GRENADA COUNTY - TIE PLANT MS
KOPPERS INC
HSWA
MSD007027543
2006-------- AI 00876

Koppers Inc

General Information

ID	Branch	SIC	County	Basin	Start	End
876	Energy and Transportation	2491	Grenada	Yazoo River	11/09/1981	

Address

Physical Address (Primary)	Mailing Address
1 Koppers Drive Tie Plant, MS 38960	PO Box 160 Tie Plant, MS 38960

Telecommunications

Type	Address or Phone
Work phone number	(662) 226-4584, Ext. 11

Alternate / Historic AI Identifiers

Alt ID	Alt Name	Alt Type	Start Date	End Date
2804300012	Koppers Inc	Air-AIRS AFS	10/12/2000	
096000012	Koppers, Inc.	Air-Title V Fee Customer	12/11/2006	
096000012	Koppers Industries, Inc.	Air-Title V Operating	03/11/1997	03/01/2002
096000012	Koppers Industries, Inc.	Air-Title V Operating	01/13/2004	03/26/2007
096000012	Koppers Inc	Air-Title V Operating	03/26/2007	01/01/2009
MSR220005	Koppers Industries, Inc.	GP-Wood Treating	09/25/1992	
MSD007027543	Koppers Industries, Inc.	Hazardous Waste-EPA ID	08/27/1999	
HW8854301	Koppers Industries, Inc.	Hazardous Waste-TSD	06/28/1988	06/28/1998
HW8854301	Koppers Industries, Inc.	Hazardous Waste-TSD	11/10/1999	03/26/2007
HW8854301	Koppers, Inc. (Owner)	Hazardous Waste-TSD	03/26/2007	09/30/2009
876	Koppers Industries, Inc.	Historic Site Name	11/09/1981	12/11/2006
876	Koppers, Inc.	Official Site Name	12/11/2006	
MSP090300	Koppers Industries, Inc.	Water-Pretreatment	11/14/1995	11/13/2000
MSP090300	Koppers Industries, Inc.	Water-Pretreatment	09/18/2001	08/31/2006
MSP090300	Koppers Inc	Water-Pretreatment	03/26/2007	02/28/2012
MSU081080	Koppers Industries, Inc.	Water-SOP	11/09/1981	11/30/1985

Regulatory Programs

Program	SubProgram	Start Date	End Date
Air	Title V - major	06/01/1900	
Hazardous Waste	Large Quantity Generator	08/27/1999	
Hazardous Waste	TSD - Not Classified	06/28/1988	
Water	Baseline Stormwater	01/01/1900	
Water	PT CIU	11/14/1995	
Water	PT CIU - Timber Products Processing (Subpart 429)	11/14/1995	
Water	PT SIU	11/14/1995	

Locational Data

Latitude	Longitude	Metadata	S / T / R	Map Links

33 ° 44 ' 3 .00 (033.734167)	89 ° 47 ' 8 .06 (089.785572)	**Point Desc:** PG- Plant Entrance (General). Data collected by Mike Hardy on 11/8/2005. Elevation 223 feet. Just inside entrance gate. **Method:** GPS Code (Psuedo Range) Standard Position (SA Off) **Datum:** NAD83 **Type:** MDEQ	Section: Township: Range:	SWIMS TerraServer Map It

4/3/2007 11:08:47 AM

Notice of Technical Inadequacy (NOTI)
Corrective Measure Study (CMS)
Work Plan, dated August 4, 2006
Koppers Industries/Beazer East, Inc., Tie Plant, Mississippi
EPA I.D. No. MSD 007 027 543

1. The facility shall prepare and submit a Corrective Measure Study (CMS) Work Plan for seventeen (17) SWMUs in accordance with Specific Condition II.G.1.a of the HSWA permit. The CMS Work Plan shall include the SWMU Description, Previous Investigation Summary related to RCRA Facility Investigation (RFI), Constituents of Concern (COCs), Monitoring Well(s), Additional Delineations or Evaluations, and Potential Corrective Measure(s) related to each SWMU and/or any contaminated area. Such information should be covered in all media, such as soil, sediment, surface water and groundwater.

2. The CMS Work Plan shall meet the requirement of Appendix C at a minimum in accordance with Specific Condition II.G.1.b of the HSWA permit. Items 3, 4, and 5 of Appendix C are not necessary for the preparation of the CMS Work Plan.

3. The CMS Work Plan shall contain a brief site-specific description of its objectives.

4. The facility shall develop the points of compliance on an area-by-area basis. Selection of the proposed points of compliance shall be based on groundwater flow directions, plume dimensions, receptor proximity or any other factor(s). Keep in mind that the proposed locations may be subject to change based on additional evaluations and field conditions.

5. The facility plans to submit the Monitored Natural Attentuation (MNA) Work Plan for the groundwater. The MNA Work Plan should be discussed under a separate Title. Beazer shall also include the basis of selection of MNA, supporting documentation, sampling and duration. Microbial enumeration and other MNA parameters and conditions need be evaluated and included in the CMS Work Plan. The facility must start the sampling of the monitoring wells for the MNA parameters. The MNA Work Plan can be divided into different sections as follows:

> Section 1 should include a review of the available historical and background conditions. This section should also contain a summary of the hydrogeologic conditions, contaminant distribution, the MNA program to date, geochemical characteristics, natural attenuation mechanisms and biodegradable constituents, and the identification of potential receptors.
>
> Section 2 can address the development of a preliminary conceptual model for MNA. This will define the focus of the MNA program, the integration of hydrogeologic, geochemical, and contaminant data into the preliminary model, and the identification of additional data requirement necessary to support MNA.

Section 3 can present any projected site characterization work necessary to fill the data requirements of MNA.

Section 4 can include refining of the conceptual model and documenting the natural attenuation indicators. The pre-modeling calculations are necessary to evaluate plume stability, biodegradative capacity of groundwater, evaluation of attentuation and biodegradation rates, and remediation time frames.

Section 5 can address the simulation of natural attenuation using fate and transport modeling. This shall contain a discussion of model assumptions and limitations, input parameters, model calibration and sensitivity analysis, and the results of the simulations.

Section 6 can address the determination of exposure pathways and its analyses.

Section 7 should include the development of a long-term monitoring plan. Key elements of the monitoring plan can contain points of compliance and reference points, monitoring strategy, monitoring locations, analytical protocols (including monitoring parameters and frequency), data evaluation and reporting.

Section 8 should address the contingency plan if it is determined that natural attenuation is not working at the site. This can include an examination of remedial alternatives to serve as the potential backup remedies.

6. Beazer should incorporate a brief description of overall project management including overall approach, levels of authority (organizational chart), lines of communication, project schedules, budget and personnel.

7. A detailed Public Involvement Plan should also be included in the CMS Work Plan. This will contain introduction, facility overview, HSWA permit history and actions to date, discussion of RFI and proposed CMS process, stakeholders, discussion points, and list and schedule of public participation activities.

8. Please discuss the CMS Work Plan for off-site areas under a separation Section. It is highly recommended that the facility should discuss the active remedy for the off-site areas.

9. Under a separate section, Beazer should summarize the results of the risk assessment. In addition, the CMS Work Plan should contain the specific cleanup standards in all media such as soil, sediment, surface water and groundwater. The removal and practical limits of dense-aqueous phase liquids (DNAPs) at the site should also be discussed. The cleanup standards must be either background, promulgated Federal and State goals or risk-derived standards.

10. During the December 2002 meeting, EPA said that the dioxins and furans in the groundwater will be addressed in the CMS, not if necessary. Please discuss the dioxins and furans in the groundwater in relation to CMS.

11. Koppers/Beazer's should submit the analytical results of the plant production well in October 2006. A specific date for the annual analytical results of the plant production well needs to be finalized.

Linda S. Paul
Environmental Manager

KOPPERS

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September 18, 2009

Ms. D. Karen Knight, CHMM
Chief, Corrective Action Section
Restoration and UST Branch
U.S. Environmental Protection Agency
Region 4
Atlanta Federal Center
61 Forsyth Street
Atlanta Georgia 30303-8960

SEP 21 2009

Dear Ms. Knight:

On August 24, 2009, Koppers Inc. received the additional U.S. Environmental Protection Agency (EPA) comments, dated August 19, 2009, on the human health risk portion of the "Confirmatory Sampling Report, Koppers Inc./Beazer East Inc. Tie Plant, Mississippi EPA I.D. No. MSD 007 027 543", specifically on the Response to EPA Comments, dated May 20, 2009.

We have reviewed the comments and have revised the screening evaluation (Attachment E to the Confirmatory Sampling Report) in accordance with EPA's comments and the responses provided below. Two versions of the revised screening evaluation are attached to this letter. In one version the revised text within the screening evaluation is highlighted in yellow to expedite EPA's review. In the second version, the highlighting is removed so EPA has a final version should the revisions be deemed acceptable.

<u>Response to EPA's comments.</u>

Comment 1. The main focus of this comment is on Koppers' disagreement with EPA comment stating that a Fraction Ingested (FI) term of 1 should be used for the exposure scenarios. EPA stands by this comment on the issue based on the rationale stated in the comment. As stated in our Regional risk assessment guidance, a FI of less than 1 should be reserved for hot spot contamination and for intermittent streams (EPA 2000). The scenario, as described in the human health risk assessment, of receptor who is exposed to a contaminated drainageway, does not appear to meet these criteria. If the drainageway does have an intermittent stream that results in the soils/sediments in question being immersed in water, this information should be presented and the FI term of the Exposure Frequency (EF) term could be adjusted as appropriate.

> ***Response.*** *As indicated in our May 20, 2009 response to comments, Koppers continues to believe that given the nature and location of the drainageways, an FI based on an assumed contact of two hours per day on the days that a hypothetical resident is assumed to contact drainageway soils is conservative and appropriate. However, in response to EPA's comment, Koppers has changed the FI used in the screening evaluation to 1.*

Additional explanation has been added to the revised screening evaluation to indicate why this assumption is conservative as further discussed below.

Comment 2. As stated in the original comment 3, EPA does support the use of an exposure frequency of less than 365 d/y along with an explanation that would still be very conservative as it assumes this receptor gets all his/her daily ingested soil/dust from the drainageway on those days of exposure.

Response. *Koppers agrees with U.S. EPA that the assumed Exposure Frequency (EF) of 365 days/year for hypothetical contact with drainageway soils is very conservative, even for a screening evaluation, given the nature of the drainageways and the fact that they are covered with water on some days of the year, their distance from residences, and the use of an FI of 1. Based upon these factors, the revised screening evaluation assumes that a hypothetical resident contacts drainageway soils one day per week, for every week of the year (i.e., the EF is equal to 52 days/year). The revised screening evaluation includes an explanation of why an EF of 52 days/year combined with an FI of 1 is very conservative.*

Comment 3. Exposure Duration (ED) term. EPA concurs with the response to comments 2 and 4.

Response. *No changes to the screening evaluation were needed in response to Comment 2. As indicated in its May 20, 2009 response to comment letter, Koppers has added additional text to the revised screening evaluation explaining the basis for the assumption that a hypothetical resident would potentially be exposed to drainageway soils for only 27 of the first 30 years of his or her life.*

If you have any questions about the responses provided in this letter, need additional information, or if you would like to discuss the responses in more detail, please call me at your convenience (412- 227-2434).

Sincerely,

L S Paul

Linda S. Paul
Environmental Manager

Cc: Toby Cook, MDEQ
Michael Bollinger, Beazer East, Inc.
Jennifer Abrahams, GeoTrans
Marcus Smith, Koppers Inc.

Attachment E
Screening Evaluation of Potential Risk

Revised Screening Evaluation of Potential Risk
Retention Pond Soil Samples Collected September 11, 2008
Koppers Inc. Wood Treating Facility
Grenada, Mississippi

INTRODUCTION

In response to EPA comments dated April 20, 2009 and August 24, 2009, a revised screening evaluation has been completed to determine whether the concentrations of polynuclear aromatic hydrocarbons (PAHs) and pentachlorophenol in soil samples from retention ponds that are part of storm water management outfalls No. 5 and No. 6 have the potential to pose a health concern. In this case, a health concern is defined as having a Hazard Index of greater than 1.0 or a potential excess lifetime cancer risk associated with exposure to potentially carcinogenic PAHs and pentachlorophenol being greater than the United States Environmental Protection Agency's (U.S. EPA's) range of allowable risk of $1x10^{-6}$ to $1x10^{-4}$, (i.e., from one in one million to one in ten thousand).

Consistent with the previously submitted screening level risk assessment, this revised screening level risk assessment evaluates two potential exposure scenarios. The first is of an on-Site KI worker contacting the soils in the retention pond and potentially being exposed to constituents via incidental ingestion of, and dermal contact with, soil.

The second hypothetical exposure scenario assumes the concentrations of constituents detected in retention pond soils also exist in off-Site soils in the drainageways into which stormwater from the Site flows. This represents a worse-case assumption about potential concentrations of potentially Site-related constituents in drainageway soils because the retention ponds are designed to capture any constituents that may be in the stormwater. As such, concentrations of potentially Site-related constituents in off-Site drainage ways are expected to be much lower than detected in the on-Site retention ponds. However, to be conservative, this screening evaluation assumes off-Site concentrations of constituents are the same as the concentrations found in the retention pond samples. In off-Site locations, a hypothetical resident is assumed to contact drainageway soils for the entire day, one day a week, for 27 of the first 30 years of his or her life and to potentially be exposed via incidental ingestion of, and dermal contact with, soils in the drainageways. Given the nature and location of the off-Site drainageways, day-long contact on a weekly basis through the year over the first 30 years of a person's life is a very conservative assumption.

The revised screening level risk assessment of retention pond soil presented herein follows human health risk assessment guidance developed by U.S. EPA (U.S. EPA, 1989) and the National Academy of Sciences (NAS, 1983) and generally follows the four-step process of: Hazard Identification, Exposure Assessment, Dose Response Assessment, and Risk Characterization defined by the NAS (NAS, 1983) and employed by U.S. EPA.

