disposal.

LFR does not anticipate encountering groundwater during excavation activities at the Site because shallow groundwater was generally present at depths of approximately 25 feet bgs and the deepest proposed excavation extends to a depth of 10 feet bgs. If it is necessary to pump groundwater from an excavation, this water will be containerized on site in vacuum trucks or Baker tanks and sampled for subsequent analysis. Pumped groundwater, if any, will be transported to and disposed of at an appropriate off-site disposal facility based on the analytical sample results.

Confirmation soil samples will be collected from the side walls and floor of each excavation. The proposed confirmation sampling strategy would be to collect three soil samples for compositing from each side wall and one discrete sample from the floor of each excavation. Confirmation sampling would continue at this frequency until the RAOs have been met.

Confirmation soil samples will be collected in 2-inch-diameter brass or stainless steel liners and placed in an ice-chilled cooler for transport under standard chain-of-custody protocol to a laboratory certified by the State of California State to perform the requested analysis. The samples will be analyzed on a 24-hour rush turn-around schedule to minimize excavation down time.

Confirmation samples collected in areas of TPH-affected soil will be analyzed for TPHg, TPHd, TPHmo, TPHms, TPHss, and TPHhf using EPA Method 8015 Modified; PCBs using EPA Method 8082; and BTEX using EPA Method 8021. Confirmation samples collected in areas of chromium-affected soil and arsenic-affected soil will be analyzed for total chromium and total arsenic, respectively, using EPA Method 6020.

Following removal of the affected soil, the excavations will be backfilled with "clean" imported fill material. The source of the imported fill material will be documented and samples of the material will be submitted for laboratory analysis to establish its suitability for use at the Site.

A detailed work plan is presented as Appendix G.

Sections 7.1, 7.1.2 and 7.1.3 were revised and Sections 7.1.4, 7.1.5 and 7.1.6 were added, as noted below, to provide information on how the costs for the remedial alternatives were established:

The following sentences have been added to the beginning of Section 7.1:

The remedial actions evaluated do not address TPH-affected groundwater as shallow groundwater was encountered at a depth of approximately 25 feet bgs and direct contact with shallow groundwater is considered highly unlikely and does not represent a complete exposure pathway. In addition, the release occurred prior to OUSD's planned acquisition of the Site and shallow groundwater is not a planned source of domestic water for the Site. Since plans do not include remediation of TPH-affected groundwater, OUSD's goal of obtaining unrestricted land use would not be met; therefore, LFR proposes that OUSD's plans for the Site include obtaining water from public utilities for domestic and irrigation purposes, and placing restrictions on use of shallow groundwater at the Site.

Recent conversations with the DTSC have indicated that the RWQCB may require additional investigation, monitoring, or remediation of affected groundwater to protect the waters of the state in accordance with the requirements of the Clean Water Act of ??????. LFR will therefore submit copies of environmental documents to the RWQCB and discuss site groundwater issues with RWQCB staff.

The following paragraphs have been added to the end of Section 7.1.2:

For this alternative, surface caps would be placed over eight locations across the Site. These surface caps would cover TPH-affected soil in five locations within Areas 1, 5, and 6; chromium-affected soil in one location within Area 4; and arsenic-affected soil in two locations in Areas 5 and 6. The total area to be covered by the surface caps would be 844 square feet, based on capping areas measuring 12 by 12 feet at boring BASB031 and 10 by 10 feet at each of the following boring locations: BASB036, -077, -022, -002, -013, -023, and -021.

Capital expenditure for this alternative is estimated at about $250,000. Although the capping technology is readily implementable and could be completed in a matter of weeks, the alternative would require an ongoing maintenance and monitoring program. Maintenance and reporting (including submission of five-year reviews) costs are estimated to be $5,000 per year. Additionally, the cap would require complete replacement at a cost of about $50,000 every 15 to 20 years. Capping combined with institutional controls would be an effective method to reduce contaminant exposure, but may not meet OUSD's goal of obtaining an unrestricted land-use designation for the Site. Furthermore, the necessary maintenance activities and reporting requirements **would represent an ongoing operation and maintenance cost for OUSD. Placement of a cap over eight locations across the Site would be impractical as construction of a new school is proposed for the Site. A breakdown of anticipated costs associated with this alternative is presented in Table 2.**

Section 7.1.3 has been replaced with the new Section 7.1.3 titled "Alternative 3: Soil Excavation and Groundwater Natural Attenuation" to address soil and groundwater remediation:

This alternative would involve removal of soil with COCs in concentrations exceeding RAOs. Affected soil would be removed from Areas 1, 4, 5, and 6. Under this option, the volume, toxicity, and mobility of contaminants in soil at the Site would be considerably reduced. **This alternative would be effective for TPH-, chromium-, and arsenic-affected soil.**

For this alternative, LFR estimates that approximately 150 bank cubic yards of TPH-affected soil will be removed from five locations on the southern and central portions of the Site (designated as Areas 1, 5, and 6 on Figure 2). These locations include: beneath the maintenance building near boring BASB031; east of the service building near boring BASB036; in the central portion of Area 1 near boring BASB077; near the northwest corner of Area 5 at boring BASB022; and near the west end of Area 6 at boring BASB002. LFR assumes that the excavation at boring BASB031 will measure approximately 12 by 12 feet laterally and will extend to a depth of approximately 10 feet bgs. **TPH concentrations above the RAOs extent to a depth of approximately 15 feet bgs at boring BASB031; however, the excavation total depth will depend on site conditions noted during field work, risk considerations, and discussions with the DTSC and RWQCB. LFR anticipates that the excavation will extend to a depth of approximately 10 feet bgs.**

Each excavation at borings BASB036, -077 and -002 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 5 feet bgs. The excavation at boring BASB022 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 10 feet bgs.

The volume of chromium-affected soil located within Area 4 at boring BASB013 is estimated to be approximately 15 bank cubic yards. This quantity is based on the anticipation that the excavation at boring BASB013 within Area 4 will measure about 10 by 10 feet laterally and 4 feet vertically. The total volume of arsenic-affected soil is estimated to be approximately 24 bank cubic yards. This quantity is based on the anticipation that the excavations at boring BASB023 within Area 5 and boring BASB021 within Area 6 will each measure about 10 by 10 feet laterally and 3 feet vertically.

LFR does not anticipate encountering groundwater during excavation activities at the Site as shallow groundwater was generally present at depths of approximately 25 feet bgs and the deepest proposed excavation extends to a depth of 10 feet bgs. Should it be necessary to pump groundwater from an excavation, this water will be containerized onsite in vacuum trucks or Baker tanks and sampled for subsequent analysis. Pumped groundwater, if any, will be transported to and disposed of at an appropriate off-site disposal facility based on the analytical sample results. An on-site treatment alternative for the pumped groundwater is not proposed as the potential volume of pumped groundwater is not anticipated to be sufficient to allow for this alternative to be cost effective and the anticipated construction schedule would not allow for this alternative to be time effective.

TPH-affected groundwater at the western end of Area 1 would not be actively remediated under this alternative but would rather be allowed to attenuate naturally. Natural attenuation of TPH in groundwater is considered a viable alternative as shallow groundwater was encountered at a depth of approximately 25 feet bgs and direct contact with shallow groundwater is considered highly unlikely and does not represent a complete

exposure pathway. In addition, the release occurred prior to OUSD's planned acquisition of the Site and shallow groundwater is not a planned source of domestic water for the Site.

OUSD's goal of obtaining unrestricted land use may not be met if groundwater is allowed to attenuate naturally; therefore, LFR proposes that OUSD's plans for the Site include obtaining water from public utilities for domestic and irrigation purposes, and possibly placing restrictions on use of shallow groundwater at the Site. LFR will discuss site groundwater issues with RWQCB staff.

This alternative would cost an estimated $200,000 to implement; no maintenance or ongoing reporting costs are anticipated. About two to three months would be needed to complete the project. A breakdown of anticipated costs associated with this remedial alternative is presented in Table 2.

A new section titled "Section 7.1.4 Alternative 4: Soil Excavation and Groundwater Bioremediation" has been added as follows:

This alternative would involve removal of soil with COCs in concentrations exceeding RAOs. Affected soil would be removed from Areas 1, 4, 5, and 6. Bioremediation of TPH-affected groundwater would be enhanced by introduction of Oxygen Release Compound (ORC™) or a similar compound. Under this option, the volume, toxicity, and mobility of contaminants in soil and groundwater at the Site would be considerably reduced. **This alternative would be effective for TPH-, chromium-, and arsenic-affected soil.**

For this alternative, the scope of work for excavation and disposal of TPH, chromium and arsenic-affected would be the same as for Alternative 3 above.

TPH-affected groundwater at the western end of Area 1 would not be actively remediated; however, bioremediation would be enhanced by addition of ORC™ or a similiar compound. ORC™ would be injected into the groundwater during two separate events, including one prior to commencement of soil excavation and one following completion of soil excavation. Bioremediation of TPH in groundwater is considered a viable alternative as shallow groundwater was encountered at a depth of approximately 25 feet bgs and direct contact with shallow groundwater is considered highly unlikely and does not represent a complete exposure pathway. In addition, the release occurred prior to OUSD's planned acquisition of the Site and shallow groundwater is not a planned source of domestic water for the Site.

OUSD's goal of obtaining unrestricted land use would not be met if groundwater is allowed to bioremediate; therefore, LFR proposes that OUSD's plans for the Site include obtaining water from public utilities for domestic and irrigation purposes, and placing restrictions on use of shallow groundwater at the Site.

This alternative would cost an estimated $305,000 to implement; no maintenance or ongoing reporting costs are anticipated. About two to three months would be needed to complete the project. A breakdown of anticipated costs associated with this remedial alternative is presented in Table 2.

