UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

61 Forsyth Street, S.W.
Atlanta, Georgia 30303

MEMORANDUM September 19, 2008

SUBJECT: Review of the HG_RES2 Final Results (pdf), Huntsville Final Data (excel), and Review of the HG_RES2 Final Results (pdf), Huntsville Final Data (excel), Huntsville Gas Company Site
Huntsville, AL

FROM: Ofia Hodoh
Technical Services Section
Superfund Support Branch

TO: Matthew Huyser, OSC
Emergency Response & Removal Branch

THROUGH: Glenn Adams, Chief
Technical Services Section
Superfund Support Branch

Per your request, I have reviewed the **HG_RES2 Final Results (pdf), Huntsville Final Data (excel), Review of the HG_RES2 Final Results (pdf), Huntsville Final Data (excel),** for the **Huntsville Gas Company Site, Huntsville, AL**.

On the TSS Request Form, you asked specifically that our review focus on three issues: (1) What are the risk based Removal Actions Levels for PAHs and BaP equivalency for surface soils? (2) Zones HG-30 and HG-Res-39 are vegetable/flower garden that are annually tilled and tended by children. An unknown number of residents in the neighborhood consume vegetables from these gardens. Are there more stringent Removal Action Levels for these locations? (If "yes", what are they?) and (3) Samples HG-Res-41, HG-Res-42 and HG-Res-43 (see the Huntsville Final Data excel spreadsheet) were collected from dry drainage ditch that children often play in. Are there more stringent Removal Action Levels for these locations? (If "yes", what are they?) As a human health risk assessor, I have reviewed the surface soil data in comparison to health based Removal Action Levels (i.e., direct contact) for soil. Your specific comments are addressed below:

From a human health risk assessment perspective, I have the following comments to offer:

Specific Comments from OSC:

1. What are the risk based Removal Actions Levels for PAHs and BaP equivalency for surface soils?
For carcinogenic PAHs, Region 4 has adopted the TEF methodology which the TEFs are based on the relative potency of each compound relative to that of benzo(a)pyrene (BaP). The BaP equivalent value (1,500 ug/kg or ppb) based on 10^{-4} is recommended as the Removal Action Levels. The value based on 10^{-6} (15 ug/kg or ppb) (or some level between the two values) can be used as the final Cleanup Levels.

For non-carcinogenic PAHs, the values based on HQ = 3 are recommended as the Removal Action Levels. The values based on HQ = 1 (or some level between the two values) can be used as the final Cleanup Levels. See table below.

Non-Carcinogenic PAHs:

Chemical	Units	HQ = 1	HQ=3
1-Methylnaphthalene	ug/kg	2.2E+04	6.6E+04
2-Methylnaphthalene	ug/kg	3.1E+05	9.3E+05
Acenaphthene	ug/kg	3.4E+06	1.0E+07
Acenaphthylene	ug/kg	NA	NA
Anthracene	ug/kg	1.7E+07	5.1E+07
Benzo(g,h,i)perylene	ug/kg	NA	NA
Fluoranthene	ug/kg	2.3E+06	6.9E+06
Fluorene	ug/kg	2.3E+06	6.9E+06
Naphthalene	ug/kg	3.9E+03	1.2E+04
Phenanthrene	ug/kg	NA	NA
Pyrene	ug/kg	1.7E+06	5.1E+06

2. Zones HG-30 and HG-Res-39 are vegetable/flower garden that are annually tilled and tended by children. An unknown number of residents in the neighborhood consume vegetables from these gardens. Are there more stringent Removal Action Levels for these locations? (If "yes", what are they?)
No. We do not have RALs for homegrown produce. The RALs for surface soil are applicable under this scenario. The cPAHs are not easily absorbed into plants. cPAHs in dust or soil can settle on leaf surfaces (EPA 1993). As an extra precaution, residents who garden near the Huntsville Gas Co. Site should be advised to thoroughly wash all home-grown vegetables prior to eating. The level (25,689 ug/kg) found in sample HG-Res2-05 (HG-30) exceeds its recommended risk based Removal Action Level (RAL) of 1500 ug/kg for BaP TEFs in residential surface soil (based on a 10^{-4} risk level). The dibenzo(a,h)anthracene detection of 2,500 ug/kg in HG-Res2-05 (HG-30) exceeds its recommended risk based Removal Action Level (RAL) of 1,500 ug/kg for dibenzo(a,h)anthracene in residential surface soil (based on hazard quotient = 3). No reported detections for carcinogenic and non-carcinogenic PAHs for sample HG-Res2-06 (HG-39) exceeded RALs for direct contact.