HAZARD IDENTIFICATION

Generally, constituents of potential concern (COPCs) are selected as part of Hazard Identification. In the case of the retention pond samples, all detected constituents in the retention pond samples collected on September 11, 2008 are considered to be COPCs and are included in the revised screening level risk assessment. A list of these is presented in Table 1.

Table 1.
Analytical results from samples KGCS05-01 and KGCS06-01 collected from storm water management outfalls No. 05 and 06, respectively.

Compound	Soil Concentration Sample ID KGCS05-01	Soil Concentration Sample ID KGCS06-01
	(mg/kg)	(mg/kg)
Acenaphthene	0.0803	0.0891
Acenaphthylene	1.5	1.31
Anthracene	2.74	2.23
Benzo(a)anthracene	3.1	3.87
Benzo(a)pyrene	3.2	4.43
Benzo(b)fluoranthene	7.6	9.42
Benzo(g,h,i)perylene	4.57	3.9
Benzo(k)fluoranthene	2.69	4.53
Chrysene	4.39	6.27
Dibenz(a,h)anthracene	1.43	1.51
Fluoranthene	4.71	5.66
Fluorene	0.101	0.107
Indeno(1,2,3-cd)pyrene	4.35	4.2
Naphthalene	0.258	0.153
Phenanthrene	1.2	0.947
Pyrene	4.89	5.81
Pentachlorophenol	2.99	4.91

EXPOSURE ASSESSMENT

The next step of the risk assessment (Exposure Assessment) estimates potential exposure for the receptors potentially exposed to COPCs. Potential exposure depends upon the concentration (referred to as the exposure point concentration (EPC)) of constituents in media that are potentially contacted by receptors and the frequency and magnitude of potential contact. In this case, potential exposure is estimated separately for each retention pond sample and EPCs of COPCs in each retention pond are assumed to be equal to the concentration detected in the single sample from each pond. The equations used to estimate potential exposure and assumptions that determine frequency and magnitude of potential contact are described below for both the on-Site KI worker and the hypothetical off-Site resident. The hypothetical off-Site resident is assumed to potentially be exposed for a total of 27 of the first 30 years of his or her life. Consequently, potential exposure of three age groups is evaluated and summed to estimate total lifetime exposure of such a resident.

Ingestion of soil

$$ADD\ (LADD) = \frac{EPC \times IR \times RAF \times FI \times EF \times ED \times CF}{BW \times AT}$$

where:

ADD = Average daily dose (potential non-cancer exposure) (mg/kg-day)
LADD = Lifetime average daily dose (potential carcinogenic exposure) (mg/kg-day)
EPC = Exposure point concentration (mg/kg)
IR_s = Soil ingestion rate (mg/day)
RAF = Oral-soil relative absorption factor (unitless)
FI = Fraction of daily intake from the Site (unitless)
EF = Exposure frequency (d/yr)
ED = Exposure duration (yr)
CF = Units conversion factor (10^{-6} kg/mg)
BW = Body weight (kg)
AT = Averaging time (equal to: ED x 365 d/yr for ADD; 25,550 for LADD) (d)

Dermal contact with soil

$$ADD\ (LADD) = \frac{EPC \times SA \times AF \times RAF \times FI \times EF \times ED \times CF}{BW \times AT}$$

where:

ADD = Average daily dose (potential non-cancer exposure) (mg/kg-day)
LADD = Lifetime average daily dose (potential carcinogenic exposure) (mg/kg-day)
EPC = Exposure point concentration (mg/kg)
SA = Exposed skin surface area (cm^2)
AF = Soil adherence factor (mg/cm^2)
RAF = Dermal-soil relative absorption factor (unitless)
FI = Fraction of daily intake from the Site (unitless)
EF = Exposure frequency (d/yr)
ED = Exposure duration (yr)
CF = Units conversion factor (10^{-6} kg/mg)
BW = Body weight (kg)
AT = Averaging time (equal to: ED x 365 d/yr for ADD; 25,550 for LADD) (d)

The exposure parameters used to estimate potential or hypothetical expsoure to COPCs in retention pond soils are described below and summarized in Table 2.

Table 2.
Risk Assessment Parameters Used to Estimate the Frequency and Magnitude of Incidental Ingestion and Dermal Contact.

Risk Assessment Parameter Incidental Ingestion & Dermal Contact	Units	Worker Adult	Hypothetical Off-Site Young Child Resident	Hypothetical Off-Site Older Child/ Teenager Resident	Hypothetical Off-Site Adult Resident
Soil Ingestion Rate (IR)	mg/d	50	200	50	50
Dermal Contact Skin Area Exposed (SA)	cm^2/day	903.5	2755	5215	6935
Dermal Contact Adherence Factor (AF)	mg/cm^2	0.268	0.145	0.145	0.145
Fraction Ingested	unitless	1	1	1	1
Exposure Frequency (EF)	days/yr	12	52	52	52
Exposure Duration (ED)	years	25	3	11	13
Averaging Time (LADD)	days	25550	25550	25550	25550
Averaging Time (ADD)	days	9125	1095	4015	4745
Body Weight	kg	71.8	12	44.3	71.8
Age Range	years	18-43	1-6	7-17	18-30

Soil Ingestion Rate (IR)

For young children, (ages 0-6), the U.S. EPA's Exposure Factors Handbook (U.S. EPA, 1997) and soil screening level guidance (U.S. EPA 2002) recommend an upper bound daily soil ingestion rate of 200 mg/day. This screening assessment adopts that upper bound ingestion for the hypothetical off-Site young child For hypothetical resident older children/teens, hypothetical adult residents and workers, this screening risk assessment adopts the conservative incidental soil ingestion rate of 100 mg/day recommended in U.S. EPA (2002). Based upon more recent information provided by the same researchers whose data form the basis of U.S. EPA's recommended incidental soil ingestion rates, lower upper bound incidental soil ingestion rates are more appropriate for older children, adults and workers, but are not used herein given the conservative screening nature of this risk assessment.

Dermal Contact Skin Area Exposed (SA)

The extent of skin surface area potentially contacting soil varies depending on the activity in which the individual is engaged and the amount of clothing that is worn. Each of these factors needs to be considered in developing estimates of the exposed skin surface areas. For the on-Site worker scenario, this screening risk assessment assumes exposure to hands. The hypothetical off-Site resident is assumed to potentially have hands, forearms, lower legs, feet and face, exposed. For the hands of an on-Site worker, an SA of 903.5 cm^2 is used which represents the average of the 50th percentile of male and female hands (U.S. EPA 1997 Tables 6-2 and 6-3). For the hypothetical off-Site adult resident, a surface area of 6,935 cm^2 was developed and represents the summation of the relevant body parts averaged for males and females at the 50th percentile (U.S. EPA 1997 Table 6-2 and 6-3). Potentially exposed skin surface areas for children and older children/teens were estimated by calculating the percent surface area of each body part for adults, summing percents over all relevant body parts and then applying the age weighted scaling for children from Table 6-6 (U.S. EPA 1997 Tables 6-5 and 6-6). The resulting exposed surface areas for hypothetical resident younger children and hypothetical older children/teenagers are 2,755 cm^2 (38% of adult SA) and 5,215 cm^2 (75% of Adult SA).

Dermal Contact Adherence Factor (AF)

The dermal contact adherence factor (AF) estimates the amount of soil that adheres to skin over the course of a day. U.S. EPA's Exposure Factors Handbook (U.S. EPA, 1997) presents a range of dermal adherence factors. These vary by age, body part, and most importantly, whether a person was engaged in an indoor or outdoor activity. Outdoor activities tend to have greater rates of soil adherence, particularly activities that involve close contact with soil. U.S. EPA 1997 provides soil adherence rates for different body parts for various different groups of people (Table 6-12). For the on-Site worker scenario, this screening risk assessment uses adherence of soils to hands using "Utility workers No. 2" with an AF of 0.268. For the hypothetical off-Site resident, assuming potential exposure to hands, forearms, lower legs, feet and face, this screening risk assessment uses a composite AF of 0.145, reflecting an activity type between playing soccer and engaged in outdoor gardening/landscaping activities.

Exposure Frequency (EF)

The exposure frequency is the number of days per year that a person engages in a particular activity. For the on-Site worker, exposure frequency to soils in the retention pond is estimated to be 12 days per year; one day a month on a regular basis. For the hypothetical off-Site resident exposure scenario, this screening risk assessment assumes that a hypothetical resident may visit and contact an off-Site drainage ditch containing soils one time every week for the entire year. This is equal to 52 days per year.

Exposure Duration (ED)

The exposure duration for an onsite worker is assumed to be 25 years; a conservative duration for a worker to remain employed at one workplace without interruption.
The hypothetical off-Site resident's potential exposure is assumed to occur for the first 30 years of a resident's lifetime; 30 years being the typical upper bound assumption U.S. EPA makes for the years spent by a person at one home (U.S. EPA 1989). This risk assessment estimates the potential exposure of a resident over those 30 years by first estimating the potential exposure of three different age groups and then summing the potential exposure of each age group to arrive at a total potential exposure for the 30-year period. The three age groups are children (1-6 years), child/teen (7-17 years), and adult (18-30 years). Children ages 1-6 are assumed to contact drainageway soils for 3

years, when 4, 5, and 6 years old. Given the remoteness of the drainageways and their distances from homes, children three years old and younger are assumed to not contact drainageway soils. Older Children/teens ages (7-17 years old) are assumed to contact soils for 11 years and young adults (18-30 years old) are assumed to contact soils for 13 years. Thus, total exposure duration for the first 30 years of life is assumed to be 27 years.

Fraction Intake (FI)

The amount of a receptor's total daily exposure to soil that is comprised of retention pond or drainageway soils is accounted for by the fraction intake. For workers, the screening risk assessment conservatively assumes that all of his or her daily intake of soil is from the retention pond on the days they contact retention pond soils. As requested by EPA in its comments, on each of the days that a hypothetical off-Site resident is assumed to contact drainageway soils, all of a hypothetical resident's daily soil ingestion and daily dermal contact with soils are assumed to be comprised of drainageway soils. In other words, the FI is assumed to be 1.0. Given the nature and remoteness of the drainageways from most nearby residences, this is a very conservative assumption. If a hypothetical resident were to contact drainage way soils, it seems much more likely that such contact would occur for a part of the day. The assumption of day-long contact for 52 days a year is the same as contact with soils for between one and two hours a day, but for 365 days a year. Moreover, the drainageways may contain water after rainfall events. Contact with soils in the drainageways would be unlikely during the days they are covered with storm water.

Averaging Times

In accordance with standard risk assessment protocol (U.S. EPA, 1989), averaging time for estimation of potential non-cancer risks is equal to the exposure duration (ED) times 365 days per year and the averaging time for estimation of potential excess lifetime cancer risk is 25,550 days (equal to 70 years times 365 days per year).

Body Weight

The body weight of each age group included in the risk assessment was estimated by calculating the average body weight of each age included in a particular age group. Body weight for a particular year was taken from U.S. EPA (1997). For the hypothetical off-Site resident, a child (age 1-6 years) was assumed to have an average body weight of 12 kilograms (kg), an older children/teen was assumed to weigh 44.3 kg, and adults (ages 18-30) were assumed to weigh 71.8 kg.

Relative Absorption Factors (RAFs)

To estimate the potential risk to human health that may be posed by the presence of COPCs in soil, it is necessary first to estimate the potential exposure dose of each COPC. The potential exposure dose is similar to the administered dose or applied dose in a laboratory experiment. The animal-derived cancer slope factors (CSFs) and reference doses (RfDs) used in quantitative risk assessment are based on applied doses in most cases. However, the efficiency of COPC absorption via a particular route and from a particular matrix (e.g., soil, water) at the Site may differ from the absorption efficiency for the exposure route and matrix used in the experimental study that serves as the basis for the CSF or RfD. Relative Absorption Factors (RAFs) for Site-related COPCs have been derived and used in the calculation of potential exposure doses presented above. This screening evaluation uses two sets of RAFs: default RAFs developed by U.S. EPA; and, RAFs derived by AMEC following critical review of the scientific literature pertaining to potential absorption of COPCs. Both sets of RAFs are shown in the derivation of AMEC RAFs in the calculation attachments to this screening risk assessment. The derivation of AMEC AAFs is described in AMEC 2003.

TOXICITY ASSESSMENT

Toxicity values (cancer slope factors (CSFs) and reference doses (RfDs)) are presented in the spreadsheets attached to this screening risk assessment (Attachment A) and are taken from standard EPA sources described in AMEC 2003.

RISK CHARACTERIZATION

Potential non-cancer risks were estimated for potential exposures of on-Site KI workers and Hypothetical off-Site residents to COPCs detected in Samples KGCS05-01 (Outfall No. 5) and KGCS06-01 (Outfall No. 6). Potential non-cancer risks were estimated using the equation shown below.

$$HQ = \frac{ADD}{RfD}$$

where:

HQ	=	Hazard quotient (unitless);
ADD	=	Average daily dose (mg/kg-day); and,
RfD	=	Reference dose (mg/kg-day).

Hazard Quotients (HQs) for all receptors included in this screening risk assessment were less than 1.0 indicating that potential non-cancer risks are not expected to occur as a result of potential exposure to COPCs in retention pond soils (results shown Attachment A).

Potential excess lifetime cancer risks (PELCRs) were estimated for potential exposures of on-Site KI workers and Hypothetical off-Site residents to COPCs detected in Samples KGCS05-01 (Outfall No. 5) and KGCS06-01 (Outfall No. 6). Potential excess lifetime cancer risks were estimated using the equation shown below.

$$PELCR = LADD \times CSF$$

where:

PELCR	=	Potential Excess Lifetime Cancer Risk (unitless);
LADD	=	Lifetime Average Daily Dose (mg/kg-day); and,
CSF	=	Cancer Slope Factor ($(mg/kg\text{-}day)^{-1}$).