A new section titled "Section 7.1.5 Alternative 5: Soil Flushing and Acid Leaching" has been added as follows:

This alternative would involve removal of soil with chromium and arsenic in concentrations exceeding RAOs in Areas 4, 5, and 6. **This alternative would be effective for chromium-, and arsenic-affected soil but not TPH-affected soil.**

The soil would be placed in a mobile washing plant so that fine grained materials (silts and clays), which would be expected to contain the elevated concentrations of chromium and arsenic, can be separated from coarse grained materials (sands and gravels). Samples of the coarse grained materials would be obtained and submitted to an analytical laboratory to confirm that concentrations of chromium and arsenic are below the RAOs. The coarse grained materials would then be reused onsite as fill material and fine grained materials would be properly disposed of off-site.

For this alternative, LFR estimates that approximately 15 bank cubic yards of chromium-affected soil located within Area 4 at boring BASB013 and approximately 24 bank cubic yards of arsenic-affected soil at boring BASB023 within Area 5 and boring BASB021 within Area 6 would be treated.

This alternative would not be effective for TPH-affected soil, may not reduce the concentrations of arsenic to below the RAOs, and may result in significant soil disposal costs even after treatment due to the high clay and silt content in onsite soils.

This alternative would cost an estimated $50,000 to implement for the chromium and arsenic-affected soil. If treatment is not effective, LFR anticipates that disposal of chromium and arsenic-affected soil would cost an additional $5,000. No maintenance or

ongoing reporting costs are anticipated. About two to three months would be needed to complete the project. TPH-affected soil would need to be addressed using another remedial alternative. A breakdown of anticipated costs associated with this remedial alternative is presented in Table 2.

A new section titled "Section 7.1.6 Alternative 6: In Situ Methods" has been added as follows:

Several in situ methods were evaluated for this alternative. These methods include chemical oxidation, thermal treatment, multiple stage permeable active barrier, and electrokinetic decontamination. The first two methods would be effective for treatment of TPH-affected soil, the third method would be effective for both TPH-and metals-affected soil, and the last method would be effective for treatment of heavy metals such as chromium and arsenic. Site conditions would require implementation of at least two of these methods. These methods would involve introduction of chemicals, heat, or electrical current into the subsurface with ongoing monitoring for a period of one year or more.

For this alternative, LFR estimates that approximately 150 bank cubic yards of TPH-affected soil will be treated at five locations on the southern and central portions of the Site (designated as Areas 1, 5 and 6 on Figure 2), approximately 15 bank cubic yards of chromium-affected soil will be treated within Area 4 at boring BASB013 and approximately 24 bank cubic yards of arsenic-affected soil will be treated at boring BASB023 within Area 5 and boring BASB021 within Area 6.

Costs for these methods range from approximately $100,000 to $220,000 with ongoing monitoring costs ranging up to $30,000 per year. If treatment is established to not be effective, LFR anticipates that the TPH-, chromium- and arsenic-affected soil would require removal and disposal which would be disruptive to an existing school if construction is completed by that time. A breakdown of anticipated costs associated with the methods of this remedial alternative is presented in Table 2.

DTSC SPECIFIC COMMENT NO. 1

Section 4.0, Health-Based Risk Assessment and Section 5.0, Remedial Action Alternatives, states that groundwater is affected by petroleum and other constituents, but that groundwater does not represent a complete exposure pathway. Although DTSC agrees with this statement, it is unclear how a completely unrestricted land-use scenario will be obtained while groundwater contamination still exists. DTSC recommends that costs for groundwater remediation alternatives, including natural attenuation, are considered, and that restrictions of groundwater use at the site be implemented if it is determined that groundwater will not be remediated at the site.

RESPONSE

As noted above under DTSC General Comments, Sections 7.1, 7.1.3, and 7.1.4 have been revised to address the groundwater remediation issue. The remedial actions evaluated do not address TPH-affected groundwater; therefore, OUSD's goal of obtaining unrestricted land use may not be met and restrictions may be placed on use of shallow groundwater at the Site. **LFR will work with the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) to further evaluate groundwater issues at the Site.**

DTSC SPECIFIC COMMENT NO. 2

Section 5.0, Remedial Action Objectives, page 9. The Remedial Action Objective (RAO) for total petroleum hydrocarbon concentrations (gas and diesel range) of 400 mg/kg and 500 mg/kg appears high. DTSC recommends that the District further evaluate these recommended concentrations to ensure that these concentrations are in an acceptable health risk and ARAR range.

RESPONSE

The second paragraph of Section 5.0 was replaced with the following to clarify the selection of remedial action goals:

> COCs identified at the Site that may present a significant risk to human health are TPH, chromium and arsenic. Since OUSD's plans include construction of a school on the Site, LFR proposes to remediate the Site's soil to residential standards. LFR proposes the following numerical remedial action objectives (RAOs):

COC	RAO (mg/kg)
TPHg, TPHms, and TPHss	400
TPHd and TPHmo	500
Chromium	40
Arsenic	7.8

Notes: TPHg = total petroleum hydrocarbons as gasoline; TPHms = total petroleum hydrocarbons as mineral spirits; TPHss = total petroleum hydrocarbons as Stoddard solvent; TPHd = total petroleum hydrocarbons as diesel; TPHmo = total petroleum hydrocarbons as motor oil; mg/kg = milligrams per kilogram

The RAOs for TPH are based on the RWQCB RBSLs for residential surface soil (depth of 10 feet or less) where groundwater is not a current or potential source of drinking water. These RAOs are proposed for the Site as shallow groundwater was encountered at a depth of approximately 25 feet bgs and direct contact with shallow groundwater is considered highly unlikely and does not represent a complete exposure pathway. In addition, the release occurred prior to OUSD's planned acquisition of the Site and shallow groundwater is not a planned source of domestic water for the Site.

The RAOs for chromium and arsenic are based on natural background concentrations for the Site. During the PEA, a total of 86 soil samples were collected from within the upper 5 feet. The concentrations of chromium in 85 of these samples ranged from 2.1 mg/kg to 40 mg/kg with all but one of the soil samples having concentrations between 25 mg/kg and 40 mg/kg. The concentrations of arsenic in 84 of these samples ranged from 0.68 mg/kg to 7.8 mg/kg with all but two of the soil samples having concentrations between 3 mg/kg and 5 mg/kg. Based on these results, background chromium concentrations appear to range from 2 mg/kg to 40 mg/kg and background arsenic concentrations appear to range from less than 1 mg/kg to 7.8 mg/kg. LFR proposes to use 40 mg/kg as the RAO for chromium and 7.8 mg/kg as the RAO for arsenic as these values represent the upper limit of natural background concentrations at the Site.

DTSC SPECIFIC COMMENT NO. 3

Section 7.0, Remedial Action Alternatives. On-site treatment of soil and groundwater was not listed as a treatment alternative, except for the addition of ORC to the proposed excavation, which would be considered onsite treatment of groundwater. Had other on-site treatment technologies been considered?

RESPONSE

As noted above under DTSC General Comments, Sections 7.1.2 and 7.1.3 were revised, Sections 7.1.4, 7.1.5 and 7.1.6 were added, and Table 2 was modified to include additional remedial alternatives, including natural attenuation and in situ treatment.

DTSC SPECIFIC COMMENT NO. 4

Appendix D, Identification of Potential ARARs, does not include Alameda County, the City of Oakland, or ARARs promulgated specifically for California school construction.

RESPONSE

Specific Federal, State and local ARARS have been identified and added as new tables to Appendix D of the RAW and attached as Tables D-1, D-2, and D-3 of this correspondence.

DTSC SPECIFIC COMMENT NO. 5

Appendix F, Sampling and Analysis Plan. The Workplan portion(s) of this appendix need to be included in the document text. Based on the data provided, it appears that the lateral and vertical extent of contamination have not been fully characterized at any of the proposed excavation sites, although it does appear to be more fully characterized in some areas than in others, The lateral and vertical extent of contamination will be characterized more fully during the excavation process. The report stated that approximately 50,000 gallons of water will be generated during the excavation process. This water will be transported off-site for disposal. Has on-site treatment of this water been looked at as a treatment alternative? Contaminated soil excavated will be transported off-site to a designated landfill for disposal. Was on-site treatment of this soil looked at as a treatment alternative?

RESPONSE

The work plan portions of the SAP have been included in the document text (see Section 8.2) and in the Detailed Work Plan presented as Appendix G.

The text of the RAW has been modified and the reference to approximately 50,000 gallons of water has been removed. LFR does not anticipate encountering groundwater during excavation activities at the Site as shallow groundwater was generally present at depths of approximately 25 feet bgs and the deepest proposed excavation extends to a depth of 10 feet bgs. The modified text describes the dispensation of pumped groundwater, if any should be encountered during excavation activities at the Site. Should it be necessary to pump groundwater from an excavation, this water will be containerized onsite and sampled for subsequent analysis. Pending review of the analytical sample results, potential pumped groundwater will be disposed of at an appropriate off-site disposal facility. An on-site treatment alternative for the pumped groundwater is not proposed as the potential volume of pumped groundwater is not anticipated to be sufficient to allow for this alternative to be cost effective.

As noted above under DTSC General Comments, Sections 7.1.5 and 7.1.6 were added to address onsite treatment of excavated soil.

DTSC SPECIFIC COMMENT NO. 6

Appendix G, Quality Assurance Plan. The Workplan portion(s) of this appendix need to be included in the document text. The SAP portion(s) of this appendix need to be included in the SAP appendix.

RESPONSE

The Quality Assurance Project Plan (QAPP) was modified by deleting Section G.4 and renumbering the remaining sections, workplan portions of the QAPP were included in the text,

sampling information was included in the SAP, and a new Appenidx G titled "Detailed Work Plan" was prepared (see below).

