UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

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

MEMORANDUM August 20, 2008

SUBJECT: Review of Removal Site Evaluation Report
Rev. 0
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 **Removal Site Evaluation Report, Revision 0** for the **Huntsville Gas Company Site, Huntsville, AL**.

On the TSS Request Form, you asked specifically that our review focus on four issues: (1) What are the Removal Actions Levels for PAHs and BaP equivalency for surface soils? (2) Does the Removal Action Level change for soils at a depth of 12" that are covered by fill-dirt? (3) Samples HG-Res-30, HG-Res-39, and HG-Res-38 were collected from vegetable and flower garden that are annually tilled. Are there more stringent Removal Action Levels for these locations? and (4) Samples HG-Res-41, HG-Res-42 and HG-Res-43 were collected from dry drainage ditch that children often play in. Are there more stringent Removal Action Levels for these locations? As a human health risk assessor, I have reviewed the soil and sediment data in comparison to health based Removal Action Levels (i.e. direct contact) for surface 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 Removal Actions Levels for PAHs and BaP equivalency for surface soils? *See table below.*

PAH (ug/kg)	Removal Action Level (1E-4 risk level)
Acenaphthene	1.02E+07
Acenaphthylene	NA
Anthracene	5.10E+07
Benzo(a)anthracene	1.50E+04
Benzo(a)pyrene	1.50E+03
Benzo(b)fluoranthene	1.50E+04
Benzo(g,h,i)perylene	NA
Benzo(k)fluoranthene	1.50E+05
Chrysene	1.50E+06
Dibenzo(a,h)anthracene	1.50E+03
Fluoranthene	6.90E+06
Fluorene	6.90E+06
Indeno (1,2,3-cd) pyrene	1.50E+04
Naphthalene	1.17E+04
Phenanthrene	NA
Pyrene	5.10E+06
BaP Equivalent	1.50E+03

2. Does the Removal Action Level change for soils at a depth of 12" that are covered by fill-dirt?
Yes. If the top 12" of soil is "clean", then the 12' – 24" below the surface soil is not available for human contact and we have no "current" exposure pathway. If there is data available for the top 12", TSS should review it to provide further recommendations to OSC.

3. Samples HG-Res-30, HG-Res-38, and HG-Res-39 were collected from vegetable and flower garden that are annually tilled. Are there more stringent Removal Action Levels for these locations?
See comment #2 above. For metals, none of the specific locations exceeded the 10^{-4} RAL for arsenic. A review of literature pertaining to arsenic phytotoxicity indicates that it is rare for arsenic to accumulate in garden plants at levels that are harmful to animals and humans. When exposed to arsenic, the growth of vegetable plants is limited before arsenic concentrations in plant tissue reach levels that would be toxic to humans (Lepp 1981). For cPAHs, only sample location HG-Res-30 exceeded the 10^{-4} RAL for cPAHs which are not easily absorbed into plants. PAHs in dust or soil can settle on leaf surfaces. 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.

4. Samples HG-Res-41, HG-Res-42 and HG-Res-43 were collected from dry drainage ditch that children often play in. Are there more stringent Removal Action Levels for these locations?
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.

Specific Comments from Risk Assessor:

1. *Table 2 - soil data. The comments below for soil samples pertain to soil if the 12""clean" soil cover is removed.*

SVOCs

No reported detections for SVOCs on this table exceeded RALs for direct contact.

PAHs

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). 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 17 – 79,000 ug/kg (parts per billion, or ppb) for samples HG-Res-07 and HG-Res-15, respectively. The levels found in samples HG-Res-03, HG-Res-12, HG-Res-14, HG-Res-15, HG-Res-16, HG-Res-17, HG-Res-18, HG-Res-19, HG-Res-20, HG-Res-21, HG-Res-22, HG-Res-24, HG-Res-25, HG-Res-26, HG-Res-27, HG-Res-28, HG-Res-29, HG-Res-30, HG-Res-31, HG-Res-32, HG-Res-33, HG-Res-36 and HG-Res-37 exceeded its recommended risk based Removal Action Level (RAL) of 1500 ug/kg for BaP TEFs in residential surface soil.

Non-Carcinogenic PAHs

No reported detections for non-carcinogenic PAHs on this table exceeded RALs for direct contact.

Metals

The arsenic detection of 41 mg/kg in HG-Res-19 exceeds its recommended risk based Removal Action Level (RAL) of 39 mg/kg for arsenic in residential surface soil. The concentration at 41 mg/kg is very close to the RAL value at 39 mg/kg. The average arsenic concentration for all the soil samples is approximately 15 mg/kg and below the

action level of 39 mg/kg. The lead detection of 1900 mg/kg in HG-Res-11 exceeds its recommended risk based Removal Action Level (RAL) of 1200 mg/kg for Lead in residential surface soil. The residential soil removal for lead (1200 mg/kg) is based on the current child exposure scenario. EPA recommends using a simple average or arithmetic mean of soil lead concentrations from a representative area in the child's yard" for the Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead (EPA 2003). The average lead concentration 240 mg/kg is below the RAL of 1200 mg/kg for Lead in residential surface soil. No other reported detections on this table exceed RALs for direct contact.

2. *Table 3 – sediment data.*

TSS assumes that the top 12" is available for human contact and no clean cover exist for the sediment. EPA region 4 does not have human health based RALs for sediment. As shown on the tables, sediment screening vales for chronic exposure were detected at significant levels in the sediments. Sediment that is covered by surface water does not typically need to be evaluated in a human health risk assessment, whereas sediment that is exposed (not covered with water) should be addressed as surface soil (EPA 2002d). This comparison provides a good basis by which to proceed into a site–specific ecological risk assessment to determine whether ecological habitat has been adversely affected by the site.

SVOCs

No reported detections for SVOCs on this table exceeded RALs for direct contact.

PAHs

The data are reported for both individual PAHs and for the benzo(a)pyrene equivalent (BaP) calculated using the toxicity equivalency factors. The reported BaP TEF levels for the 3 sediment samples ranged from 13,649 ug/kg – 227,800 ug/kg (parts per billion, or ppb). These levels exceeds its recommended risk based Removal Action Level (RAL) of 1,500 ug/kg for BaP TEFs in residential surface soil. The areas that are contaminated with carcinogenic PAHs exceeding the RALs should be removed to prevent risks to children that may come in contact with the sediment.

Non-Carcinogenic PAHs

No reported detections for non-carcinogenic PAHs on this table exceeded RALs for direct contact.

Metals

The arsenic detection of 44 mg/kg in HG-Res-43 exceeds its recommended risk based Removal Action Level (RAL) of 39 mg/kg for Arsenic in residential surface soil. The average arsenic concentration for all the sediment samples is approximately 35 mg/kg and below the action level of 39 mg/kg. No other reported detections for metals on this table exceed RALs (in soil) for direct contact.

Conclusions

If the "clean" soil cover is removed, then areas that are contaminated with cPAHs and metals exceeding the RALs 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 2003, 1996. *Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil* [EPA-540-R-03-001, OSWER Dir #9285.7-54]; EPA # added January 2003, originally published December 1996.

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

Lepp. N.W. Effect of Heavy Metal Pollution on Plants. Volume 1. Effects of Trace Metal on Plant Function; Applied Science Publishers: London, U.K., 1981.