Table 3 presents the estimated Potential Excess Lifetime Cancer Risks for the KI worker and the hypothetical off-Site resident assuming the two alternative RAFs. Even though exceptionally conservative exposure assumptions were made (contact once a month with retention pond soils for the KI worker for 25 years and daily contact for 30 years for the hypothetical off-Site resident), potential risks fall below or within U.S. EPA's range of allowable risk (1×10^{-6} to 1×10^{-4}).

Table 3
Summary of Potential Excess Lifetime Cancer Risks
Associated with COPC Concentrations Detected in Samples KGCS05-01 (Outfall No. 5) and KGCS06-01 (Outfall No. 6).

	AMEC RAFs		**EPA RAFs**	
Potential Excess Lifetime Cancer Risk	**KI Worker**	**Hypothetical Off-Site Resident**	**KI Worker**	**Hypothetical Off-Site Resident**
KGCS05-01	7.8E-07	9.5E-6	9.8E-07	1.4E-5
KGCS06-01	9.8E-07	1.2E-5	1.2E-06	1.8E-5

Based upon the results of this screening risk assessment potentially carcinogenic COPCs in retention pond soils do not pose a health concern. Further, even if concentrations of potentially carcinogenic COPCs were to exist in off-Site drainageways at concentrations equal to those detected on-Site, they would not be expected to pose a health concern to a local resident hypothetically contacting such soils.

REFERENCES

AMEC. 2003. Revised Final Risk Assessment Koppers Industries, Inc. Facility Grenada, Mississippi. Westford, Massachusetts. 4-7200-5700

NAS. 1983. *Risks Assessment in the Federal Government: Managing the Process.* National Academy of Sciences (NAS) National Academy Press: Washington, D.C. RA Approach.

U.S. EPA. 1989. *Risk Assessment Guidance for Superfund; Volume I: Human Health Evaluation Manual (Part A) – Interim Final.* U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C. EPA/540/1-89-002. July.

U.S. EPA. 1997. Exposure Factors Handbook. U.S. Environmental Protection Agency, Office of Research and Development. EPA/600/P-95/002Fa-c. August.

U.S. EPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Office and Solid Waste and Emergency Response, OSWER 9355.4-24, USEPA, December 2002.

ATTACHMENT A:

Screening Risk Assessment Spreadsheets

Hypothetical Off-Site Young Child Residential Exposures: AMEC AAFs

SAMPLE ID KGCS05-01

Scenario:	Hypothetical Off-Site Young Child Resident
Receptor:	Young Child (1-6 years old)
Medium:	Soil
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = $\frac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)
Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	200	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1	
SA: Skin Surface Area (cm2/event)	2755	EPA (1997). Mean of 50th percentile values for hands, forearms, lower legs, feet, and face for males and females represent age range
AF: Adherence Factor (mg/cm2)	0.145	EPA (2001). Body-part specific age-adjusted values for children playing in dry soil.
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1	
EF: Exposure Frequency (days/year)	52	Professional Judgement: 52 days per year (one time per week)
ED: Exposure Duration (years)	3	Based on 1-6 year old receptor, assumes no exposure for first three years of child's life
BW: Body Weight (kg)	12	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	1095	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

Compound	Soil Concentration (mg/kg)	Noncancer Hazard Quotient: Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Potential Excess Lifetime Cancer Risk: Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
Acenaphthene	0.0803	1	0.1	2.29E-07	6.00E-02	3.81E-06	NA	NA	NA	NA	NA
Acenaphthylene	1.5	1	0.1	4.27E-06	2.00E-02	2.14E-04	NA	NA	NA	NA	NA
Anthracene	2.74	1	0.1	7.81E-06	3.00E-01	2.60E-05	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.1	1	0.02	7.65E-06	2.00E-02	3.83E-04	1	0.02	3.28E-07	7.30E-01	2.39E-07
Benzo(a)pyrene	3.2	1	0.02	7.90E-06	2.00E-02	3.95E-04	1	0.02	3.39E-07	7.30E+00	2.47E-06
Benzo(b)fluoranthene	7.6	1	0.02	1.88E-05	2.00E-02	9.38E-04	1	0.02	8.04E-07	7.30E-01	5.87E-07
Benzo(g,h,i)perylene	4.57	1	0.1	1.30E-05	2.00E-02	6.51E-04	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	2.69	1	0.02	6.64E-06	2.00E-02	3.32E-04	1	0.02	2.85E-07	7.30E-02	2.08E-08
Chrysene	4.39	1	0.02	1.08E-05	2.00E-02	5.42E-04	1	0.02	4.65E-07	7.30E-03	3.39E-09
Dibenz(a,h)anthracene	1.43	1	0.02	3.53E-06	2.00E-02	1.77E-04	1	0.02	1.51E-07	7.30E+00	1.10E-06
Fluoranthene	4.71	1	0.1	1.34E-05	4.00E-02	3.35E-04	NA	NA	NA	NA	NA
Fluorene	0.101	1	0.1	2.88E-07	4.00E-02	7.19E-06	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.35	1	0.02	1.07E-05	2.00E-02	5.37E-04	1	0.02	4.60E-07	7.30E-01	3.36E-07
Naphthalene	0.258	1	0.1	7.35E-07	2.00E-02	3.67E-05	NA	NA	NA	NA	NA
Phenanthrene	1.2	1	0.1	3.42E-06	2.00E-02	1.71E-04	NA	NA	NA	NA	NA
Pyrene	4.89	1	0.1	1.39E-05	3.00E-02	4.64E-04	NA	NA	NA	NA	NA
Pentachlorophenol	2.99	1	0.03	7.52E-06	3.00E-02	2.51E-04	1	0.032	3.24E-07	1.20E-01	3.88E-08
Risk Total						5.46E-03					4.80E-06

Notes:
EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS.
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

Hypothetical Off-Site Young Child Residential Exposures: EPA AAFs

SAMPLE ID KGCS05-01

Scenario:	Hypothetical Off-Site Young Child Resident
Receptor:	Young Child(1-6 years old)
Medium:	Soil
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = $\frac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)
Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	200	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1	
SA: Skin Surface Area (cm2/event)	2755	EPA (1997). Mean of 50th percentile values for hands, forearms, lower legs, feet, and face for males and females represent age range
AF: Adherence Factor (mg/cm2)	0.145	EPA (2001). Body-part specific age-adjusted values for children playing in dry soil.
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1	
EF: Exposure Frequency (days/year)	52	Professional Judgement: 52 days per year (one time per week)
ED: Exposure Duration (years)	3	Based on 1-6 year old receptor, assumes no exposure for first three years of child's life
BW: Body Weight (kg)	12	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	1095	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

		Noncancer Hazard Quotient					Potential Excess Lifetime Cancer Risk				
Compound	Soil Concentration (mg/kg)	Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
Acenaphthene	0.0803	1	0.13	2.40E-07	6.00E-02	4.00E-06	NA	NA	NA	NA	NA
Acenaphthylene	1.5	1	0.13	4.49E-06	2.00E-02	2.24E-04	NA	NA	NA	NA	NA
Anthracene	2.74	1	0.13	8.20E-06	3.00E-01	2.73E-05	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.1	1	0.13	9.27E-06	2.00E-02	4.64E-04	1	0.13	3.97E-07	7.30E-01	2.90E-07
Benzo(a)pyrene	3.2	1	0.13	9.57E-06	2.00E-02	4.79E-04	1	0.13	4.10E-07	7.30E+00	2.99E-06
Benzo(b)fluoranthene	7.6	1	0.13	2.27E-05	2.00E-02	1.14E-03	1	0.13	9.74E-07	7.30E-01	7.11E-07
Benzo(g,h,i)perylene	4.57	1	0.13	1.37E-05	2.00E-02	6.83E-04	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	2.69	1	0.13	8.05E-06	2.00E-02	4.02E-04	1	0.13	3.45E-07	7.30E-02	2.52E-08
Chrysene	4.39	1	0.13	1.31E-05	2.00E-02	6.57E-04	1	0.13	5.63E-07	7.30E-03	4.11E-09
Dibenz(a,h)anthracene	1.43	1	0.13	4.28E-06	2.00E-02	2.14E-04	1	0.13	1.83E-07	7.30E+00	1.34E-06
Fluoranthene	4.71	1	0.13	1.41E-05	4.00E-02	3.52E-04	NA	NA	NA	NA	NA
Fluorene	0.101	1	0.13	3.02E-07	4.00E-02	7.55E-06	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.35	1	0.13	1.30E-05	2.00E-02	6.51E-04	1	0.13	5.58E-07	7.30E-01	4.07E-07
Naphthalene	0.258	1	0.13	7.72E-07	2.00E-02	3.86E-05	NA	NA	NA	NA	NA
Phenanthrene	1.2	1	0.13	3.59E-06	2.00E-02	1.79E-04	NA	NA	NA	NA	NA
Pyrene	4.89	1	0.13	1.46E-05	3.00E-02	4.88E-04	NA	NA	NA	NA	NA
Pentachlorophenol	2.99	1	0.25	1.06E-05	3.00E-02	3.55E-04	1	0.25	4.56E-07	1.20E-01	5.47E-08
Risk Total						6.36E-03					5.82E-06

Notes:
EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS.
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

Hypothetical Off-Site Older Child/Teen Residental Exposures: AMEC AAFs

SAMPLE ID KGCS05-01

Scenario:	Hypothetical Off-Site Older Child/Teen Resident
Receptor:	Older Child/teen (7-17 years old)
Medium:	Soil
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = $\frac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)
Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	100	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1	
SA: Skin Surface Area (cm2/event)	5215	EPA (1997). Mean of 50th percentile values for hands, forearms, lower legs, feet, and face for males and females represent age range
AF: Adherence Factor (mg/cm2)	0.145	EPA (2001). Body-part specific age-adjusted values for child/teen playing in dry soil.
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1	
EF: Exposure Frequency (days/year)	52	Professional Judgement: 52 days per year (once per week)
ED: Exposure Duration (years)	11	Based on 7 to 17 year old receptor
BW: Body Weight (kg)	44.3	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	4015	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

Compound	Soil Concentration (mg/kg)	Noncancer Hazard Quotient: Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Potential Excess Lifetime Cancer Risk: Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
Acenaphthene	0.0803	1	0.1	4.54E-08	6.00E-02	7.56E-07	NA	NA	NA	NA	NA
Acenaphthylene	1.5	1	0.1	8.47E-07	2.00E-02	4.24E-05	NA	NA	NA	NA	NA
Anthracene	2.74	1	0.1	1.55E-06	3.00E-01	5.16E-06	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.1	1	0.02	1.15E-06	2.00E-02	5.74E-05	1	0.02	1.80E-07	7.30E-01	1.32E-07
Benzo(a)pyrene	3.2	1	0.02	1.18E-06	2.00E-02	5.92E-05	1	0.02	1.86E-07	7.30E+00	1.36E-06
Benzo(b)fluoranthene	7.6	1	0.02	2.81E-06	2.00E-02	1.41E-04	1	0.02	4.42E-07	7.30E-01	3.23E-07
Benzo(g,h,i)perylene	4.57	1	0.1	2.58E-06	2.00E-02	1.29E-04	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	2.69	1	0.02	9.96E-07	2.00E-02	4.98E-05	1	0.02	1.57E-07	7.30E-02	1.14E-08
Chrysene	4.39	1	0.02	1.63E-06	2.00E-02	8.13E-05	1	0.02	2.55E-07	7.30E-03	1.86E-09
Dibenz(a,h)anthracene	1.43	1	0.02	5.29E-07	2.00E-02	2.65E-05	1	0.02	8.32E-08	7.30E+00	6.07E-07
Fluoranthene	4.71	1	0.1	2.66E-06	4.00E-02	6.65E-05	NA	NA	NA	NA	NA
Fluorene	0.101	1	0.1	5.70E-08	4.00E-02	1.43E-06	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.35	1	0.02	1.61E-06	2.00E-02	8.05E-05	1	0.02	2.53E-07	7.30E-01	1.85E-07
Naphthalene	0.258	1	0.1	1.46E-07	2.00E-02	7.29E-06	NA	NA	NA	NA	NA
Phenanthrene	1.2	1	0.1	6.78E-07	2.00E-02	3.39E-05	NA	NA	NA	NA	NA
Pyrene	4.89	1	0.1	2.76E-06	3.00E-02	9.21E-05	NA	NA	NA	NA	NA
Pentachlorophenol	2.99	1	0.03	1.18E-06	3.00E-02	3.93E-05	1	0.032	1.88E-07	1.20E-01	2.25E-08
Risk Total						9.13E-04					2.64E-06

Notes:
EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites

Hypothetical Off-Site Older Child/Teen Residental Exposures: EPA AAFs

SAMPLE ID KGCS05-01

Scenario:	Hypothetical Off-Site Older Child/Teen Residental
Receptor:	Older Child/teen (7-17 years old)
Medium:	Soil
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = $\frac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)
Cancer Risk (FLCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	100	US EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1	
SA: Skin Surface Area (cm2/event)	5215	EPA (1997). Mean of 50th percentile values for hands, forearms, lower legs, feet, and face for males and females represent age range
AF: Adherence Factor (mg/cm2)	0.145	EPA (2001). Body-part specific age-adjusted values for child/teen playing in dry soil.
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1	
EF: Exposure Frequency (days/year)	52	Professional Judgement: 52 days per year (once per week)
ED: Exposure Duration (years)	11	Based on 7 to 17 year old receptor
BW: Body Weight (kg)	44.3	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	4015	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