As noted above in LFR's response to *DTSC General Comments*, Section 8.2 was modified to include information from the QAPP. The existing Section 8.3 was renumbered as Section 8.5 and two new sections, titled "8.3 Post-Demolition Soil Sampling for Lead" and "8.4 Decontamination", were moved from the QAPP to the document text (see below).

8.3 Post-Demolition Soil Sampling for Lead

LFR will collect soil samples from various locations across the Site prior to construction of the new school campus. As required by DTSC, up to 30 soil samples will be collected within the drip lines of the demolished buildings and analyzed for lead to assess the potential residual presence of these materials from demolition debris. The samples will be collected from the surface to 0.5 feet in depth using decontaminated hand sampling equipment consisting of a slide hammer with an attached sampler lined with brass or stainless-steel tubes. The ends of each tube will be covered with Teflon-lined plastic caps. The samples will then be labeled, logged, and placed in an ice-chilled cooler for transport to the analytical laboratory under chain-of-custody control.

8.4 Decontamination

Equipment used during this project that might come into contact with samples or contaminated materials will be properly decontaminated before and after each use. Generally, equipment will be cleaned with high-pressure hot water (steam cleaning) and/or washed with a laboratory-grade detergent (Alconox™) and rinsed with deionized or distilled water.

DETAILED WORK PLAN

G.1 Introduction

This Detailed Work Plan has been prepared by LFR Levine·Fricke (LFR) on behalf of the Oakland Unified School District (OUSD) for use during implementation of the Remedial Action Work Plan (RAW) activities to be conducted on property located near the southeastern corner of the intersection of 104th Avenue and East 14th Street in Oakland, California. This "Site," also known as the "Batarse Site," consists of numerous parcels situated within the area bounded to the north by 104th Avenue, to the west by commercial businesses fronting East 14th Street, to the east by residences along Breed Avenue, and to the south by an Alameda County Transit bus-maintenance facility. The Site, which consists of multiple parcels occupied by commercial businesses, industrial facilities, and residential buildings, is being considered by OUSD as a potential location for a new school.

G.1.1 Background

Pursuant to California Health and Safety Code Section 25355.5 (a)(1)(C), OUSD entered into a Voluntary Cleanup Agreement (VCA) with the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) to receive proper regulatory oversight and meet Education Code requirements for this potential new school site. Consistent with requirements in the VCA, a Preliminary Environmental Assessment (PEA) was conducted for the Site in accordance with a DTSC-approved work plan. The purpose of the PEA was to establish whether a release or threatened release of hazardous substances posing a threat to human health or the environment exists at the Site.

PEA results indicated that soil affected by TPH, chromium, and arsenic at concentrations that warrant remediation is present at the Site. Accordingly, a Remedial Action Work Plan (RAW) for the Site has been developed to mitigate human health and environmental risks and hazards; its scope of work includes impacted soil sampling, excavation, transport, and disposal, and possible shallow-groundwater sampling, extraction, treatment, and disposal.

G.2 Pre-Field Activities

A Health and Safety Plan (HSP) will be prepared before performing fieldwork. The HSP will document the potential hazards to worker health and safety at the Site during the proposed field activities and will specify the appropriate means to mitigate or control these hazards. It will address the potential for exposure to hazardous constituents, as well as describe general safety procedures. Fieldwork will be monitored to ensure that appropriate health and safety procedures are followed.

Before fieldwork begins, LFR will coordinate clearance of excavation locations for underground utilities with Underground Service Alert (USA) and a private utility-locating subcontractor. USA will be notified at least 48 hours in advance of sampling activities.

G.3 Field Activities

This section describes routine procedures designed to ensure quality data acquisition, the collection of representative samples, and methods to minimize potential sample contamination. To allow comparison of data from different data collection events, soil results will be reported in the units of milligrams per kilogram (mg/kg) and groundwater results will be reported in units of micrograms per liter (µg/l). Sampling locations will be consistently indicated on site maps, and lithologic descriptions (if appropriate) will be provided in accordance with the Unified Soil Classification System (USCS).

G.3.1 Soil Excavation and Confirmation Sampling

Conventional construction equipment such as backhoes and loaders will be used for soil excavation. Excavations deeper than 4 feet will be benched, sloped or shored appropriately. To ensure effective removal, the excavations will extend from impacted areas both laterally and vertically until confirmation samples indicate that residual concentrations are less than the RAOs (see Section 5.0 of RAW). TPH-, chromium-, and arsenic-affected soil identified in the PEA will be excavated, temporarily stockpiled in roll-off bins, and transported to an appropriate landfill for disposal.

LFR does not anticipate encountering groundwater during excavation activities at the Site as shallow groundwater was generally present at depths of approximately 25 feet bgs and the deepest proposed excavation extends to a depth of 10 feet bgs. Should it be necessary to pump groundwater from an excavation, this water will be containerized onsite in vacuum trucks or Baker tanks and sampled for subsequent analysis. Pumped groundwater, if any, will be transported to and disposed of at an appropriate off-site disposal facility based on the analytical sample results.

Equipment will be operated by a person with a current Hazardous-Waste Operations certificate. Excavation of soil will continue until visual observations, analytical results, and/or PID readings indicate that the affected soil has been removed from the area. The excavated soil will be placed in covered roll-off bins temporarily located on the Site and disposed of appropriately.

Soil containing TPH in concentrations greater than the RAOs is present in five locations on the southern and central portions of the Site (designated as Areas 1, 5 and 6 on Figure 2). These locations include beneath the maintenance building near boring BASB031; east of the service building near boring BASB036; in the central portion of Area 1 near boring BASB077; near the northwest corner of Area 5 at boring BASB022; and at the west end of Area 6 at boring BASB002.

The total volume of TPH-affected soil is estimated to be approximately 150 bank cubic yards based on information obtained during the PEA. This quantity is based on excavating soil from five areas centered on borings BASB031, -036, -077, -022, and -002.

LFR assumes that the excavation at boring BASB031 will measure approximately 12 by 12 feet laterally and will extend to a depth of approximately 10 feet bgs (about 55 bank cubic yards). These measurements are based on the analytical results of soil samples collected from boring BASB031 and step-out borings BASB070 and -071 which indicate that soil with TPH concentrations above the RAOs is limited to the area around BASB031. **TPH concentrations above the RAOs extent to a depth of approximately 15 feet bgs at this location; however, the excavation total depth will depend on site conditions noted during field work, risk considerations, and discussions with the DTSC and RWQCB.**

LFR anticipates that the excavation will extend to a depth of approximately 10 feet bgs.

The excavation at boring BASB036 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 5 feet bgs (about 18 bank cubic yards). These measurements are based on the analytical results of soil samples collected from boring BASB036 and step-out boring BASB037 which indicate that soil with TPH concentrations above the RAOs is limited to the area around BASB031 to a depth of approximately 4 feet bgs.

The excavation at boring BASB077 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 5 feet bgs (about 18 bank cubic yards). These measurements are based on the analytical results of soil samples collected from this boring which indicate that soil with TPH concentrations above the RAOs are limited to a depth of approximately 4 feet bgs. The lateral extent is assumed to be limited based on leakage from vehicles being the likely source.

The excavation at boring BASB022 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 10 feet bgs (about 40 bank cubic yards). These measurements are based on the analytical results of soil samples collected from this boring which indicate that soil with TPH concentrations above the RAOs are limited to a depth of approximately 10 feet bgs. The lateral extent is assumed to be limited based on leakage from vehicles being the likely source.

The excavation at boring BASB002 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 5 feet bgs (about 18 bank cubic yards). These measurements are based on analysis of the soil sample from this boring at the 2.5 to 3-foot depth interval which revealed TPH concentrations above the RAOs and the assumption that the vertical and lateral extents of TPH-affected soil are limited to a depth of approximately 3 to 4 feet bgs in the area immediately surrounding this boring. A limited vertical and lateral extent is assumed based on leakage from vehicles being the likely source.

Chromium-affected soil in concentrations greater than the RAOs is present in one location (boring BASB013) on the southern portion of the Site (within Area 4 on Figure 2). The volume of chromium-affected soil is estimated to be approximately 15 bank cubic yards. This quantity is based on the anticipation that the excavation at boring BASB013 will measure about 10 by 10 feet laterally and 4 feet vertically. These measurements are based on the analytical results of soil samples collected from this boring which indicate that soil with chromium concentrations above the RAOs are limited to a depth of approximately 3 feet bgs. The lateral extent is assumed to be limited based on analytical results from nearby borings (BASB012 and -016).

Arsenic-affected soil in concentrations greater than the RAOs is present in two locations, including at boring BASB023 on the southern portion of the Site (within Area 5 on Figure 2) and at boring BASB021 on the central portion of the Site (within Area 6 on Figure 2).

The total volume of arsenic-affected soil is estimated to be approximately 24 bank cubic yards. This quantity is based on the anticipation that the excavations at borings BASB023 and -021 will each measure about 10 by 10 feet laterally and 3 feet vertically. These measurements are based on the analytical results of soil samples collected from these borings which indicate that soil with arsenic concentrations above the RAOs are limited to a depth of approximately 1 to 2 feet bgs. The lateral extent is assumed to be limited based on the distribution of arsenic in shallow soils across the Site.

After removal of the affected soil is completed, confirmation soil samples will be collected from the sidewalls and floor of each excavation as detailed in the Sampling and Analysis Plan (SAP) presented in Appendix F.

Following removal of the affected soils, the excavations will be backfilled with "clean" imported fill material, which will consist primarily of gravel and sandy material, substantially free of clay, organic materials, loam, wood, and trash. The imported fill material will not contain stones larger than 3 inches in any dimension, broken concrete, masonry, rubble, asphalt pavement, or other waste. The source of the imported fill material will be documented and samples of the material will be submitted for laboratory analysis to establish its suitability for use at the Site.