3. Samples HG-Res-41, HG-Res-42 and HG-Res-43 (see the Huntsville Final Data excel spreadsheet) were collected from dry drainage ditch that children often play in. Are there more stringent Removal Action Levels for these locations? (If "yes", what are they?) *No. TSS assumes that the top 12" of the sediment is available for human contact, if it differs, please inform us. Exposures to sediment will differ from exposures to soil due to potential differences in the chemical and physical properties between the two media and differing conditions under which these types of exposures occur. Since studies of dermal exposure to sediments are limited, it is recommended that the same risk assessment approach for soil exposures be used for sediments. It should be noted that particulate-bound chemicals in an aqueous medium (e.g., suspended sediment particles) would be considered to be much less bioavailable for dermal absorption, due to inefficient adsorption of suspended particles onto the skin surface and a slower rate of absorption into the skin (EPA 2004b). The use of the conservative 10^{-4} RALs for soils serve to over-estimate risk for sediment samples. See memo from risk assessor dated August 20, 2008, for human health screening of sediment data. See response to comment #1 for RALs for sediment.*

Specific Comments from Risk Assessor:

cPAHs

The potential carcinogenic effects associated with exposure to PAHs in environmental media are assessed in accordance with the toxicicity equivalency approach developed by EPA (EPA 1993, 2002d). The carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene) were calculated by adjusting the benzo(a)pyrene with Toxicity Equivalence Factors (TEFs) that are specific for each of the PAHs. TEFs are fractions that equate the potential toxicity of each potentially carcinogenic PAH to that of benzo(a)pyrene. The data are reported for both individual PAHs and for the benzo(a)pyrene equivalent (BaP) calculated using the toxicity equivalency factors. The BaP TEFs levels for the soil samples ranged from 270 – 43,666 ug/kg (parts per billion, or ppb) for samples HG-Res2-00 thru HG-Res2-07, respectively. The levels found in samples HG-Res2-01, HG-Res2-02, HG-Res2-03, HG-Res2-05 and HG-Res2-07(duplicate) exceeded its recommended risk based Removal Action Level (RAL) of 1,500 ug/kg for BaP TEFs in residential surface soil (based on a 10^{-4} risk level).

Non-Carcinogenic PAHs

No reported detections for non-carcinogenic PAHs for the seven surface soil samples exceed RALs (in soil) for direct contact.

Conclusions

The analysis results of the seven surface soils in samples collected from zoned locations HG-Res2-01, HG-Res2-02, HG-Res2-03, HG-Res2-05 and HG-Res2-07(duplicate) are contaminated with cPAHs exceeding the RALs and should be removed to prevent risks to children that may come in contact with the soils.

If I can be of any further assistance or if you have any questions, please call me at 404 562 9176.

References:

EPA 1993. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. Office of Health and Environmental Assessment. EPA/600/R-93/089.

EPA 2002d. Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment Bulletins. EPA Region 4, Website version last updated May 2000. [http://www.epa.gov/region4/waste/oftecser/healtbul.htm]

EPA 2004b. *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment*. EPA Office of Superfund Remediation and Technology Innovation (OSRTI), EPA/540/R/99/005, OSWER 9285.7-02EP, PB-99-963312, July 2004.

EPA 2008. Regional Screening Levels for Chemical Contaminants at Superfund Sites, Interagency Agreement between EPA Office of Superfund and Oak Ridge National Laboratory, http://epa-prgs.ornl.gov/chemicals/index.shtml