		Noncancer Hazard Quotient					Potential Excess Lifetime Cancer Risk				
Compound	Soil Concentration (mg/kg)	Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
Acenaphthene	0.0803	1	0.13	5.12E-08	6.00E-02	8.53E-07	NA	NA	NA	NA	NA
Acenaphthylene	1.5	1	0.13	9.57E-07	2.00E-02	4.78E-05	NA	NA	NA	NA	NA
Anthracene	2.74	1	0.13	1.75E-06	3.00E-01	5.82E-06	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.1	1	0.13	1.98E-06	2.00E-02	9.88E-05	1	0.13	3.11E-07	7.30E-01	2.27E-07
Benzo(a)pyrene	3.2	1	0.13	2.04E-06	2.00E-02	1.02E-04	1	0.13	3.21E-07	7.30E+00	2.34E-06
Benzo(b)fluoranthene	7.6	1	0.13	4.85E-06	2.00E-02	2.42E-04	1	0.13	7.62E-07	7.30E-01	5.56E-07
Benzo(g,h,i)perylene	4.57	1	0.13	2.91E-06	2.00E-02	1.46E-04	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	2.69	1	0.13	1.72E-06	2.00E-02	8.58E-05	1	0.13	2.70E-07	7.30E-02	1.97E-08
Chrysene	4.39	1	0.13	2.80E-06	2.00E-02	1.40E-04	1	0.13	4.40E-07	7.30E-03	3.21E-09
Dibenz(a,h)anthracene	1.43	1	0.13	9.12E-07	2.00E-02	4.56E-05	1	0.13	1.43E-07	7.30E+00	1.05E-06
Fluoranthene	4.71	1	0.13	3.00E-06	4.00E-02	7.51E-05	NA	NA	NA	NA	NA
Fluorene	0.101	1	0.13	6.44E-08	4.00E-02	1.61E-06	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.35	1	0.13	2.77E-06	2.00E-02	1.39E-04	1	0.13	4.36E-07	7.30E-01	3.18E-07
Naphthalene	0.258	1	0.13	1.65E-07	2.00E-02	8.23E-06	NA	NA	NA	NA	NA
Phenanthrene	1.2	1	0.13	7.65E-07	2.00E-02	3.83E-05	NA	NA	NA	NA	NA
Pyrene	4.89	1	0.13	3.12E-06	3.00E-02	1.04E-04	NA	NA	NA	NA	NA
Pentachlorophenol	2.99	1	0.25	2.78E-06	3.00E-02	9.26E-05	1	0.25	4.37E-07	1.20E-01	5.24E-08
Risk Total						1.37E-03					4.56E-06

Notes:
AAFs are based on EPA guidance
EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites

Hypothetical Off-Site Adult Residential Exposures: AMEC AAFs

SAMPLE ID KGCS05-01

Scenario:	Hypothetical Off-Site Adult Resident
Receptor:	Adult (18-30 years old)
Medium:	Soil
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = $\frac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)
Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	100	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1	
SA: Skin Surface Area (cm2/event)	6935	EPA (1997). Mean of 50th percentile values for hands, forearms, lower legs, feet, and face for males and females represent age range
AF: Adherence Factor (mg/cm2)	0.145	EPA (2001). Body-part specific age-adjusted values for adult exposed to dry soil.
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1	
EF: Exposure Frequency (days/year)	52	Professional Judgement: 52 days per year (one time per week)
ED: Exposure Duration (years)	13	Based on 18 to 30 year old receptor
BW: Body Weight (kg)	71.8	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	4745	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

		Noncancer Hazard Quotient					Potential Excess Lifetime Cancer Risk				
Compound	Soil Concentration (mg/kg)	Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
Acenaphthene	0.0803	1	0.1	3.20E-08	6.00E-02	5.33E-07	NA	NA	NA	NA	NA
Acenaphthylene	1.5	1	0.1	5.97E-07	2.00E-02	2.98E-05	NA	NA	NA	NA	NA
Anthracene	2.74	1	0.1	1.09E-06	3.00E-01	3.63E-06	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.1	1	0.02	7.39E-07	2.00E-02	3.69E-05	1	0.02	1.37E-07	7.30E-01	1.00E-07
Benzo(a)pyrene	3.2	1	0.02	7.63E-07	2.00E-02	3.81E-05	1	0.02	1.42E-07	7.30E+00	1.03E-06
Benzo(b)fluoranthene	7.6	1	0.02	1.81E-06	2.00E-02	9.06E-05	1	0.02	3.36E-07	7.30E-01	2.46E-07
Benzo(g,h,i)perylene	4.57	1	0.1	1.82E-06	2.00E-02	9.09E-05	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	2.69	1	0.02	6.41E-07	2.00E-02	3.21E-05	1	0.02	1.19E-07	7.30E-02	8.69E-09
Chrysene	4.39	1	0.02	1.05E-06	2.00E-02	5.23E-05	1	0.02	1.94E-07	7.30E-03	1.42E-09
Dibenz(a,h)anthracene	1.43	1	0.02	3.41E-07	2.00E-02	1.70E-05	1	0.02	6.33E-08	7.30E+00	4.62E-07
Fluoranthene	4.71	1	0.1	1.87E-06	4.00E-02	4.69E-05	NA	NA	NA	NA	NA
Fluorene	0.101	1	0.1	4.02E-08	4.00E-02	1.00E-06	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.35	1	0.02	1.04E-06	2.00E-02	5.18E-05	1	0.02	1.93E-07	7.30E-01	1.41E-07
Naphthalene	0.258	1	0.1	1.03E-07	2.00E-02	5.13E-06	NA	NA	NA	NA	NA
Phenanthrene	1.2	1	0.1	4.78E-07	2.00E-02	2.39E-05	NA	NA	NA	NA	NA
Pyrene	4.89	1	0.1	1.95E-06	3.00E-02	6.49E-05	NA	NA	NA	NA	NA
Pentachlorophenol	2.99	1	0.03	7.72E-07	3.00E-02	2.57E-05	1	0.032	1.46E-07	1.20E-01	1.75E-08
Risk Total						6.11E-04					2.01E-06

Notes:
EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS.
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

Hypothetical Off-Site Adult Residential Exposures: EPA AAFs

SAMPLE ID KGCS05-01

Scenario:	Hypothetical Off-Site Adult Resident
Receptor:	Adult (18-30 years old)
Medium:	Soil
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = $\frac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)
Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	100	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1	
SA: Skin Surface Area (cm2/event)	6935	EPA (1997). Mean of 50th percentile values for hands, forearms, lower legs, feet, and face for males and females represent age range
AF: Adherence Factor (mg/cm2)	0.145	EPA (2001). Body-part specific age-adjusted values for adult exposed to dry soil.
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1	
EF: Exposure Frequency (days/year)	52	Professional Judgement:52 days per year (one time per week)
ED: Exposure Duration (years)	13	Based on 18 to 30 year old receptor
BW: Body Weight (kg)	71.8	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	4745	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

		Noncancer Hazard Quotient					Potential Excess Lifetime Cancer Risk				
Compound	Soil Concentration (mg/kg)	Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
Acenaphthene	0.0803	1	0.13	3.68E-08	6.00E-02	6.13E-07	NA	NA	NA	NA	NA
Acenaphthylene	1.5	1	0.13	6.87E-07	2.00E-02	3.43E-05	NA	NA	NA	NA	NA
Anthracene	2.74	1	0.13	1.25E-06	3.00E-01	4.18E-06	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.1	1	0.13	1.42E-06	2.00E-02	7.10E-05	1	0.13	2.64E-07	7.30E-01	1.92E-07
Benzo(a)pyrene	3.2	1	0.13	1.46E-06	2.00E-02	7.32E-05	1	0.13	2.72E-07	7.30E+00	1.99E-06
Benzo(b)fluoranthene	7.6	1	0.13	3.48E-06	2.00E-02	1.74E-04	1	0.13	6.46E-07	7.30E-01	4.72E-07
Benzo(g,h,i)perylene	4.57	1	0.13	2.09E-06	2.00E-02	1.05E-04	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	2.69	1	0.13	1.23E-06	2.00E-02	6.16E-05	1	0.13	2.29E-07	7.30E-02	1.67E-08
Chrysene	4.39	1	0.13	2.01E-06	2.00E-02	1.00E-04	1	0.13	3.73E-07	7.30E-03	2.72E-09
Dibenz(a,h)anthracene	1.43	1	0.13	6.55E-07	2.00E-02	3.27E-05	1	0.13	1.22E-07	7.30E+00	8.88E-07
Fluoranthene	4.71	1	0.13	2.16E-06	4.00E-02	5.39E-05	NA	NA	NA	NA	NA
Fluorene	0.101	1	0.13	4.62E-08	4.00E-02	1.16E-06	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.35	1	0.13	1.99E-06	2.00E-02	9.96E-05	1	0.13	3.70E-07	7.30E-01	2.70E-07
Naphthalene	0.258	1	0.13	1.18E-07	2.00E-02	5.91E-06	NA	NA	NA	NA	NA
Phenanthrene	1.2	1	0.13	5.49E-07	2.00E-02	2.75E-05	NA	NA	NA	NA	NA
Pyrene	4.89	1	0.13	2.24E-06	3.00E-02	7.46E-05	NA	NA	NA	NA	NA
Pentachlorophenol	2.99	1	0.25	2.08E-06	3.00E-02	6.95E-05	1	0.25	3.87E-07	1.20E-01	4.65E-08
Risk Total						9.89E-04					3.87E-06

Notes:
EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS.
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

Hypothetical Off-Site Young Child Residential Exposures: AMEC AAFs

SAMPLE ID KGCS06-01

Scenario:	Hypothetical Off-Site Young Child Resident
Receptor:	Child (1-6 years old)
Medium:	Soil
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = $\frac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)
Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	200	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1.0000	
SA: Skin Surface Area (cm2/event)	2755	EPA (1997). Mean of 50th percentile values for hands, forearms, lower legs, feet, and face for males and females represent age range
AF: Adherence Factor (mg/cm2)	0.145	EPA (2001). Body-part specific age-adjusted values for children playing in dry soil.
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1.0000	
EF: Exposure Frequency (days/year)	52	Professional Judgement: 52 days per year (once per week)
ED: Exposure Duration (years)	3	Based on 1-6 year old receptor
BW: Body Weight (kg)	12	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	1095	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

		Noncancer Hazard Quotient					Potential Excess Lifetime Cancer Risk				
Compound	Soil Concentration (mg/kg)	Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
Acenaphthene	0.0891	1	0.1	2.54E-07	6.00E-02	4.23E-06	NA	NA	NA	NA	NA
Acenaphthylene	1.31	1	0.1	3.73E-06	2.00E-02	1.87E-04	NA	NA	NA	NA	NA
Anthracene	2.23	1	0.1	6.35E-06	3.00E-01	2.12E-05	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.87	1	0.02	9.56E-06	2.00E-02	4.78E-04	1	0.02	4.10E-07	7.30E-01	2.99E-07
Benzo(a)pyrene	4.43	1	0.02	1.09E-05	2.00E-02	5.47E-04	1	0.02	4.69E-07	7.30E+00	3.42E-06
Benzo(b)fluoranthene	9.42	1	0.02	2.33E-05	2.00E-02	1.16E-03	1	0.02	9.97E-07	7.30E-01	7.28E-07
Benzo(g,h,i)perylene	3.9	1	0.1	1.11E-05	2.00E-02	5.55E-04	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	4.53	1	0.02	1.12E-05	2.00E-02	5.59E-04	1	0.02	4.79E-07	7.30E-02	3.50E-08
Chrysene	6.27	1	0.02	1.55E-05	2.00E-02	7.74E-04	1	0.02	6.64E-07	7.30E-03	4.84E-09
Dibenz(a,h)anthracene	1.51	1	0.02	3.73E-06	2.00E-02	1.86E-04	1	0.02	1.60E-07	7.30E+00	1.17E-06
Fluoranthene	5.66	1	0.1	1.61E-05	4.00E-02	4.03E-04	NA	NA	NA	NA	NA
Fluorene	0.107	1	0.1	3.05E-07	4.00E-02	7.62E-06	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.2	1	0.02	1.04E-05	2.00E-02	5.19E-04	1	0.02	4.44E-07	7.30E-01	3.24E-07
Naphthalene	0.153	1	0.1	4.36E-07	2.00E-02	2.18E-05	NA	NA	NA	NA	NA
Phenanthrene	0.947	1	0.1	2.70E-06	2.00E-02	1.35E-04	NA	NA	NA	NA	NA
Pyrene	5.81	1	0.1	1.66E-05	3.00E-02	5.52E-04	NA	NA	NA	NA	NA
Pentachlorophenol	4.91	1	0.03	1.24E-05	3.00E-02	4.12E-04	1	0.032	5.32E-07	1.20E-01	6.38E-08
Risk Total						6.52E-03					6.04E-06

Notes:

EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS.
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

Hypothetical Off-Site Young Child Residential Exposures: EPA AAFs

SAMPLE ID KGCS06-01

Scenario:	Hypothetical Off-Site Young Child Resident
Receptor:	Child(1-6 years old)
Medium:	Soil
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = $\frac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)
Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	200	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1	
SA: Skin Surface Area (cm2/event)	2755	EPA (1997). Mean of 50th percentile values for hands, forearms, lower legs, feet, and face for males and females represent age range
AF: Adherence Factor (mg/cm2)	0.145	EPA (2001). Body-part specific age-adjusted values for children playing in dry soil.
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1	
EF: Exposure Frequency (days/year)	52	Professional Judgement:52 days per year (once per week)
ED: Exposure Duration (years)	3	Based on 1-6 year old receptor
BW: Body Weight (kg)	12	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	1095	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