Pea gravel may be placed in the lower portion of the deeper excavations to a depth of about 5 feet. Pea gravel is proposed for use based on engineering considerations. A geotextile fabric would be placed over the gravel and would be overlain by engineering fill to the ground surface. Compaction testing of the engineering fill will be performed and documented by LFR personnel. The backfilled areas will be rough graded to minimize ponding of water and to direct surface-water flow away from the Site in preparation for construction activities.

Excavated soil will be profiled for disposal by hand-driving a brass or stainless-steel tube into randomly selected portions of the excavated soil. The soil will then be transported to the appropriate disposal facility selected by OUSD.

G.4 Post-Demolition Soil Sampling for Lead

LFR will collect soil samples from various locations across the Site prior to construction of the new school campus. As required by DTSC, up to 30 soil samples will be collected within the drip lines of the demolished buildings and analyzed for lead to assess the potential residual presence of these materials from demolition debris. The samples will be collected from the surface to 0.5 feet in depth using decontaminated hand sampling equipment consisting of a slide hammer with an attached sampler lined with brass or stainless-steel tubes. The ends of each tube will be covered with Teflon-lined plastic caps. The samples will then be labeled, logged, and placed in an ice-chilled cooler for transport to the analytical laboratory under chain-of-custody control.

G.5 Decontamination

Equipment used during this project that might come into contact with samples or contaminated materials will be properly decontaminated before and after each use. Generally, equipment will be cleaned with high-pressure hot water (steam cleaning) and/or washed with a laboratory-grade detergent (Alconox™) and rinsed with deionized, distilled, or fresh tap water.

HERD SPECIFIC COMMENT NO. 1

Page 9, Section 5, 2nd paragraph, Remedial Action Objectives. The basis for the proposed RAOs should be discussed. Although the text states that the proposed RAOs are based on discussions with DTSC and on the health-based risk assessment discussed in Section 4 and in Appendix C, these references merely describe the health risk assessment. If the proposed RAOs for petroleuum hydrocarbons is based on the Basin Plan of the San Francisco Regional Water Quality Control Board, which is listed as one of the potential ARARs, then this should be stated in the report, HERD cannot concur or disagree with these RAOs until the rationale is provided.

RESPONSE

As noted above in DTSC Specific Comment No. 2, Section 5.0 was revised clarify the selection of remedial action goals.

HERD SPECIFIC COMMENT NO. 2

Page 14, Section 7.3. The preferred option for remediation is soil excavation and possible groundwater extraction, yet LFR is not proposing to remediate groundwater (see page 9, Section 4.0). In Section 7.1.3, LFR states that affected groundwater would be removed from the western end of Area 1, if required. What are these potential requirements? The groundwater issue should be consistent between the text and the Alternative 3 presented in Table 2 of the draft RAW.

RESPONSE

The text in Section 7.1.3 and Table 2 have been revised to reflect that the preferred alternative is excavation for TPH, chromium and arsenic-affected soil and natural attenuation for TPH-affected groundwater. **LFR will work with the RWQCB to further evaluate groundwater issues at the Site.**

HERD SPECIFIC COMMENT NO. 3

Appendix D, Section D.2. Contrary to the statement that site-specific risk-based cleanup levels were developed and discussed in Appendix C, Appendix C merely summarizes the health risk evaluation (see specific comment #1). Therefore, the assumptions and the development of the risk-based remedial action objectives should be described in Appendix C.

RESPONSE

As noted above in DTSC Specific Comment No. 2, Section 5.0 and Appendix C were revised to clarify the selection of remedial action goals.

HERD SPECIFIC COMMENT NO. 4

Figure 3, Extent of Proposed Removal Action. One of HERD's comments in the memorandum, dated November 6, 2001, was to delineate the arsenic and chromium detected in BASB023 and BASB013. LFR did not address this comment, and instead, is proposing to remove the soil around these areas. HERD presumes that the delineation was not performed. In the absence of this relevant information, the report should discuss the factors used to determine the extent of the soil removal.

RESPONSE

Additional delineation of the extent of chromium and arsenic-affected soil detected at BASB23 and BASB013 is not practical at this time. Borings BASB023 and BASB013 were advanced on parcels that were and are occupied by commercial businesses. Boring BASB023 is located within the Chevron Tow yard; this yard is occupied by numerous vehicles being stored by the tow company. Boring BASB013 is located within the shop occupied by Ward's Custom Painting; the majority of floor space within this building is utilized for auto painting operations. Therefore, attempts to delineate affected soil by advancing additional borings in these areas would be disruptive to the existing businesses. Based on the distribution of arsenic and chromium across the Site, LFR anticipates that the arsenic and chromium-affected soil in these two locations is not extensive. The lateral and vertical extent of affected soil will be established during the excavation process.

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October 18, 2002 001-07962-01-061

Mr. Michael Stephens
California Environmental Protection Agency
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, California 95826-3200

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Subject: Responses to Comments on Draft Remedial Action Work Plan, Batarse Site, Southeast of 104th Avenue and East 14th Street, Oakland, California [should subject line match draft RAW title?]

Dear Mr. Stephens:

LFR Levine·Fricke (LFR) was retained by the Oakland Unified School District (OUSD) to prepare a Remedial Action Work Plan (RAW) for the Batarse School Project Site located south of 104th Avenue and east of East 14th Street in Oakland, California. The draft RAW, entitled "Draft Remedial Action Work Plan, Batarse Site, Southeast of 104th Avenue and East 14th Street, Oakland, California," was issued on March 26, 2002.

The California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC) submitted comments on the draft RAW to Mr. Timothy White of the OUSD in a letter dated May 17, 2002. The DTSC letter also contained comments made by the Human and Ecological Risk Division of Cal-EPA. On behalf of OUSD, LFR has prepared responses to these comments in the attached document.

If you have any questions regarding these responses, please contact Lita Freeman at (510) 596-9628.

Sincerely,

Lita D. Freeman, R.G., R.E.A. II
Senior Geologist

Alan D. Gibbs, R.G., C.HG., R.E.A. II
Principal Hydrogeologist
California New School Siting Program Manager

Attachment

Responses to Comments by California Environmental Protection Agency Department of Toxic Substances Control on the "Draft Remedial Action Work Plan, Batarse Site, Southeast of 104th Avenue and East 14th Street, Oakland, California"

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DTSC Comments on the Draft Remedial Action Work Plan (RAW)

LFR Levine·Fricke (LFR) has prepared the following responses to California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC) comments on the work plan entitled "Draft Remedial Action Work Plan, Batarse Site, Southeast of 104th Avenue and East 14th Street, Oakland, California," dated March 26, 2002, on behalf of the Oakland Unified School District (OUSD). The Batarse School Site ("the Site") is located on the eastern side of East 14th Street and the southern side of 104th Avenue in Oakland, California.

DTSC GENERAL COMMENTS

No volumes of contaminated soil are mentioned in the text of the report, but rather are incorporated into the Sampling and Analyses Plan (SAP) located in Appendix F. Information pertaining to planned remedial activities should be provided in Section 8.0, Remedial Action Workplan. It is difficult to assess from the information provided how costs for the three remedial alternatives were determined. The report states that shallow groundwater at the site has been adversely impacted, and that the preferred remediation alternative will lead to unrestricted land use. However, the preferred alternative does not address groundwater contamination, therefore it is unlikely that land use will be unrestricted, even though it is doubtful that shallow groundwater would be used as a drinking water source in the near future.

RESPONSE

The following text was added to the end of Section 5.0 to provide information on the volumes of affected soil:

> Areas of Concern
>
> TPH (in five locations), chromium (in one location), and arsenic (in two locations) were reported at concentrations above the RAOs in soil samples collected from the southern and central portions of the Site. The concentrations of TPH, chromium, and arsenic may present a significant risk to human health via the inhalation or ingestion/dermal-contact pathways. Because of access constraints by the existing on-site businesses, the lateral and vertical extent of affected soil was not fully defined at each of the locations. However, the extent of affected soil will be characterized more fully during the building demolition, construction, and soil excavation process.

TPH-Affected Soil

Soil containing TPH in concentrations greater than the RAOs is present in five locations on the southern and central portions of the Site (designated as Areas 1, 5 and 6 on Figure 2). These locations include: beneath the maintenance building near boring BASB031; east of the service building near boring BASB036; in the central portion of Area 1 near boring BASB077; near the northwest corner of Area 5 at boring BASB022; and at the west end of Area 6 at boring BASB002.

The total volume of TPH-affected soil is estimated to be approximately 150 bank cubic yards based on information obtained during the PEA. This quantity is based on excavating soil from five areas centered on borings BASB031, -036, -077, -022, and -002.

LFR assumes that the excavation at boring BASB031 will be limited to an area of approximately 12 by 12 feet laterally and to a depth of approximately 10 feet bgs vertically. These measurements are based on the analytical results of soil samples collected from boring BASB031 and step-out borings BASB070 and -071 which indicate that soil with TPH concentrations above the RAOs is limited to the area around BASB031. **TPH concentrations above the RAOs extent to a depth of approximately 15 feet bgs at this location; however, the excavation total depth will depend on site conditions noted during field work, risk considerations, and discussions with the DTSC and RWQCB. LFR anticipates that the excavation will extend to a depth of approximately 10 feet bgs.** TPH detected in the soil in this area appears to be related to the hydraulic lifts in this area.

The extent of TPH-affected soil at boring BASB036 is assumed to be limited to an area of about 10 by 10 feet laterally and about 4 feet bgs vertically and that the excavation will measure 10 by 10 feet laterally and about 5 feet bgs vertically. These measurements are based on the analytical results of soil samples collected from borings BASB036 and step-out boring BASB037 which indicate that soil with TPH concentrations above the RAOs is limited to the area around BASB036 to a depth of approximately 4 feet bgs. **TPH detected in the soil in this area appears to be related to the past chemical storage in this area.**

The extent of TPH-affected soil at boring BASB077 is assumed to be limited to an area of about 10 by 10 feet laterally and about 4 feet bgs vertically and that the excavation will measure 10 by 10 feet laterally and about 5 feet bgs vertically. These measurements are based on the analytical results of soil samples collected from this boring which indicate that soil with TPH concentrations above the RAOs are limited to a depth of approximately 4 feet bgs. The lateral extent is assumed to be limited based on leakage from vehicles being the likely source.

LFR assumes that the excavation at boring BASB022 is assumed will be limited to an area of about 10 by 10 feet laterally and about 10 feet bgs vertically. These measurements are based on the analytical results of soil samples collected from this boring which indicate

that soil with TPH concentrations above the RAOs are limited to a depth of approximately 10 feet bgs. The lateral extent is assumed to be limited based on leakage from vehicles being the likely source.

The extent of TPH-affected soil at boring BASB002 is assumed to be limited to an area of about 10 by 10 feet laterally and about 3 to 4 feet bgs vertically and that the excavation will measure 10 by 10 feet laterally and about 5 feet bgs vertically. These measurements are based on analysis of the soil sample from this boring at the 2.5 to 3-foot depth interval which revealed TPH concentrations above the RAOs and the assumption that the vertical and lateral extents of TPH-affected soil are limited to a depth of approximately 3 to 4 feet bgs in the area immediately surrounding this boring. A limited vertical and lateral extent is assumed based on leakage from vehicles being the likely source.

Chromium-Affected Soil

Chromium-affected soil at concentrations greater than the RAOs is present in one location (boring BASB013) on the southern portion of the Site (within Area 4 on Figure 2). The volume of chromium-affected soil is estimated to be approximately 15 bank cubic yards. This quantity is based on the assumption that the extent of chromium-affected soil at boring BASB013 is limited to an area of about 10 by 10 feet laterally and 3 feet bgs vertically. These measurements are based on the analytical results of soil samples collected from this boring which indicate that soil with chromium concentrations above the RAOs are limited to a depth of approximately 3 feet bgs. The lateral extent is assumed to be limited based on analytical results from nearby borings (BASB012 and -016).

Arsenic-Affected Soil

Arsenic-affected soil at concentrations greater than the RAOs is present in two locations on the Site: at boring BASB023 on the southern portion of the Site (within Area 5 on Figure 2) and at boring BASB021 on the central portion of the Site (within Area 6 on Figure 2). The total volume of arsenic-affected soil is estimated to be approximately 24 bank cubic yards. This quantity is based on the assumption that the extent of arsenic-affected soil at each location is limited to an area of about 10 by 10 feet laterally and 1 to 2 feet bgs vertically. These measurements are based on the analytical results of soil samples collected from these borings which indicate that soil with arsenic concentrations above the RAOs are limited to a depth of approximately 1 to 2 feet bgs. The lateral extent is assumed to be limited based on the distribution of arsenic in shallow soils across the Site.

The following text was added to the end of Section 8.2 to provide information on planned remedial activities at the Site:

Soil excavation and groundwater natural attenuation, the preferred remedial alternative, will involve removal of TPH-, chromium-, and arsenic-affected soil identified in the RAW as

having concentrations of these constituents above their respective RAOs. TPH-affected soil is present in five locations within Areas 1, 5, and 6; chromium-affected soil is present in one location within Area 4; and arsenic-affected soil is present in two locations in Areas 5 and 6. Under this option, the volume, toxicity, and mobility of contaminants at the Site would be considerably reduced.

LFR estimates that approximately 150 bank cubic yards of TPH-affected soil will be removed from five locations on the southern and central portions of the Site (designated as Areas 1, 5, and 6 on Figure 2). These locations include: beneath the maintenance building near boring BASB031; east of the service building near boring BASB036; in the central portion of Area 1 near boring BASB077; near the northwest corner of Area 5 at boring BASB022; and near the west end of Area 6 at boring BASB002. LFR assumes that the excavation at boring BASB031 will measure approximately 12 by 12 feet laterally and will extend to a depth of approximately 10 feet bgs. Each excavation at borings BASB036, -077 and -002 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 5 feet bgs. The excavation at boring BASB022 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 10 feet bgs.

Metals of concern at the Site are chromium and arsenic. The approximate volume of chromium-affected soil located within Area 4 at boring BASB013 is estimated to be 15 bank cubic yards. This quantity is based on the assumption that the excavation at boring BASB013 will measure about 10 by 10 feet laterally and 4 feet vertically. The total volume of arsenic-affected soil is estimated to be approximately 24 bank cubic yards. This quantity is based on the anticipation that the excavations at boring BASB023 within Area 5 and boring BASB021 within Area 6 will each measure about 10 by 10 feet laterally and 3 feet vertically.

Conventional construction equipment such as backhoes and loaders will be used for soil excavation. The excavation contractor will be responsible for locating and protecting active underground utilities within the excavation areas. Underground utilities that could be encountered during the excavations include natural-gas lines, sewer mains and laterals, and water pipes. Excavation around exposed active utilities will be performed manually.

To ensure effective removal, the excavations will extend from impacted areas both laterally and vertically until confirmation samples indicate that residual concentrations are less than the RAOs (see Section 5.0). TPH-, chromium-, and arsenic-affected soil identified in the PEA will be excavated, temporarily stockpiled in roll-off bins, and transported to an appropriate landfill for disposal.

LFR does not anticipate encountering groundwater during excavation activities at the Site because shallow groundwater was generally present at depths of approximately 25 feet bgs and the deepest proposed excavation extends to a depth of 10 feet bgs. If it is necessary to pump groundwater from an excavation, this water will be containerized on site in vacuum trucks or Baker tanks and sampled for subsequent analysis. Pumped groundwater, if any, will be transported to and disposed of at an appropriate off-site disposal facility based on the analytical sample results.

Confirmation soil samples will be collected from the side walls and floor of each excavation. The proposed confirmation sampling strategy would be to collect three soil samples for compositing from each side wall and one discrete sample from the floor of each excavation. Confirmation sampling would continue at this frequency until the RAOs have been met.

Confirmation soil samples will be collected in 2-inch-diameter brass or stainless steel liners and placed in an ice-chilled cooler for transport under standard chain-of-custody protocol to a laboratory certified by the State of California State to perform the requested analysis. The samples will be analyzed on a 24-hour rush turn-around schedule to minimize excavation down time.

Confirmation samples collected in areas of TPH-affected soil will be analyzed for TPHg, TPHd, TPHmo, TPHms, TPHss, and TPHhf using EPA Method 8015 Modified; PCBs using EPA Method 8082; and BTEX using EPA Method 8021. Confirmation samples collected in areas of chromium-affected soil and arsenic-affected soil will be analyzed for total chromium and total arsenic, respectively, using EPA Method 6020.

Following removal of the affected soil, the excavations will be backfilled with "clean" imported fill material. The source of the imported fill material will be documented and samples of the material will be submitted for laboratory analysis to establish its suitability for use at the Site.

A detailed work plan is presented as Appendix G.

Sections 7.1, 7.1.2 and 7.1.3 were revised and Sections 7.1.4, 7.1.5 and 7.1.6 were added, as noted below, to provide information on how the costs for the remedial alternatives were established:

The following sentences have been added to the beginning of Section 7.1:

The remedial actions evaluated do not address TPH-affected groundwater as shallow groundwater was encountered at a depth of approximately 25 feet bgs and direct contact with shallow groundwater is considered highly unlikely and does not represent a complete exposure pathway. In addition, the release occurred prior to OUSD's planned acquisition of the Site and shallow groundwater is not a planned source of domestic water for the Site. Since plans do not include remediation of TPH-affected groundwater, OUSD's goal of obtaining unrestricted land use would not be met; therefore, LFR proposes that OUSD's plans for the Site include obtaining water from public utilities for domestic and irrigation purposes, and placing restrictions on use of shallow groundwater at the Site.

Recent conversations with the DTSC have indicated that the RWQCB may require additional investigation, monitoring, or remediation of affected groundwater to protect the waters of the state in accordance with the requirements of the Clean Water Act of ??????. LFR will therefore submit copies of environmental documents to the RWQCB and discuss site groundwater issues with RWQCB staff.

The following paragraphs have been added to the end of Section 7.1.2:

For this alternative, surface caps would be placed over eight locations across the Site. These surface caps would cover TPH-affected soil in five locations within Areas 1, 5, and 6; chromium-affected soil in one location within Area 4; and arsenic-affected soil in two locations in Areas 5 and 6. The total area to be covered by the surface caps would be 844 square feet, based on capping areas measuring 12 by 12 feet at boring BASB031 and 10 by 10 feet at each of the following boring locations: BASB036, -077, -022, -002, -013, -023, and -021.

Capital expenditure for this alternative is estimated at about $250,000. Although the capping technology is readily implementable and could be completed in a matter of weeks, the alternative would require an ongoing maintenance and monitoring program. Maintenance and reporting (including submission of five-year reviews) costs are estimated to be $5,000 per year. Additionally, the cap would require complete replacement at a cost of about $50,000 every 15 to 20 years. Capping combined with institutional controls would be an effective method to reduce contaminant exposure, but may not meet OUSD's goal of obtaining an unrestricted land-use designation for the Site. Furthermore, the necessary maintenance activities and reporting requirements **would represent an ongoing operation and maintenance cost for OUSD. Placement of a cap over eight locations across the Site would be impractical as construction of a new school is proposed for the Site. A breakdown of anticipated costs associated with this alternative is presented in Table 2.**

Section 7.1.3 has been replaced with the new Section 7.1.3 titled "Alternative 3: Soil Excavation and Groundwater Natural Attenuation" to address soil and groundwater remediation:

This alternative would involve removal of soil with COCs in concentrations exceeding RAOs. Affected soil would be removed from Areas 1, 4, 5, and 6. Under this option, the volume, toxicity, and mobility of contaminants in soil at the Site would be considerably reduced. **This alternative would be effective for TPH-, chromium-, and arsenic-affected soil.**

For this alternative, LFR estimates that approximately 150 bank cubic yards of TPH-affected soil will be removed from five locations on the southern and central portions of the Site (designated as Areas 1, 5, and 6 on Figure 2). These locations include: beneath the maintenance building near boring BASB031; east of the service building near boring BASB036; in the central portion of Area 1 near boring BASB077; near the northwest corner of Area 5 at boring BASB022; and near the west end of Area 6 at boring BASB002. LFR assumes that the excavation at boring BASB031 will measure approximately 12 by 12 feet laterally and will extend to a depth of approximately 10 feet bgs. **TPH concentrations above the RAOs extent to a depth of approximately 15 feet bgs at boring BASB031; however, the excavation total depth will depend on site conditions noted during field work, risk considerations, and discussions with the DTSC and RWQCB. LFR anticipates that the excavation will extend to a depth of approximately 10 feet bgs.**

Each excavation at borings BASB036, -077 and -002 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 5 feet bgs. The excavation at boring BASB022 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 10 feet bgs.