Compound	Soil Concentration (mg/kg)	Noncancer Hazard Quotient: Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Potential Excess Lifetime Cancer Risk: Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
Acenaphthene	0.0891	1	0.13	2.66E-07	6.00E-02	4.44E-06	NA	NA	NA	NA	NA
Acenaphthylene	1.31	1	0.13	3.92E-06	2.00E-02	1.96E-04	NA	NA	NA	NA	NA
Anthracene	2.23	1	0.13	6.67E-06	3.00E-01	2.22E-05	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.87	1	0.13	1.16E-05	2.00E-02	5.79E-04	1	0.13	4.96E-07	7.30E-01	3.62E-07
Benzo(a)pyrene	4.43	1	0.13	1.32E-05	2.00E-02	6.62E-04	1	0.13	5.68E-07	7.30E+00	4.15E-06
Benzo(b)fluoranthene	9.42	1	0.13	2.82E-05	2.00E-02	1.41E-03	1	0.13	1.21E-06	7.30E-01	8.81E-07
Benzo(g,h,i)perylene	3.9	1	0.13	1.17E-05	2.00E-02	5.83E-04	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	4.53	1	0.13	1.35E-05	2.00E-02	6.77E-04	1	0.13	5.81E-07	7.30E-02	4.24E-08
Chrysene	6.27	1	0.13	1.88E-05	2.00E-02	9.38E-04	1	0.13	8.04E-07	7.30E-03	5.87E-09
Dibenz(a,h)anthracene	1.51	1	0.13	4.52E-06	2.00E-02	2.26E-04	1	0.13	1.94E-07	7.30E+00	1.41E-06
Fluoranthene	5.66	1	0.13	1.69E-05	4.00E-02	4.23E-04	NA	NA	NA	NA	NA
Fluorene	0.107	1	0.13	3.20E-07	4.00E-02	8.00E-06	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.2	1	0.13	1.26E-05	2.00E-02	6.28E-04	1	0.13	5.38E-07	7.30E-01	3.93E-07
Naphthalene	0.153	1	0.13	4.58E-07	2.00E-02	2.29E-05	NA	NA	NA	NA	NA
Phenanthrene	0.947	1	0.13	2.83E-06	2.00E-02	1.42E-04	NA	NA	NA	NA	NA
Pyrene	5.81	1	0.13	1.74E-05	3.00E-02	5.79E-04	NA	NA	NA	NA	NA
Pentachlorophenol	4.91	1	0.25	1.75E-05	3.00E-02	5.83E-04	1	0.25	7.49E-07	1.20E-01	8.99E-08
Risk Total						7.68E-03					7.33E-06

Notes:
AAFs are based on EPA guidance.
EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS.
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

Hypothetical Off-Site Older Child/Teen Residential Exposures: AMEC AAFs

SAMPLE ID KGCS06-01

Scenario:	Hypothetical Off-Site Older Child/Teen Resident
Receptor:	Older Child/teen (7-17 years old)
Medium:	Soil
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = $\frac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)

Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	100	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1	
SA: Skin Surface Area (cm2/event)	5215	EPA (1997). Mean of 50th percentile values for hands, forearms, lower legs, feet, and face for males and females represent age range
AF: Adherence Factor (mg/cm2)	0.145	EPA (2001). Body-part specific age-adjusted values for child/teen playing in dry soil.
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1	
EF: Exposure Frequency (days/year)	52	Professional Judgement:52 days per year (once per week)
ED: Exposure Duration (years)	11	Based on 7 to 17 year old receptor
BW: Body Weight (kg)	44.3	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	4015	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

		Noncancer Hazard Quotient					Potential Excess Lifetime Cancer Risk				
Compound	Soil Concentration (mg/kg)	Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
Acenaphthene	0.0891	1	0.1	5.03E-08	6.00E-02	8.39E-07	NA	NA	NA	NA	NA
Acenaphthylene	1.31	1	0.1	7.40E-07	2.00E-02	3.70E-05	NA	NA	NA	NA	NA
Anthracene	2.23	1	0.1	1.26E-06	3.00E-01	4.20E-06	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.87	1	0.02	1.43E-06	2.00E-02	7.16E-05	1	0.02	2.25E-07	7.30E-01	1.64E-07
Benzo(a)pyrene	4.43	1	0.02	1.64E-06	2.00E-02	8.20E-05	1	0.02	2.58E-07	7.30E+00	1.88E-06
Benzo(b)fluoranthene	9.42	1	0.02	3.49E-06	2.00E-02	1.74E-04	1	0.02	5.48E-07	7.30E-01	4.00E-07
Benzo(g,h,i)perylene	3.9	1	0.1	2.20E-06	2.00E-02	1.10E-04	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	4.53	1	0.02	1.68E-06	2.00E-02	8.39E-05	1	0.02	2.64E-07	7.30E-02	1.92E-08
Chrysene	6.27	1	0.02	2.32E-06	2.00E-02	1.16E-04	1	0.02	3.65E-07	7.30E-03	2.66E-09
Dibenz(a,h)anthracene	1.51	1	0.02	5.59E-07	2.00E-02	2.80E-05	1	0.02	8.79E-08	7.30E+00	6.41E-07
Fluoranthene	5.66	1	0.1	3.20E-06	4.00E-02	7.99E-05	NA	NA	NA	NA	NA
Fluorene	0.107	1	0.1	6.04E-08	4.00E-02	1.51E-06	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.2	1	0.02	1.55E-06	2.00E-02	7.77E-05	1	0.02	2.44E-07	7.30E-01	1.78E-07
Naphthalene	0.153	1	0.1	8.64E-08	2.00E-02	4.32E-06	NA	NA	NA	NA	NA
Phenanthrene	0.947	1	0.1	5.35E-07	2.00E-02	2.67E-05	NA	NA	NA	NA	NA
Pyrene	5.81	1	0.1	3.28E-06	3.00E-02	1.09E-04	NA	NA	NA	NA	NA
Pentachlorophenol	4.91	1	0.03	1.94E-06	3.00E-02	6.46E-05	1	0.032	3.08E-07	1.20E-01	3.70E-08
Risk Total						1.07E-03					3.32E-06

Notes:
EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites

Hypothetical Off-Site Older Child/Teen Residential Exposures: EPA AAFs

SAMPLE ID KGCS06-01

Scenario:	Hypothetical Off-Site Older Child/Teen Resident
Receptor:	Older Child/teen (7-17 years old)
Medium:	Soil
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = $\frac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)
Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	100	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1	
SA: Skin Surface Area (cm2/event)	5215	EPA (1997). Mean of 50th percentile values for hands, forearms, lower legs, feet, and face for males and females represent age range
AF: Adherence Factor (mg/cm2)	0.145	EPA (2001). Body-part specific age-adjusted values for child/teen playing in dry soil.
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1	
EF: Exposure Frequency (days/year)	52	Professional Judgement: 52 days per year (once per week)
ED: Exposure Duration (years)	11	Based on 7 to 17 year old receptor
BW: Body Weight (kg)	44.3	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	4015	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

Compound	Soil Concentration (mg/kg)	Noncancer Hazard Quotient: Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Potential Excess Lifetime Cancer Risk: Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
Acenaphthene	0.0891	1	0.13	5.68E-08	6.00E-02	9.47E-07	NA	NA	NA	NA	NA
Acenaphthylene	1.31	1	0.13	8.35E-07	2.00E-02	4.18E-05	NA	NA	NA	NA	NA
Anthracene	2.23	1	0.13	1.42E-06	3.00E-01	4.74E-06	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.87	1	0.13	2.47E-06	2.00E-02	1.23E-04	1	0.13	3.88E-07	7.30E-01	2.83E-07
Benzo(a)pyrene	4.43	1	0.13	2.83E-06	2.00E-02	1.41E-04	1	0.13	4.44E-07	7.30E+00	3.24E-06
Benzo(b)fluoranthene	9.42	1	0.13	6.01E-06	2.00E-02	3.00E-04	1	0.13	9.44E-07	7.30E-01	6.89E-07
Benzo(g,h,i)perylene	3.9	1	0.13	2.49E-06	2.00E-02	1.24E-04	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	4.53	1	0.13	2.89E-06	2.00E-02	1.44E-04	1	0.13	4.54E-07	7.30E-02	3.31E-08
Chrysene	6.27	1	0.13	4.00E-06	2.00E-02	2.00E-04	1	0.13	6.28E-07	7.30E-03	4.59E-09
Dibenz(a,h)anthracene	1.51	1	0.13	9.63E-07	2.00E-02	4.81E-05	1	0.13	1.51E-07	7.30E+00	1.10E-06
Fluoranthene	5.66	1	0.13	3.61E-06	4.00E-02	9.02E-05	NA	NA	NA	NA	NA
Fluorene	0.107	1	0.13	6.82E-08	4.00E-02	1.71E-06	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.2	1	0.13	2.68E-06	2.00E-02	1.34E-04	1	0.13	4.21E-07	7.30E-01	3.07E-07
Naphthalene	0.153	1	0.13	9.76E-08	2.00E-02	4.88E-06	NA	NA	NA	NA	NA
Phenanthrene	0.947	1	0.13	6.04E-07	2.00E-02	3.02E-05	NA	NA	NA	NA	NA
Pyrene	5.81	1	0.13	3.71E-06	3.00E-02	1.24E-04	NA	NA	NA	NA	NA
Pentachlorophenol	4.91	1	0.25	4.56E-06	3.00E-02	1.52E-04	1	0.25	7.17E-07	1.20E-01	8.61E-08
Risk Total						1.67E-03					5.75E-06

Notes:
AAFs are based on EPA guidance
EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites

Hypothetical Off-Site Adult Residential Exposures: AMEC AAFs

SAMPLE ID KGCS06-01

Scenario:	Hypothetical Off-Site Adult Resident
Receptor:	Adult (18-30 years old)
Medium:	Soil
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = $\dfrac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)

Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	100	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1	
SA: Skin Surface Area (cm2/event)	6935	EPA (1997). Mean of 50th percentile values for hands, forearms, lower legs, feet, and face for males and females represent age range
AF: Adherence Factor (mg/cm2)	0.145	EPA (2001). Body-part specific age-adjusted values for adult exposed to dry soil.
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1	
EF: Exposure Frequency (days/year)	52	Professional Judgement: 52 days per year (once per week)
ED: Exposure Duration (years)	13	Based on 18 to 30 year old receptor
BW: Body Weight (kg)	71.8	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	4745	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

Compound	Soil Concentration (mg/kg)	Noncancer Hazard Quotient: Oral-Soil RAF (noncancer) Chronic	Noncancer Hazard Quotient: Dermal-Soil RAF (noncancer) Chronic	Noncancer Hazard Quotient: ADD (noncancer) (mg/kg-day)	Noncancer Hazard Quotient: Chronic RfD (mg/kg-day)	Noncancer Hazard Quotient: Soil HQ	Potential Excess Lifetime Cancer Risk: Oral-Soil AAF (cancer)	Potential Excess Lifetime Cancer Risk: Dermal-Soil AAF (cancer)	Potential Excess Lifetime Cancer Risk: ADD (cancer) (mg/kg-day)	Potential Excess Lifetime Cancer Risk: CSF [1/(mg/kg-day)]	Potential Excess Lifetime Cancer Risk: Soil Risk (mg/kg)
	0	1	0.04	NA	NA	NA	1	0.04	0.00E+00	1.50E+05	0.00E+00
Acenaphthene	0.0891	1	0.1	3.55E-08	6.00E-02	5.91E-07	NA	NA	NA	NA	NA
Acenaphthylene	1.31	1	0.1	5.21E-07	2.00E-02	2.61E-05	NA	NA	NA	NA	NA
Anthracene	2.23	1	0.1	8.87E-07	3.00E-01	2.96E-06	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.87	1	0.02	9.22E-07	2.00E-02	4.61E-05	1	0.02	1.71E-07	7.30E-01	1.25E-07
Benzo(a)pyrene	4.43	1	0.02	1.06E-06	2.00E-02	5.28E-05	1	0.02	1.96E-07	7.30E+00	1.43E-06
Benzo(b)fluoranthene	9.42	1	0.02	2.25E-06	2.00E-02	1.12E-04	1	0.02	4.17E-07	7.30E-01	3.04E-07
Benzo(g,h,i)perylene	3.9	1	0.1	1.55E-06	2.00E-02	7.76E-05	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	4.53	1	0.02	1.08E-06	2.00E-02	5.40E-05	1	0.02	2.00E-07	7.30E-02	1.46E-08
Chrysene	6.27	1	0.02	1.49E-06	2.00E-02	7.47E-05	1	0.02	2.78E-07	7.30E-03	2.03E-09
Dibenz(a,h)anthracene	1.51	1	0.02	3.60E-07	2.00E-02	1.80E-05	1	0.02	6.68E-08	7.30E+00	4.88E-07
Fluoranthene	5.66	1	0.1	2.25E-06	4.00E-02	5.63E-05	NA	NA	NA	NA	NA
Fluorene	0.107	1	0.1	4.26E-08	4.00E-02	1.06E-06	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.2	1	0.02	1.00E-06	2.00E-02	5.00E-05	1	0.02	1.86E-07	7.30E-01	1.36E-07
Naphthalene	0.153	1	0.1	6.09E-08	2.00E-02	3.04E-06	NA	NA	NA	NA	NA
Phenanthrene	0.947	1	0.1	3.77E-07	2.00E-02	1.88E-05	NA	NA	NA	NA	NA
Pyrene	5.81	1	0.1	2.31E-06	3.00E-02	7.71E-05	NA	NA	NA	NA	NA
	0	1	0.02	0.00E+00	2.00E-02	0.00E+00	1	0.02	0.00E+00	7.30E+00	0.00E+00
Pentachlurophenol	4.91	1	0.03	1.27E-06	3.00E-02	4.23E-05	1	0.032	2.39E-07	1.20E-01	2.87E-08
Risk Total						7.14E-04					2.53E-06

Notes:

EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS.
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

Hypothetical Off-Site Adult Residential Exposures: EPA AAFs

SAMPLE ID KGCS06-01

Scenario:	Hypothetical Off-Site Adult Resident
Receptor:	Adult (18-30 years old)
Medium:	Soil
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = CS x [(IR x FI x AAF) + (SA x AF x FA x AAF)] x EF x ED x CF / BW x AT