The volume of chromium-affected soil located within Area 4 at boring BASB013 is estimated to be approximately 15 bank cubic yards. This quantity is based on the anticipation that the excavation at boring BASB013 within Area 4 will measure about 10 by 10 feet laterally and 4 feet vertically. The total volume of arsenic-affected soil is estimated to be approximately 24 bank cubic yards. This quantity is based on the anticipation that the excavations at boring BASB023 within Area 5 and boring BASB021 within Area 6 will each measure about 10 by 10 feet laterally and 3 feet vertically.

LFR does not anticipate encountering groundwater during excavation activities at the Site as shallow groundwater was generally present at depths of approximately 25 feet bgs and the deepest proposed excavation extends to a depth of 10 feet bgs. Should it be necessary to pump groundwater from an excavation, this water will be containerized onsite in vacuum trucks or Baker tanks and sampled for subsequent analysis. Pumped groundwater, if any, will be transported to and disposed of at an appropriate off-site disposal facility based on the analytical sample results. An on-site treatment alternative for the pumped groundwater is not proposed as the potential volume of pumped groundwater is not anticipated to be sufficient to allow for this alternative to be cost effective and the anticipated construction schedule would not allow for this alternative to be time effective.

TPH-affected groundwater at the western end of Area 1 would not be actively remediated under this alternative but would rather be allowed to attenuate naturally. Natural attenuation of TPH in groundwater is considered a viable alternative as shallow groundwater was encountered at a depth of approximately 25 feet bgs and direct contact with shallow groundwater is considered highly unlikely and does not represent a complete

exposure pathway. In addition, the release occurred prior to OUSD's planned acquisition of the Site and shallow groundwater is not a planned source of domestic water for the Site.

OUSD's goal of obtaining unrestricted land use may not be met if groundwater is allowed to attenuate naturally; therefore, LFR proposes that OUSD's plans for the Site include obtaining water from public utilities for domestic and irrigation purposes, and possibly placing restrictions on use of shallow groundwater at the Site. LFR will discuss site groundwater issues with RWQCB staff.

This alternative would cost an estimated $200,000 to implement; no maintenance or ongoing reporting costs are anticipated. About two to three months would be needed to complete the project. A breakdown of anticipated costs associated with this remedial alternative is presented in Table 2.

A new section titled "Section 7.1.4 Alternative 4: Soil Excavation and Groundwater Bioremediation" has been added as follows:

This alternative would involve removal of soil with COCs in concentrations exceeding RAOs. Affected soil would be removed from Areas 1, 4, 5, and 6. Bioremediation of TPH-affected groundwater would be enhanced by introduction of Oxygen Release Compound (ORC™) or a similar compound. Under this option, the volume, toxicity, and mobility of contaminants in soil and groundwater at the Site would be considerably reduced. **This alternative would be effective for TPH-, chromium-, and arsenic-affected soil.**

For this alternative, the scope of work for excavation and disposal of TPH, chromium and arsenic-affected would be the same as for Alternative 3 above.

TPH-affected groundwater at the western end of Area 1 would not be actively remediated; however, bioremediation would be enhanced by addition of ORC™ or a similiar compound. ORC™ would be injected into the groundwater during two separate events, including one prior to commencement of soil excavation and one following completion of soil excavation. Bioremediation of TPH in groundwater is considered a viable alternative as shallow groundwater was encountered at a depth of approximately 25 feet bgs and direct contact with shallow groundwater is considered highly unlikely and does not represent a complete exposure pathway. In addition, the release occurred prior to OUSD's planned acquisition of the Site and shallow groundwater is not a planned source of domestic water for the Site.

OUSD's goal of obtaining unrestricted land use would not be met if groundwater is allowed to bioremediate; therefore, LFR proposes that OUSD's plans for the Site include obtaining water from public utilities for domestic and irrigation purposes, and placing restrictions on use of shallow groundwater at the Site.

This alternative would cost an estimated $305,000 to implement; no maintenance or ongoing reporting costs are anticipated. About two to three months would be needed to complete the project. A breakdown of anticipated costs associated with this remedial alternative is presented in Table 2.

A new section titled "Section 7.1.5 Alternative 5: Soil Flushing and Acid Leaching" has been added as follows:

This alternative would involve removal of soil with chromium and arsenic in concentrations exceeding RAOs in Areas 4, 5, and 6. **This alternative would be effective for chromium-, and arsenic-affected soil but not TPH-affected soil.**

The soil would be placed in a mobile washing plant so that fine grained materials (silts and clays), which would be expected to contain the elevated concentrations of chromium and arsenic, can be separated from coarse grained materials (sands and gravels). Samples of the coarse grained materials would be obtained and submitted to an analytical laboratory to confirm that concentrations of chromium and arsenic are below the RAOs. The coarse grained materials would then be reused onsite as fill material and fine grained materials would be properly disposed of off-site.

For this alternative, LFR estimates that approximately 15 bank cubic yards of chromium-affected soil located within Area 4 at boring BASB013 and approximately 24 bank cubic yards of arsenic-affected soil at boring BASB023 within Area 5 and boring BASB021 within Area 6 would be treated.

This alternative would not be effective for TPH-affected soil, may not reduce the concentrations of arsenic to below the RAOs, and may result in significant soil disposal costs even after treatment due to the high clay and silt content in onsite soils.

This alternative would cost an estimated $50,000 to implement for the chromium and arsenic-affected soil. If treatment is not effective, LFR anticipates that disposal of chromium and arsenic-affected soil would cost an additional $5,000. No maintenance or

ongoing reporting costs are anticipated. About two to three months would be needed to complete the project. TPH-affected soil would need to be addressed using another remedial alternative. A breakdown of anticipated costs associated with this remedial alternative is presented in Table 2.

A new section titled "Section 7.1.6 Alternative 6: In Situ Methods" has been added as follows:

Several in situ methods were evaluated for this alternative. These methods include chemical oxidation, thermal treatment, multiple stage permeable active barrier, and electrokinetic decontamination. The first two methods would be effective for treatment of TPH-affected soil, the third method would be effective for both TPH-and metals-affected soil, and the last method would be effective for treatment of heavy metals such as chromium and arsenic. Site conditions would require implementation of at least two of these methods. These methods would involve introduction of chemicals, heat, or electrical current into the subsurface with ongoing monitoring for a period of one year or more.

For this alternative, LFR estimates that approximately 150 bank cubic yards of TPH-affected soil will be treated at five locations on the southern and central portions of the Site (designated as Areas 1, 5 and 6 on Figure 2), approximately 15 bank cubic yards of chromium-affected soil will be treated within Area 4 at boring BASB013 and approximately 24 bank cubic yards of arsenic-affected soil will be treated at boring BASB023 within Area 5 and boring BASB021 within Area 6.

Costs for these methods range from approximately $100,000 to $220,000 with ongoing monitoring costs ranging up to $30,000 per year. If treatment is established to not be effective, LFR anticipates that the TPH-, chromium- and arsenic-affected soil would require removal and disposal which would be disruptive to an existing school if construction is completed by that time. A breakdown of anticipated costs associated with the methods of this remedial alternative is presented in Table 2.

DTSC SPECIFIC COMMENT NO. 1

Section 4.0, Health-Based Risk Assessment and Section 5.0, Remedial Action Alternatives, states that groundwater is affected by petroleum and other constituents, but that groundwater does not represent a complete exposure pathway. Although DTSC agrees with this statement, it is unclear how a completely unrestricted land-use scenario will be obtained while groundwater contamination still exists. DTSC recommends that costs for groundwater remediation alternatives, including natural attenuation, are considered, and that restrictions of groundwater use at the site be implemented if it is determined that groundwater will not be remediated at the site.

RESPONSE

As noted above under DTSC General Comments, Sections 7.1, 7.1.3, and 7.1.4 have been revised to address the groundwater remediation issue. The remedial actions evaluated do not address TPH-affected groundwater; therefore, OUSD's goal of obtaining unrestricted land use may not be met and restrictions may be placed on use of shallow groundwater at the Site. **LFR will work with the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) to further evaluate groundwater issues at the Site.**

DTSC SPECIFIC COMMENT NO. 2

Section 5.0, Remedial Action Objectives, page 9. The Remedial Action Objective (RAO) for total petroleum hydrocarbon concentrations (gas and diesel range) of 400 mg/kg and 500 mg/kg appears high. DTSC recommends that the District further evaluate these recommended concentrations to ensure that these concentrations are in an acceptable health risk and ARAR range.