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)
Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	100	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1.0000	
SA: Skin Surface Area (cm2/event)	6935	EPA (1997). Mean of 50th percentile values for hands, forearms, lower legs, feet, and face for males and females represent age range
AF: Adherence Factor (mg/cm2)	0.145	EPA (2001). Body-part specific age-adjusted values for adult exposed to dry soil.
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1.0000	
EF: Exposure Frequency (days/year)	52	Professional Judgement: 52 days per year (once per week)
ED: Exposure Duration (years)	13	Based on 18 to 30 year old receptor
BW: Body Weight (kg)	71.8	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	4745	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

Compound	Soil Concentration (mg/kg)	Noncancer Hazard Quotient: Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Potential Excess Lifetime Cancer Risk: Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
	0	1	0.04	NA	NA	NA	1	0.04	0.00E+00	1.50E+05	0.00E+00
Acenaphthene	0.0891	1	0.13	4.08E-08	6.00E-02	6.80E-07	NA	NA	NA	NA	NA
Acenaphthylene	1.31	1	0.13	6.00E-07	2.00E-02	3.00E-05	NA	NA	NA	NA	NA
Anthracene	2.23	1	0.13	1.02E-06	3.00E-01	3.40E-06	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.87	1	0.13	1.77E-06	2.00E-02	8.86E-05	1	0.13	3.29E-07	7.30E-01	2.40E-07
Benzo(a)pyrene	4.43	1	0.13	2.03E-06	2.00E-02	1.01E-04	1	0.13	3.77E-07	7.30E+00	2.75E-06
Benzo(b)fluoranthene	9.42	1	0.13	4.31E-06	2.00E-02	2.16E-04	1	0.13	8.01E-07	7.30E-01	5.85E-07
Benzo(g,h,i)perylene	3.9	1	0.13	1.79E-06	2.00E-02	8.93E-05	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	4.53	1	0.13	2.07E-06	2.00E-02	1.04E-04	1	0.13	3.85E-07	7.30E-02	2.81E-08
Chrysene	6.27	1	0.13	2.87E-06	2.00E-02	1.44E-04	1	0.13	5.33E-07	7.30E-03	3.89E-09
Dibenz(a,h)anthracene	1.51	1	0.13	6.91E-07	2.00E-02	3.46E-05	1	0.13	1.28E-07	7.30E+00	9.37E-07
Fluoranthene	5.66	1	0.13	2.59E-06	4.00E-02	6.48E-05	NA	NA	NA	NA	NA
Fluorene	0.107	1	0.13	4.90E-08	4.00E-02	1.22E-06	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.2	1	0.13	1.92E-06	2.00E-02	9.61E-05	1	0.13	3.57E-07	7.30E-01	2.61E-07
Naphthalene	0.153	1	0.13	7.00E-08	2.00E-02	3.50E-06	NA	NA	NA	NA	NA
Phenanthrene	0.947	1	0.13	4.34E-07	2.00E-02	2.17E-05	NA	NA	NA	NA	NA
Pyrene	5.81	1	0.13	2.66E-06	3.00E-02	8.87E-05	NA	NA	NA	NA	NA
Pentachlorophenol	4.91	1	0.25	3.42E-06	3.00E-02	1.14E-04	1	0.25	6.36E-07	1.20E-01	7.63E-08
Risk Total						1.20E-03					4.88E-06

Notes:
AAFs are based on EPA guidance.
EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS.
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

Worker KI Exposures: AMEC AAFs

SAMPLE ID KGCS05-01

Scenario:	Worker
Receptor:	Adult (18-43 years old)
Medium:	Sediment
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = $\frac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)
Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	100	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1	
SA: Skin Surface Area (cm2/event)	903.5	EPA (1997). Hands for males and females
AF: Adherence Factor (mg/cm2)	0.268	EPA (2001). Body-part specific age-adjusted hands
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1	
EF: Exposure Frequency (days/year)	12	Professional Judgement
ED: Exposure Duration (years)	25	Based on 18 to 43 year old receptor
BW: Body Weight (kg)	71.8	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	9125	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

		Noncancer Hazard Quotient					Potential Excess Lifetime Cancer Risk				
Compound	Soil Concentration (mg/kg)	Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
Acenaphthene	0.0803	1	0.1	4.57E-09	6.00E-02	7.61E-08	NA	NA	NA	NA	NA
Acenaphthylene	1.5	1	0.1	8.53E-08	2.00E-02	4.27E-06	NA	NA	NA	NA	NA
Anthracene	2.74	1	0.1	1.56E-07	3.00E-01	5.19E-07	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.1	1	0.02	1.49E-07	2.00E-02	7.44E-06	1	0.02	5.32E-08	7.30E-01	3.88E-08
Benzo(a)pyrene	3.2	1	0.02	1.54E-07	2.00E-02	7.68E-06	1	0.02	5.49E-08	7.30E+00	4.01E-07
Benzo(b)fluoranthene	7.6	1	0.02	3.65E-07	2.00E-02	1.82E-05	1	0.02	1.30E-07	7.30E-01	9.51E-08
Benzo(g,h,i)perylene	4.57	1	0.1	2.60E-07	2.00E-02	1.30E-05	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	2.69	1	0.02	1.29E-07	2.00E-02	6.46E-06	1	0.02	4.61E-08	7.30E-02	3.37E-09
Chrysene	4.39	1	0.02	2.11E-07	2.00E-02	1.05E-05	1	0.02	7.53E-08	7.30E-03	5.49E-10
Dibenz(a,h)anthracene	1.43	1	0.02	6.86E-08	2.00E-02	3.43E-06	1	0.02	2.45E-08	7.30E+00	1.79E-07
Fluoranthene	4.71	1	0.1	2.68E-07	4.00E-02	6.70E-06	NA	NA	NA	NA	NA
Fluorene	0.101	1	0.1	5.74E-09	4.00E-02	1.44E-07	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.35	1	0.02	2.09E-07	2.00E-02	1.04E-05	1	0.02	7.46E-08	7.30E-01	5.44E-08
Naphthalene	0.258	1	0.1	1.47E-08	2.00E-02	7.34E-07	NA	NA	NA	NA	NA
Phenanthrene	1.2	1	0.1	6.83E-08	2.00E-02	3.41E-06	NA	NA	NA	NA	NA
Pyrene	4.89	1	0.1	2.78E-07	3.00E-02	9.27E-06	NA	NA	NA	NA	NA
Pentachlorophenol	2.99	1	0.03	1.47E-07	3.00E-02	4.90E-06	1	0.032	5.27E-08	1.20E-01	6.32E-09
Risk Total						1.07E-04					7.78E-07

Notes:
EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS.
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

Worker KI Exposures: EPA AAFs

SAMPLE ID KGCS05-01

Scenario:	Worker
Receptor:	Adult (18-43 years old)
Medium:	Sediment
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = $\frac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)
Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	100	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1	
SA: Skin Surface Area (cm2/event)	903.5	EPA (1997). Hands for males and females
AF: Adherence Factor (mg/cm2)	0.268	EPA (2001). Body-part specific age-adjusted hands
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1	
EF: Exposure Frequency (days/year)	12	Professional Judgement
ED: Exposure Duration (years)	25	Based on 18 to 43 year old receptor
BW: Body Weight (kg)	71.8	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	9125	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

Compound	Soil Concentration (mg/kg)	Noncancer Hazard Quotient: Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Potential Excess Lifetime Cancer Risk: Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
Acenaphthene	0.0803	1	0.13	4.83E-09	6.00E-02	8.06E-08	NA	NA	NA	NA	NA
Acenaphthylene	1.5	1	0.13	9.03E-08	2.00E-02	4.52E-06	NA	NA	NA	NA	NA
Anthracene	2.74	1	0.13	1.65E-07	3.00E-01	5.50E-07	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.1	1	0.13	1.87E-07	2.00E-02	9.33E-06	1	0.13	6.67E-08	7.30E-01	4.87E-08
Benzo(a)pyrene	3.2	1	0.13	1.93E-07	2.00E-02	9.63E-06	1	0.13	6.88E-08	7.30E+00	5.02E-07
Benzo(b)fluoranthene	7.6	1	0.13	4.58E-07	2.00E-02	2.29E-05	1	0.13	1.63E-07	7.30E-01	1.19E-07
Benzo(g,h,i)perylene	4.57	1	0.13	2.75E-07	2.00E-02	1.38E-05	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	2.69	1	0.13	1.62E-07	2.00E-02	8.10E-06	1	0.13	5.78E-08	7.30E-02	4.22E-09
Chrysene	4.39	1	0.13	2.64E-07	2.00E-02	1.32E-05	1	0.13	9.44E-08	7.30E-03	6.89E-10
Dibenz(a,h)anthracene	1.43	1	0.13	8.61E-08	2.00E-02	4.30E-06	1	0.13	3.07E-08	7.30E+00	2.24E-07
Fluoranthene	4.71	1	0.13	2.84E-07	4.00E-02	7.09E-06	NA	NA	NA	NA	NA
Fluorene	0.101	1	0.13	6.08E-09	4.00E-02	1.52E-07	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.35	1	0.13	2.62E-07	2.00E-02	1.31E-05	1	0.13	9.35E-08	7.30E-01	6.83E-08
Naphthalene	0.258	1	0.13	1.55E-08	2.00E-02	7.77E-07	NA	NA	NA	NA	NA
Phenanthrene	1.2	1	0.13	7.22E-08	2.00E-02	3.61E-06	NA	NA	NA	NA	NA
Pyrene	4.89	1	0.13	2.94E-07	3.00E-02	9.81E-06	NA	NA	NA	NA	NA
Pentachlorophenol	2.99	1	0.25	2.20E-07	3.00E-02	7.33E-06	1	0.25	7.85E-08	1.20E-01	9.42E-09
Risk Total						1.28E-04					9.77E-07

Notes:
AAFs are based on EPA guidance.
EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS.
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

Worker KI Exposures: AMEC AAFs

SAMPLE ID KGCS06-01

Scenario:	Worker
Receptor:	Adult (18-43 years old)
Medium:	Sediment
Exposure Pathway:	Ingestion and Dermal Contact

$$ADD\ (mg/kg\text{-}day) = \frac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)

Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	100	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1	
SA: Skin Surface Area (cm2/event)	903.5	EPA (1997). Hands for males and females
AF: Adherence Factor (mg/cm2)	0.268	EPA (2001). Body-part specific age-adjusted hands.
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1	
EF: Exposure Frequency (days/year)	12	Professional Judgement
ED: Exposure Duration (years)	25	Based on 18 to 43 year old receptor
BW: Body Weight (kg)	71.8	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	9125	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

		Noncancer Hazard Quotient					Potential Excess Lifetime Cancer Risk				
Compound	Soil Concentration (mg/kg)	Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
Acenaphthene	0.0891	1	0.1	5.07E-09	6.00E-02	8.45E-08	NA	NA	NA	NA	NA
Acenaphthylene	1.31	1	0.1	7.45E-08	2.00E-02	3.73E-06	NA	NA	NA	NA	NA
Anthracene	2.23	1	0.1	1.27E-07	3.00E-01	4.23E-07	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.87	1	0.02	1.86E-07	2.00E-02	9.29E-06	1	0.02	6.64E-08	7.30E-01	4.84E-08
Benzo(a)pyrene	4.43	1	0.02	2.13E-07	2.00E-02	1.06E-05	1	0.02	7.60E-08	7.30E+00	5.54E-07
Benzo(b)fluoranthene	9.42	1	0.02	4.52E-07	2.00E-02	2.26E-05	1	0.02	1.62E-07	7.30E-01	1.18E-07
Benzo(g,h,i)perylene	3.9	1	0.1	2.22E-07	2.00E-02	1.11E-05	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	4.53	1	0.02	2.17E-07	2.00E-02	1.09E-05	1	0.02	7.77E-08	7.30E-02	5.67E-09
Chrysene	6.27	1	0.02	3.01E-07	2.00E-02	1.51E-05	1	0.02	1.08E-07	7.30E-03	7.85E-10
Dibenz(a,h)anthracene	1.51	1	0.02	7.25E-08	2.00E-02	3.62E-06	1	0.02	2.59E-08	7.30E+00	1.89E-07
Fluoranthene	5.66	1	0.1	3.22E-07	4.00E-02	8.05E-06	NA	NA	NA	NA	NA
Fluorene	0.107	1	0.1	6.09E-09	4.00E-02	1.52E-07	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.2	1	0.02	2.02E-07	2.00E-02	1.01E-05	1	0.02	7.20E-08	7.30E-01	5.26E-08
Naphthalene	0.153	1	0.1	8.70E-09	2.00E-02	4.35E-07	NA	NA	NA	NA	NA
Phenanthrene	0.947	1	0.1	5.39E-08	2.00E-02	2.69E-06	NA	NA	NA	NA	NA
Pyrene	5.81	1	0.1	3.30E-07	3.00E-02	1.10E-05	NA	NA	NA	NA	NA
Pentachlorophenol	4.91	1	0.03	2.41E-07	3.00E-02	8.04E-06	1	0.032	8.65E-08	1.20E-01	1.04E-08
Risk Total						1.28E-04					9.79E-07

Notes:
EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS.
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

Worker KI Exposures: EPA AAFs

SAMPLE ID KGCS06-01

Scenario:	Worker
Receptor:	Adult (18-43 years old)
Medium:	Sediment
Exposure Pathway:	Ingestion and Dermal Contact

ADD (mg/kg-day) = $\frac{CS \times [(IR \times FI \times AAF) + (SA \times AF \times FA \times AAF)] \times EF \times ED \times CF}{BW \times AT}$

Hazard Quotient (HQ) = ADD (mg/kg-day) / RfD (mg/kg-d)
Cancer Risk (ELCR) = ADD (mg/kg-day) * CSF [1/(mg/kg-day)]