RESPONSE

The second paragraph of Section 5.0 was replaced with the following to clarify the selection of remedial action goals:

> COCs identified at the Site that may present a significant risk to human health are TPH, chromium and arsenic. Since OUSD's plans include construction of a school on the Site, LFR proposes to remediate the Site's soil to residential standards. LFR proposes the following numerical remedial action objectives (RAOs):

COC	RAO (mg/kg)
TPHg, TPHms, and TPHss	400
TPHd and TPHmo	500
Chromium	40
Arsenic	7.8

Notes: TPHg = total petroleum hydrocarbons as gasoline; TPHms = total petroleum hydrocarbons as mineral spirits; TPHss = total petroleum hydrocarbons as Stoddard solvent; TPHd = total petroleum hydrocarbons as diesel; TPHmo = total petroleum hydrocarbons as motor oil; mg/kg = milligrams per kilogram

The RAOs for TPH are based on the RWQCB RBSLs for residential surface soil (depth of 10 feet or less) where groundwater is not a current or potential source of drinking water. These RAOs are proposed for the Site as shallow groundwater was encountered at a depth of approximately 25 feet bgs and direct contact with shallow groundwater is considered highly unlikely and does not represent a complete exposure pathway. In addition, the release occurred prior to OUSD's planned acquisition of the Site and shallow groundwater is not a planned source of domestic water for the Site.

The RAOs for chromium and arsenic are based on natural background concentrations for the Site. During the PEA, a total of 86 soil samples were collected from within the upper 5 feet. The concentrations of chromium in 85 of these samples ranged from 2.1 mg/kg to 40 mg/kg with all but one of the soil samples having concentrations between 25 mg/kg and 40 mg/kg. The concentrations of arsenic in 84 of these samples ranged from 0.68 mg/kg to 7.8 mg/kg with all but two of the soil samples having concentrations between 3 mg/kg and 5 mg/kg. Based on these results, background chromium concentrations appear to range from 2 mg/kg to 40 mg/kg and background arsenic concentrations appear to range from less than 1 mg/kg to 7.8 mg/kg. LFR proposes to use 40 mg/kg as the RAO for chromium and 7.8 mg/kg as the RAO for arsenic as these values represent the upper limit of natural background concentrations at the Site.

DTSC SPECIFIC COMMENT NO. 3

Section 7.0, Remedial Action Alternatives. On-site treatment of soil and groundwater was not listed as a treatment alternative, except for the addition of ORC to the proposed excavation, which would be considered onsite treatment of groundwater. Had other on-site treatment technologies been considered?

RESPONSE

As noted above under DTSC General Comments, Sections 7.1.2 and 7.1.3 were revised, Sections 7.1.4, 7.1.5 and 7.1.6 were added, and Table 2 was modified to include additional remedial alternatives, including natural attenuation and in situ treatment.

DTSC SPECIFIC COMMENT NO. 4

Appendix D, Identification of Potential ARARs, does not include Alameda County, the City of Oakland, or ARARs promulgated specifically for California school construction.

RESPONSE

Specific Federal, State and local ARARS have been identified and added as new tables to Appendix D of the RAW and attached as Tables D-1, D-2, and D-3 of this correspondence.

DTSC SPECIFIC COMMENT NO. 5

Appendix F, Sampling and Analysis Plan. The Workplan portion(s) of this appendix need to be included in the document text. Based on the data provided, it appears that the lateral and vertical extent of contamination have not been fully characterized at any of the proposed excavation sites, although it does appear to be more fully characterized in some areas than in others, The lateral and vertical extent of contamination will be characterized more fully during the excavation process. The report stated that approximately 50,000 gallons of water will be generated during the excavation process. This water will be transported off-site for disposal. Has on-site treatment of this water been looked at as a treatment alternative? Contaminated soil excavated will be transported off-site to a designated landfill for disposal. Was on-site treatment of this soil looked at as a treatment alternative?

RESPONSE

The work plan portions of the SAP have been included in the document text (see Section 8.2) and in the Detailed Work Plan presented as Appendix G.

The text of the RAW has been modified and the reference to approximately 50,000 gallons of water has been removed. LFR does not anticipate encountering groundwater during excavation activities at the Site as shallow groundwater was generally present at depths of approximately 25 feet bgs and the deepest proposed excavation extends to a depth of 10 feet bgs. The modified text describes the dispensation of pumped groundwater, if any should be encountered during excavation activities at the Site. Should it be necessary to pump groundwater from an excavation, this water will be containerized onsite and sampled for subsequent analysis. Pending review of the analytical sample results, potential pumped groundwater will be disposed of at an appropriate off-site disposal facility. An on-site treatment alternative for the pumped groundwater is not proposed as the potential volume of pumped groundwater is not anticipated to be sufficient to allow for this alternative to be cost effective.

As noted above under DTSC General Comments, Sections 7.1.5 and 7.1.6 were added to address onsite treatment of excavated soil.

DTSC SPECIFIC COMMENT NO. 6

Appendix G, Quality Assurance Plan. The Workplan portion(s) of this appendix need to be included in the document text. The SAP portion(s) of this appendix need to be included in the SAP appendix.

RESPONSE

The Quality Assurance Project Plan (QAPP) was modified by deleting Section G.4 and renumbering the remaining sections, workplan portions of the QAPP were included in the text,

sampling information was included in the SAP, and a new Appenidx G titled "Detailed Work Plan" was prepared (see below).

As noted above in LFR's response to *DTSC General Comments*, Section 8.2 was modified to include information from the QAPP. The existing Section 8.3 was renumbered as Section 8.5 and two new sections, titled "8.3 Post-Demolition Soil Sampling for Lead" and "8.4 Decontamination", were moved from the QAPP to the document text (see below).

8.3 Post-Demolition Soil Sampling for Lead

LFR will collect soil samples from various locations across the Site prior to construction of the new school campus. As required by DTSC, up to 30 soil samples will be collected within the drip lines of the demolished buildings and analyzed for lead to assess the potential residual presence of these materials from demolition debris. The samples will be collected from the surface to 0.5 feet in depth using decontaminated hand sampling equipment consisting of a slide hammer with an attached sampler lined with brass or stainless-steel tubes. The ends of each tube will be covered with Teflon-lined plastic caps. The samples will then be labeled, logged, and placed in an ice-chilled cooler for transport to the analytical laboratory under chain-of-custody control.

8.4 Decontamination

Equipment used during this project that might come into contact with samples or contaminated materials will be properly decontaminated before and after each use. Generally, equipment will be cleaned with high-pressure hot water (steam cleaning) and/or washed with a laboratory-grade detergent (Alconox™) and rinsed with deionized or distilled water.

DETAILED WORK PLAN

G.1 Introduction

This Detailed Work Plan has been prepared by LFR Levine·Fricke (LFR) on behalf of the Oakland Unified School District (OUSD) for use during implementation of the Remedial Action Work Plan (RAW) activities to be conducted on property located near the southeastern corner of the intersection of 104th Avenue and East 14th Street in Oakland, California. This "Site," also known as the "Batarse Site," consists of numerous parcels situated within the area bounded to the north by 104th Avenue, to the west by commercial businesses fronting East 14th Street, to the east by residences along Breed Avenue, and to the south by an Alameda County Transit bus-maintenance facility. The Site, which consists of multiple parcels occupied by commercial businesses, industrial facilities, and residential buildings, is being considered by OUSD as a potential location for a new school.

G.1.1 Background

Pursuant to California Health and Safety Code Section 25355.5 (a)(1)(C), OUSD entered into a Voluntary Cleanup Agreement (VCA) with the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) to receive proper regulatory oversight and meet Education Code requirements for this potential new school site. Consistent with requirements in the VCA, a Preliminary Environmental Assessment (PEA) was conducted for the Site in accordance with a DTSC-approved work plan. The purpose of the PEA was to establish whether a release or threatened release of hazardous substances posing a threat to human health or the environment exists at the Site.

PEA results indicated that soil affected by TPH, chromium, and arsenic at concentrations that warrant remediation is present at the Site. Accordingly, a Remedial Action Work Plan (RAW) for the Site has been developed to mitigate human health and environmental risks and hazards; its scope of work includes impacted soil sampling, excavation, transport, and disposal, and possible shallow-groundwater sampling, extraction, treatment, and disposal.

G.2 Pre-Field Activities

A Health and Safety Plan (HSP) will be prepared before performing fieldwork. The HSP will document the potential hazards to worker health and safety at the Site during the proposed field activities and will specify the appropriate means to mitigate or control these hazards. It will address the potential for exposure to hazardous constituents, as well as describe general safety procedures. Fieldwork will be monitored to ensure that appropriate health and safety procedures are followed.

Before fieldwork begins, LFR will coordinate clearance of excavation locations for underground utilities with Underground Service Alert (USA) and a private utility-locating subcontractor. USA will be notified at least 48 hours in advance of sampling activities.

G.3 Field Activities

This section describes routine procedures designed to ensure quality data acquisition, the collection of representative samples, and methods to minimize potential sample contamination. To allow comparison of data from different data collection events, soil results will be reported in the units of milligrams per kilogram (mg/kg) and groundwater results will be reported in units of micrograms per liter (µg/l). Sampling locations will be consistently indicated on site maps, and lithologic descriptions (if appropriate) will be provided in accordance with the Unified Soil Classification System (USCS).

G.3.1 Soil Excavation and Confirmation Sampling

Conventional construction equipment such as backhoes and loaders will be used for soil excavation. Excavations deeper than 4 feet will be benched, sloped or shored appropriately. To ensure effective removal, the excavations will extend from impacted areas both laterally and vertically until confirmation samples indicate that residual concentrations are less than the RAOs (see Section 5.0 of RAW). TPH-, chromium-, and arsenic-affected soil identified in the PEA will be excavated, temporarily stockpiled in roll-off bins, and transported to an appropriate landfill for disposal.

LFR does not anticipate encountering groundwater during excavation activities at the Site as shallow groundwater was generally present at depths of approximately 25 feet bgs and the deepest proposed excavation extends to a depth of 10 feet bgs. Should it be necessary to pump groundwater from an excavation, this water will be containerized onsite in vacuum trucks or Baker tanks and sampled for subsequent analysis. Pumped groundwater, if any, will be transported to and disposed of at an appropriate off-site disposal facility based on the analytical sample results.

Equipment will be operated by a person with a current Hazardous-Waste Operations certificate. Excavation of soil will continue until visual observations, analytical results, and/or PID readings indicate that the affected soil has been removed from the area. The excavated soil will be placed in covered roll-off bins temporarily located on the Site and disposed of appropriately.

Soil containing TPH in concentrations greater than the RAOs is present in five locations on the southern and central portions of the Site (designated as Areas 1, 5 and 6 on Figure 2). These locations include beneath the maintenance building near boring BASB031; east of the service building near boring BASB036; in the central portion of Area 1 near boring BASB077; near the northwest corner of Area 5 at boring BASB022; and at the west end of Area 6 at boring BASB002.

The total volume of TPH-affected soil is estimated to be approximately 150 bank cubic yards based on information obtained during the PEA. This quantity is based on excavating soil from five areas centered on borings BASB031, -036, -077, -022, and -002.

LFR assumes that the excavation at boring BASB031 will measure approximately 12 by 12 feet laterally and will extend to a depth of approximately 10 feet bgs (about 55 bank cubic yards). These measurements are based on the analytical results of soil samples collected from boring BASB031 and step-out borings BASB070 and -071 which indicate that soil with TPH concentrations above the RAOs is limited to the area around BASB031. **TPH concentrations above the RAOs extent to a depth of approximately 15 feet bgs at this location; however, the excavation total depth will depend on site conditions noted during field work, risk considerations, and discussions with the DTSC and RWQCB.**

LFR anticipates that the excavation will extend to a depth of approximately 10 feet bgs.

The excavation at boring BASB036 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 5 feet bgs (about 18 bank cubic yards). These measurements are based on the analytical results of soil samples collected from boring BASB036 and step-out boring BASB037 which indicate that soil with TPH concentrations above the RAOs is limited to the area around BASB031 to a depth of approximately 4 feet bgs.

The excavation at boring BASB077 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 5 feet bgs (about 18 bank cubic yards). These measurements are based on the analytical results of soil samples collected from this boring which indicate that soil with TPH concentrations above the RAOs are limited to a depth of approximately 4 feet bgs. The lateral extent is assumed to be limited based on leakage from vehicles being the likely source.

The excavation at boring BASB022 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 10 feet bgs (about 40 bank cubic yards). These measurements are based on the analytical results of soil samples collected from this boring which indicate that soil with TPH concentrations above the RAOs are limited to a depth of approximately 10 feet bgs. The lateral extent is assumed to be limited based on leakage from vehicles being the likely source.

The excavation at boring BASB002 is anticipated to measure about 10 by 10 feet laterally and will extend to a depth of about 5 feet bgs (about 18 bank cubic yards). These measurements are based on analysis of the soil sample from this boring at the 2.5 to 3-foot depth interval which revealed TPH concentrations above the RAOs and the assumption that the vertical and lateral extents of TPH-affected soil are limited to a depth of approximately 3 to 4 feet bgs in the area immediately surrounding this boring. A limited vertical and lateral extent is assumed based on leakage from vehicles being the likely source.

Chromium-affected soil in concentrations greater than the RAOs is present in one location (boring BASB013) on the southern portion of the Site (within Area 4 on Figure 2). The volume of chromium-affected soil is estimated to be approximately 15 bank cubic yards. This quantity is based on the anticipation that the excavation at boring BASB013 will measure about 10 by 10 feet laterally and 4 feet vertically. These measurements are based on the analytical results of soil samples collected from this boring which indicate that soil with chromium concentrations above the RAOs are limited to a depth of approximately 3 feet bgs. The lateral extent is assumed to be limited based on analytical results from nearby borings (BASB012 and -016).

Arsenic-affected soil in concentrations greater than the RAOs is present in two locations, including at boring BASB023 on the southern portion of the Site (within Area 5 on Figure 2) and at boring BASB021 on the central portion of the Site (within Area 6 on Figure 2).

The total volume of arsenic-affected soil is estimated to be approximately 24 bank cubic yards. This quantity is based on the anticipation that the excavations at borings BASB023 and -021 will each measure about 10 by 10 feet laterally and 3 feet vertically. These measurements are based on the analytical results of soil samples collected from these borings which indicate that soil with arsenic concentrations above the RAOs are limited to a depth of approximately 1 to 2 feet bgs. The lateral extent is assumed to be limited based on the distribution of arsenic in shallow soils across the Site.

After removal of the affected soil is completed, confirmation soil samples will be collected from the sidewalls and floor of each excavation as detailed in the Sampling and Analysis Plan (SAP) presented in Appendix F.

Following removal of the affected soils, the excavations will be backfilled with "clean" imported fill material, which will consist primarily of gravel and sandy material, substantially free of clay, organic materials, loam, wood, and trash. The imported fill material will not contain stones larger than 3 inches in any dimension, broken concrete, masonry, rubble, asphalt pavement, or other waste. The source of the imported fill material will be documented and samples of the material will be submitted for laboratory analysis to establish its suitability for use at the Site.

Pea gravel may be placed in the lower portion of the deeper excavations to a depth of about 5 feet. Pea gravel is proposed for use based on engineering considerations. A geotextile fabric would be placed over the gravel and would be overlain by engineering fill to the ground surface. Compaction testing of the engineering fill will be performed and documented by LFR personnel. The backfilled areas will be rough graded to minimize ponding of water and to direct surface-water flow away from the Site in preparation for construction activities.

Excavated soil will be profiled for disposal by hand-driving a brass or stainless-steel tube into randomly selected portions of the excavated soil. The soil will then be transported to the appropriate disposal facility selected by OUSD.

G.4 Post-Demolition Soil Sampling for Lead

LFR will collect soil samples from various locations across the Site prior to construction of the new school campus. As required by DTSC, up to 30 soil samples will be collected within the drip lines of the demolished buildings and analyzed for lead to assess the potential residual presence of these materials from demolition debris. The samples will be collected from the surface to 0.5 feet in depth using decontaminated hand sampling equipment consisting of a slide hammer with an attached sampler lined with brass or stainless-steel tubes. The ends of each tube will be covered with Teflon-lined plastic caps. The samples will then be labeled, logged, and placed in an ice-chilled cooler for transport to the analytical laboratory under chain-of-custody control.

G.5 Decontamination

Equipment used during this project that might come into contact with samples or contaminated materials will be properly decontaminated before and after each use. Generally, equipment will be cleaned with high-pressure hot water (steam cleaning) and/or washed with a laboratory-grade detergent (Alconox™) and rinsed with deionized, distilled, or fresh tap water.

HERD SPECIFIC COMMENT NO. 1

Page 9, Section 5, 2nd paragraph, Remedial Action Objectives. The basis for the proposed RAOs should be discussed. Although the text states that the proposed RAOs are based on discussions with DTSC and on the health-based risk assessment discussed in Section 4 and in Appendix C, these references merely describe the health risk assessment. If the proposed RAOs for petroleuum hydrocarbons is based on the Basin Plan of the San Francisco Regional Water Quality Control Board, which is listed as one of the potential ARARs, then this should be stated in the report, HERD cannot concur or disagree with these RAOs until the rationale is provided.

RESPONSE

As noted above in DTSC Specific Comment No. 2, Section 5.0 was revised clarify the selection of remedial action goals.

HERD SPECIFIC COMMENT NO. 2

Page 14, Section 7.3. The preferred option for remediation is soil excavation and possible groundwater extraction, yet LFR is not proposing to remediate groundwater (see page 9, Section 4.0). In Section 7.1.3, LFR states that affected groundwater would be removed from the western end of Area 1, if required. What are these potential requirements? The groundwater issue should be consistent between the text and the Alternative 3 presented in Table 2 of the draft RAW.

RESPONSE

The text in Section 7.1.3 and Table 2 have been revised to reflect that the preferred alternative is excavation for TPH, chromium and arsenic-affected soil and natural attenuation for TPH-affected groundwater. **LFR will work with the RWQCB to further evaluate groundwater issues at the Site.**

HERD SPECIFIC COMMENT NO. 3

Appendix D, Section D.2. Contrary to the statement that site-specific risk-based cleanup levels were developed and discussed in Appendix C, Appendix C merely summarizes the health risk evaluation (see specific comment #1). Therefore, the assumptions and the development of the risk-based remedial action objectives should be described in Appendix C.

RESPONSE

As noted above in DTSC Specific Comment No. 2, Section 5.0 and Appendix C were revised to clarify the selection of remedial action goals.

HERD SPECIFIC COMMENT NO. 4

Figure 3, Extent of Proposed Removal Action. One of HERD's comments in the memorandum, dated November 6, 2001, was to delineate the arsenic and chromium detected in BASB023 and BASB013. LFR did not address this comment, and instead, is proposing to remove the soil around these areas. HERD presumes that the delineation was not performed. In the absence of this relevant information, the report should discuss the factors used to determine the extent of the soil removal.

RESPONSE

Additional delineation of the extent of chromium and arsenic-affected soil detected at BASB23 and BASB013 is not practical at this time. Borings BASB023 and BASB013 were advanced on parcels that were and are occupied by commercial businesses. Boring BASB023 is located within the Chevron Tow yard; this yard is occupied by numerous vehicles being stored by the tow company. Boring BASB013 is located within the shop occupied by Ward's Custom Painting; the majority of floor space within this building is utilized for auto painting operations. Therefore, attempts to delineate affected soil by advancing additional borings in these areas would be disruptive to the existing businesses. Based on the distribution of arsenic and chromium across the Site, LFR anticipates that the arsenic and chromium-affected soil in these two locations is not extensive. The lateral and vertical extent of affected soil will be established during the excavation process.