Parameter (units)	Value	Notes
ADD: Average Daily Dose (mg/kg-day)	See Below	
CS: Chemical Concentration in Soil (mg/kg)	Chemical-Specific	
IR: Ingestion Rate (mg/day)	100	EPA (2002)
AAF: Absorption Adjustment Factor (Oral-Soil) (unitless)	Chemical-Specific	
FI: Fraction Ingested from Site (unitless)	1	
SA: Skin Surface Area (cm2/event)	903.5	EPA (1997). Hands for males and females
AF: Adherence Factor (mg/cm2)	0.268	EPA (2001). Body-part specific age-adjusted hands.
AAF: Absorption Adjustment Factor (Dermal-Soil) (unitless)	Chemical-Specific	
FA: Fraction Absorbed from Site (unitless)	1	
EF: Exposure Frequency (days/year)	12	Professional Judgement
ED: Exposure Duration (years)	25	Based on 18 to 43 year old receptor
BW: Body Weight (kg)	71.8	EPA (2000)
AT: Averaging Time (days) (ED x 365 days/yr, noncancer)	9125	
AT: Averaging Time (days) (70 yr. x 365 days/yr, cancer)	25550	
RfD: Reference Dose (mg/kg-day)	Chemical-Specific	
CSF: Cancer Slope Factor [1/(mg/kg-day)]	Chemical-Specific	
CF: Conversion factor (kg/mg)	1.00E-06	

		Noncancer Hazard Quotient					Potential Excess Lifetime Cancer Risk				
Compound	Soil Concentration (mg/kg)	Oral-Soil RAF (noncancer) Chronic	Dermal-Soil RAF (noncancer) Chronic	ADD (noncancer) (mg/kg-day)	Chronic RfD (mg/kg-day)	Soil HQ	Oral-Soil AAF (cancer)	Dermal-Soil AAF (cancer)	ADD (cancer) (mg/kg-day)	CSF [1/(mg/kg-day)]	Soil Risk (mg/kg)
Acenaphthene	0.0891	1	0.13	5.36E-09	6.00E-02	8.94E-08	NA	NA	NA	NA	NA
Acenaphthylene	1.31	1	0.13	7.89E-08	2.00E-02	3.94E-06	NA	NA	NA	NA	NA
Anthracene	2.23	1	0.13	1.34E-07	3.00E-01	4.48E-07	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.87	1	0.13	2.33E-07	2.00E-02	1.16E-05	1	0.13	8.32E-08	7.30E-01	6.07E-08
Benzo(a)pyrene	4.43	1	0.13	2.67E-07	2.00E-02	1.33E-05	1	0.13	9.52E-08	7.30E+00	6.95E-07
Benzo(b)fluoranthene	9.42	1	0.13	5.67E-07	2.00E-02	2.84E-05	1	0.13	2.03E-07	7.30E-01	1.48E-07
Benzo(g,h,i)perylene	3.9	1	0.13	2.35E-07	2.00E-02	1.17E-05	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	4.53	1	0.13	2.73E-07	2.00E-02	1.36E-05	1	0.13	9.74E-08	7.30E-02	7.11E-09
Chrysene	6.27	1	0.13	3.77E-07	2.00E-02	1.89E-05	1	0.13	1.35E-07	7.30E-03	9.84E-10
Dibenz(a,h)anthracene	1.51	1	0.13	9.09E-08	2.00E-02	4.55E-06	1	0.13	3.25E-08	7.30E+00	2.37E-07
Fluoranthene	5.66	1	0.13	3.41E-07	4.00E-02	8.52E-06	NA	NA	NA	NA	NA
Fluorene	0.107	1	0.13	6.44E-09	4.00E-02	1.61E-07	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.2	1	0.13	2.53E-07	2.00E-02	1.26E-05	1	0.13	9.03E-08	7.30E-01	6.59E-08
Naphthalene	0.153	1	0.13	9.21E-09	2.00E-02	4.61E-07	NA	NA	NA	NA	NA
Phenanthrene	0.947	1	0.13	5.70E-08	2.00E-02	2.85E-06	NA	NA	NA	NA	NA
Pyrene	5.81	1	0.13	3.50E-07	3.00E-02	1.17E-05	NA	NA	NA	NA	NA
Pentachlorophenol	4.91	1	0.25	3.61E-07	3.00E-02	1.20E-05	1	0.25	1.29E-07	1.20E-01	1.55E-08
Risk Total						1.55E-04					1.23E-06

Notes:
AAFs are based on EPA guidance.
EPA (1997). Exposure Factors Handbook. Volumes I - III. EPA/600/P-95/002. August.
EPA (2000). Region IV Human Health Risk Assessment Bulletin--Supplement to RAGS.
EPA (2001) RAGS Volume I, Part E. September.
EPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

Attachment E
Screening Evaluation of Potential Risk

Revised Screening Evaluation of Potential Risk
Retention Pond Soil Samples Collected September 11, 2008
Koppers Inc. Wood Treating Facility
Grenada, Mississippi

INTRODUCTION

In response to EPA comments dated April 20, 2009 and August 24, 2009, a revised screening evaluation has been completed to determine whether the concentrations of polynuclear aromatic hydrocarbons (PAHs) and pentachlorophenol in soil samples from retention ponds that are part of storm water management outfalls No. 5 and No. 6 have the potential to pose a health concern. In this case, a health concern is defined as having a Hazard Index of greater than 1.0 or a potential excess lifetime cancer risk associated with exposure to potentially carcinogenic PAHs and pentachlorophenol being greater than the United States Environmental Protection Agency's (U.S. EPA's) range of allowable risk of $1x10^{-6}$ to $1x10^{-4}$, (i.e., from one in one million to one in ten thousand).

Consistent with the previously submitted screening level risk assessment, this revised screening level risk assessment evaluates two potential exposure scenarios. The first is of an on-Site KI worker contacting the soils in the retention pond and potentially being exposed to constituents via incidental ingestion of, and dermal contact with, soil.

The second hypothetical exposure scenario assumes the concentrations of constituents detected in retention pond soils also exist in off-Site soils in the drainageways into which stormwater from the Site flows. This represents a worse-case assumption about potential concentrations of potentially Site-related constituents in drainageway soils because the retention ponds are designed to capture any constituents that may be in the stormwater. As such, concentrations of potentially Site-related constituents in off-Site drainage ways are expected to be much lower than detected in the on-Site retention ponds. However, to be conservative, this screening evaluation assumes off-Site concentrations of constituents are the same as the concentrations found in the retention pond samples. In off-Site locations, a hypothetical resident is assumed to contact drainageway soils for the entire day, one day a week, for 27 of the first 30 years of his or her life and to potentially be exposed via incidental ingestion of, and dermal contact with, soils in the drainageways. Given the nature and location of the off-Site drainageways, day-long contact on a weekly basis through the year over the first 30 years of a person's life is a very conservative assumption.

The revised screening level risk assessment of retention pond soil presented herein follows human health risk assessment guidance developed by U.S. EPA (U.S. EPA, 1989) and the National Academy of Sciences (NAS, 1983) and generally follows the four-step process of: Hazard Identification, Exposure Assessment, Dose Response Assessment, and Risk Characterization defined by the NAS (NAS, 1983) and employed by U.S. EPA.

HAZARD IDENTIFICATION

Generally, constituents of potential concern (COPCs) are selected as part of Hazard Identification. In the case of the retention pond samples, all detected constituents in the retention pond samples collected on September 11, 2008 are considered to be COPCs and are included in the revised screening level risk assessment. A list of these is presented in Table 1.

Table 1.
Analytical results from samples KGCS05-01 and KGCS06-01 collected from storm water management outfalls No. 05 and 06, respectively.

Compound	Soil Concentration Sample ID KGCS05-01	Soil Concentration Sample ID KGCS06-01
	(mg/kg)	(mg/kg)
Acenaphthene	0.0803	0.0891
Acenaphthylene	1.5	1.31
Anthracene	2.74	2.23
Benzo(a)anthracene	3.1	3.87
Benzo(a)pyrene	3.2	4.43
Benzo(b)fluoranthene	7.6	9.42
Benzo(g,h,i)perylene	4.57	3.9
Benzo(k)fluoranthene	2.69	4.53
Chrysene	4.39	6.27
Dibenz(a,h)anthracene	1.43	1.51
Fluoranthene	4.71	5.66
Fluorene	0.101	0.107
Indeno(1,2,3-cd)pyrene	4.35	4.2
Naphthalene	0.258	0.153
Phenanthrene	1.2	0.947
Pyrene	4.89	5.81
Pentachlorophenol	2.99	4.91

EXPOSURE ASSESSMENT

The next step of the risk assessment (Exposure Assessment) estimates potential exposure for the receptors potentially exposed to COPCs. Potential exposure depends upon the concentration (referred to as the exposure point concentration (EPC)) of constituents in media that are potentially contacted by receptors and the frequency and magnitude of potential contact. In this case, potential exposure is estimated separately for each retention pond sample and EPCs of COPCs in each retention pond are assumed to be equal to the concentration detected in the single sample from each pond. The equations used to estimate potential exposure and assumptions that determine frequency and magnitude of potential contact are described below for both the on-Site KI worker and the hypothetical off-Site resident. The hypothetical off-Site resident is assumed to potentially be exposed for a total of 27 of the first 30 years of his or her life. Consequently, potential exposure of three age groups is evaluated and summed to estimate total lifetime exposure of such a resident.

Ingestion of soil

$$ADD\ (LADD) = \frac{EPC \times IR \times RAF \times FI \times EF \times ED \times CF}{BW \times AT}$$

where:

ADD	=	Average daily dose (potential non-cancer exposure) (mg/kg-day)
LADD	=	Lifetime average daily dose (potential carcinogenic exposure) (mg/kg-day)
EPC	=	Exposure point concentration (mg/kg)
IR_s	=	Soil ingestion rate (mg/day)
RAF	=	Oral-soil relative absorption factor (unitless)
FI	=	Fraction of daily intake from the Site (unitless)
EF	=	Exposure frequency (d/yr)
ED	=	Exposure duration (yr)
CF	=	Units conversion factor (10^{-6} kg/mg)
BW	=	Body weight (kg)
AT	=	Averaging time (equal to: ED x 365 d/yr for ADD; 25,550 for LADD) (d)

Dermal contact with soil

$$ADD\ (LADD) = \frac{EPC \times SA \times AF \times RAF \times FI \times EF \times ED \times CF}{BW \times AT}$$

where:

ADD	=	Average daily dose (potential non-cancer exposure) (mg/kg-day)
LADD	=	Lifetime average daily dose (potential carcinogenic exposure) (mg/kg-day)
EPC	=	Exposure point concentration (mg/kg)
SA	=	Exposed skin surface area (cm^2)
AF	=	Soil adherence factor (mg/cm^2)
RAF	=	Dermal-soil relative absorption factor (unitless)
FI	=	Fraction of daily intake from the Site (unitless)
EF	=	Exposure frequency (d/yr)
ED	=	Exposure duration (yr)
CF	=	Units conversion factor (10^{-6} kg/mg)
BW	=	Body weight (kg)
AT	=	Averaging time (equal to: ED x 365 d/yr for ADD; 25,550 for LADD) (d)

The exposure parameters used to estimate potential or hypothetical expsoure to COPCs in retention pond soils are described below and summarized in Table 2.

Table 2.
Risk Assessment Parameters Used to Estimate the Frequency and Magnitude of Incidental Ingestion and Dermal Contact.

Risk Assessment Parameter Incidental Ingestion & Dermal Contact	**Units**	**Worker Adult**	**Hypothetical Off-Site Young Child Resident**	**Hypothetical Off-Site Older Child/ Teenager Resident**	**Hypothetical Off-Site Adult Resident**
Soil Ingestion Rate (IR)	mg/d	50	200	50	50
Dermal Contact Skin Area Exposed (SA)	cm^2/day	903.5	2755	5215	6935
Dermal Contact Adherence Factor (AF)	mg/cm^2	0.268	0.145	0.145	0.145
Fraction Ingested	unitless	1	1	1	1
Exposure Frequency (EF)	days/yr	12	52	52	52
Exposure Duration (ED)	years	25	3	11	13
Averaging Time (LADD)	days	25550	25550	25550	25550
Averaging Time (ADD)	days	9125	1095	4015	4745
Body Weight	kg	71.8	12	44.3	71.8
Age Range	years	18-43	1-6	7-17	18-30

Soil Ingestion Rate (IR)

For young children, (ages 0-6), the U.S. EPA's Exposure Factors Handbook (U.S. EPA, 1997) and soil screening level guidance (U.S. EPA 2002) recommend an upper bound daily soil ingestion rate of 200 mg/day. This screening assessment adopts that upper bound ingestion for the hypothetical off-Site young child For hypothetical resident older children/teens, hypothetical adult residents and workers, this screening risk assessment adopts the conservative incidental soil ingestion rate of 100 mg/day recommended in U.S. EPA (2002). Based upon more recent information provided by the same researchers whose data form the basis of U.S. EPA's recommended incidental soil ingestion rates, lower upper bound incidental soil ingestion rates are more appropriate for older children, adults and workers, but are not used herein given the conservative screening nature of this risk assessment.

Dermal Contact Skin Area Exposed (SA)

The extent of skin surface area potentially contacting soil varies depending on the activity in which the individual is engaged and the amount of clothing that is worn. Each of these factors needs to be considered in developing estimates of the exposed skin surface areas. For the on-Site worker scenario, this screening risk assessment assumes exposure to hands. The hypothetical off-Site resident is assumed to potentially have hands, forearms, lower legs, feet and face, exposed. For the hands of an on-Site worker, an SA of 903.5 cm^2 is used which represents the average of the 50^{th} percentile of male and female hands (U.S. EPA 1997 Tables 6-2 and 6-3). For the hypothetical off-Site adult resident, a surface area of 6,935 cm^2 was developed and represents the summation of the relevant body parts averaged for males and females at the 50^{th} percentile (U.S. EPA 1997 Table 6-2 and 6-3). Potentially exposed skin surface areas for children and older children/teens were estimated by calculating the percent surface area of each body part for adults, summing percents over all relevant body parts and then applying the age weighted scaling for children from Table 6-6 (U.S. EPA 1997 Tables 6-5 and 6-6). The resulting exposed surface areas for hypothetical resident younger children and hypothetical older children/teenagers are 2,755 cm^2 (38% of adult SA) and 5,215 cm^2 (75% of Adult SA).

Dermal Contact Adherence Factor (AF)

The dermal contact adherence factor (AF) estimates the amount of soil that adheres to skin over the course of a day. U.S. EPA's Exposure Factors Handbook (U.S. EPA, 1997) presents a range of dermal adherence factors. These vary by age, body part, and most importantly, whether a person was engaged in an indoor or outdoor activity. Outdoor activities tend to have greater rates of soil adherence, particularly activities that involve close contact with soil. U.S. EPA 1997 provides soil adherence rates for different body parts for various different groups of people (Table 6-12). For the on-Site worker scenario, this screening risk assessment uses adherence of soils to hands using "Utility workers No. 2" with an AF of 0.268. For the hypothetical off-Site resident, assuming potential exposure to hands, forearms, lower legs, feet and face, this screening risk assessment uses a composite AF of 0.145, reflecting an activity type between playing soccer and engaged in outdoor gardening/landscaping activities.

Exposure Frequency (EF)

The exposure frequency is the number of days per year that a person engages in a particular activity. For the on-Site worker, exposure frequency to soils in the retention pond is estimated to be 12 days per year; one day a month on a regular basis. For the hypothetical off-Site resident exposure scenario, this screening risk assessment assumes that a hypothetical resident may visit and contact an off-Site drainage ditch containing soils one time every week for the entire year. This is equal to 52 days per year.

Exposure Duration (ED)

The exposure duration for an onsite worker is assumed to be 25 years; a conservative duration for a worker to remain employed at one workplace without interruption.
The hypothetical off-Site resident's potential exposure is assumed to occur for the first 30 years of a resident's lifetime; 30 years being the typical upper bound assumption U.S. EPA makes for the years spent by a person at one home (U.S. EPA 1989). This risk assessment estimates the potential exposure of a resident over those 30 years by first estimating the potential exposure of three different age groups and then summing the potential exposure of each age group to arrive at a total potential exposure for the 30-year period. The three age groups are children (1-6 years), child/teen (7-17 years), and adult (18-30 years). Children ages 1-6 are assumed to contact drainageway soils for 3

years, when 4, 5, and 6 years old. Given the remoteness of the drainageways and their distances from homes, children three years old and younger are assumed to not contact drainageway soils. Older Children/teens ages (7-17 years old) are assumed to contact soils for 11 years and young adults (18-30 years old) are assumed to contact soils for 13 years. Thus, total exposure duration for the first 30 years of life is assumed to be 27 years.

Fraction Intake (FI)

The amount of a receptor's total daily exposure to soil that is comprised of retention pond or drainageway soils is accounted for by the fraction intake. For workers, the screening risk assessment conservatively assumes that all of his or her daily intake of soil is from the retention pond on the days they contact retention pond soils. As requested by EPA in its comments, on each of the days that a hypothetical off-Site resident is assumed to contact drainageway soils, all of a hypothetical resident's daily soil ingestion and daily dermal contact with soils are assumed to be comprised of drainageway soils. In other words, the FI is assumed to be 1.0. Given the nature and remoteness of the drainageways from most nearby residences, this is a very conservative assumption. If a hypothetical resident were to contact drainage way soils, it seems much more likely that such contact would occur for a part of the day. The assumption of day-long contact for 52 days a year is the same as contact with soils for between one and two hours a day, but for 365 days a year. Moreover, the drainageways may contain water after rainfall events. Contact with soils in the drainageways would be unlikely during the days they are covered with storm water.

Averaging Times

In accordance with standard risk assessment protocol (U.S. EPA, 1989), averaging time for estimation of potential non-cancer risks is equal to the exposure duration (ED) times 365 days per year and the averaging time for estimation of potential excess lifetime cancer risk is 25,550 days (equal to 70 years times 365 days per year).

Body Weight

The body weight of each age group included in the risk assessment was estimated by calculating the average body weight of each age included in a particular age group. Body weight for a particular year was taken from U.S. EPA (1997). For the hypothetical off-Site resident, a child (age 1-6 years) was assumed to have an average body weight of 12 kilograms (kg), an older children/teen was assumed to weigh 44.3 kg, and adults (ages 18-30) were assumed to weigh 71.8 kg.

Relative Absorption Factors (RAFs)

To estimate the potential risk to human health that may be posed by the presence of COPCs in soil, it is necessary first to estimate the potential exposure dose of each COPC. The potential exposure dose is similar to the administered dose or applied dose in a laboratory experiment. The animal-derived cancer slope factors (CSFs) and reference doses (RfDs) used in quantitative risk assessment are based on applied doses in most cases. However, the efficiency of COPC absorption via a particular route and from a particular matrix (e.g., soil, water) at the Site may differ from the absorption efficiency for the exposure route and matrix used in the experimental study that serves as the basis for the CSF or RfD. Relative Absorption Factors (RAFs) for Site-related COPCs have been derived and used in the calculation of potential exposure doses presented above. This screening evaluation uses two sets of RAFs: default RAFs developed by U.S. EPA; and, RAFs derived by AMEC following critical review of the scientific literature pertaining to potential absorption of COPCs. Both sets of RAFs are shown in the derivation of AMEC RAFs in the calculation attachments to this screening risk assessment. The derivation of AMEC AAFs is described in AMEC 2003.

TOXICITY ASSESSMENT

Toxicity values (cancer slope factors (CSFs) and reference doses (RfDs)) are presented in the spreadsheets attached to this screening risk assessment (Attachment A) and are taken from standard EPA sources described in AMEC 2003.

RISK CHARACTERIZATION

Potential non-cancer risks were estimated for potential exposures of on-Site KI workers and Hypothetical off-Site residents to COPCs detected in Samples KGCS05-01 (Outfall No. 5) and KGCS06-01 (Outfall No. 6). Potential non-cancer risks were estimated using the equation shown below.

$$HQ = \frac{ADD}{RfD}$$

where:

HQ	=	Hazard quotient (unitless);
ADD	=	Average daily dose (mg/kg-day); and,
RfD	=	Reference dose (mg/kg-day).

Hazard Quotients (HQs) for all receptors included in this screening risk assessment were less than 1.0 indicating that potential non-cancer risks are not expected to occur as a result of potential exposure to COPCs in retention pond soils (results shown Attachment A).

Potential excess lifetime cancer risks (PELCRs) were estimated for potential exposures of on-Site KI workers and Hypothetical off-Site residents to COPCs detected in Samples KGCS05-01 (Outfall No. 5) and KGCS06-01 (Outfall No. 6). Potential excess lifetime cancer risks were estimated using the equation shown below.

$$PELCR = LADD \times CSF$$

where:

PELCR	=	Potential Excess Lifetime Cancer Risk (unitless);
LADD	=	Lifetime Average Daily Dose (mg/kg-day); and,
CSF	=	Cancer Slope Factor ((mg/kg-day)$^{-1}$).

Table 3 presents the estimated Potential Excess Lifetime Cancer Risks for the KI worker and the hypothetical off-Site resident assuming the two alternative RAFs. Even though exceptionally conservative exposure assumptions were made (contact once a month with retention pond soils for the KI worker for 25 years and daily contact for 30 years for the hypothetical off-Site resident), potential risks fall below or within U.S. EPA's range of allowable risk (1×10^{-6} to 1×10^{-4}).

Table 3
Summary of Potential Excess Lifetime Cancer Risks
Associated with COPC Concentrations Detected in Samples KGCS05-01 (Outfall No. 5) and KGCS06-01 (Outfall No. 6).

	AMEC RAFs		**EPA RAFs**	
Potential Excess Lifetime Cancer Risk	**KI Worker**	**Hypothetical Off-Site Resident**	**KI Worker**	**Hypothetical Off-Site Resident**
KGCS05-01	7.8E-07	9.5E-6	9.8E-07	1.4E-5
KGCS06-01	9.8E-07	1.2E-5	1.2E-06	1.8E-5

Based upon the results of this screening risk assessment potentially carcinogenic COPCs in retention pond soils do not pose a health concern. Further, even if concentrations of potentially carcinogenic COPCs were to exist in off-Site drainageways at concentrations equal to those detected on-Site, they would not be expected to pose a health concern to a local resident hypothetically contacting such soils.

REFERENCES

AMEC. 2003. Revised Final Risk Assessment Koppers Industries, Inc. Facility Grenada, Mississippi. Westford, Massachusetts. 4-7200-5700

NAS. 1983. *Risks Assessment in the Federal Government: Managing the Process.* National Academy of Sciences (NAS) National Academy Press: Washington, D.C. RA Approach.

U.S. EPA. 1989. *Risk Assessment Guidance for Superfund; Volume I: Human Health Evaluation Manual (Part A) – Interim Final.* U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C. EPA/540/1-89-002. July.

U.S. EPA. 1997. Exposure Factors Handbook. U.S. Environmental Protection Agency, Office of Research and Development. EPA/600/P-95/002Fa-c. August.

U.S. EPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Office and Solid Waste and Emergency Response, OSWER 9355.4-24, USEPA, December 2002.

GeoTrans, Inc.
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July 10, 2007
P:\PROJECTS\BEAZER\GRENADA\2201.099\2007 plant well sample.doc

DEPT OF ENVIRONMENTAL QUALITY
REC'D
JUL 1 7 2007

RCRA Programs Branch
Waste Management Division
U.S. Environmental Protection Agency
61 Forsyth Street SW
Atlanta, Georgia 30303

Attn: Mr. Jon D. Johnston
Chief, RCRA Programs Branch
Waste Management Division

Subject: 2007 Annual Sampling Results for Plant Production Well
Koppers Industries/Beazer East, Inc.
Tie Plant, Mississippi
EPA I.D. No. MSD 007 027 543

Dear Mr. Johnston:

On behalf of Beazer East, Inc. (Beazer), this letter provides the analytical documentation for the 2007 annual sample collected from plant production well H054 at the Koppers Industries (KI) facility in Grenada, Mississippi (site). Field & Technical Services, LLC, (FTS) is Beazer's nation-wide Operation and Maintenance contractor. FTS sampled well H054 at the Grenada site on June 5, 2007, and submitted the sample to Severn Trent Laboratory (STL) for analysis by EPA Method 8021 for benzene, ethyl benzene, toluene, and xylenes, and by EPA Method 8270 SIM for polynuclear aromatic hydrocarbons and pentachlorophenol. The complete 22-page analytical report is attached to this letter. The analytical report includes STL's letterhead on the cover page with the project manager's signature. The well H054 sample results, provided on pages 7 and 8 of the report, include the date the sample was collected (060507). All analyzed parameters were non-detect in the sample from well H054.

If you have any questions regarding this transmittal, please contact Mike Bollinger at (412) 208-8864.

Sincerely,

GeoTrans, Inc.

Jennifer Abrahams

Jennifer A. Abrahams, P.G.
Associate
Senior Hydrogeologist

Attachments

cc: Jerry Cain, MDEQ
Mike Bollinger, Beazer
Harbhajan Singh, EPA

Grenada Plant Manager, KI
Joyce Fankulewski, KI

SEVERN TRENT STL

STL Pittsburgh
301 Alpha Drive
Pittsburgh, PA 15238

Tel: 412 963 7058 Fax: 412 963 2468
www.stl-inc.com

ANALYTICAL REPORT

Grenada Mississippi

Lot #: C7F070298

Field & Technical Services, LLC

Field & Technical Services, LL

SEVERN TRENT LABORATORIES, INC.

Veronica Bortot

Veronica Bortot
Project Manager

June 22, 2007

SEVERN TRENT STL

ACCREDITED IN ACCORDANCE WITH nelac

NELAC REPORTING:

The format and content of the attached report meets NELAC standards and guidelines except as noted in the narrative. The table below presents a summary of the certifications held by STL Pittsburgh. Our primary accreditation authority for the Non-potable water and Solid & Hazardous waste programs is Pennsylvania DEP. A more detailed parameter list is available upon request. Please ask your project manager for this information when required.

Certifying State/Program	Certificate #	Program Types	STL Pittsburgh
NFESC	NA	NAVY	X
USACE	NA	Corps of Engineers	X
US Dept of Agriculture	(#S-46425)	Foreign Soil Import Permit	X
Arkansas	(#03-022-1)	WW HW	X X
California – nelac	04224CA	WW HW	X X
Connecticut	(#PH-0688)	WW HW	X X
Florida – nelac	(#E87660)	WW HW	X X
Illinois – nelac	(#200005)	WW HW	X X
Kansas – nelac	(#E-10350)	WW HW	X X
Louisiana – nelac	(#93200)	WW HW	X X
New Hampshire – nelac	(#203002)	WW –	X –
New Jersey – nelac	(PA-005)	WW HW	X X
New York – nelac	(#11182)	WW HW	X X
North Carolina	(#434)	WW HW	X X
North Dakota	R-075	WW HW	X X
Ohio Vap	(#CL0063)	WW HW	X X
Pennsylvania - nelac	(#02-00416)	WW HW	X X
South Carolina	(#89014001)	WW HW	X X
Utah – nelac	(STLP)	WW HW	X X
West Virginia	(#142)	WW HW	X X
Wisconsin	998027800	WW HW	X X

The codes utilized for program types are described below:

HW Hazardous Waste certification
WW Non-potable Water and/or Wastewater certification
X Laboratory has some form of certification under the specific program. Many states certify laboratories for specific parameters or tests within a category. The information in the table indicates the lab is certified in a general category of testing. Please contact the laboratory if parameter specific certification information is required.

CASE NARRATIVE

Field and Technical Services
Grenada, Mississippi

STL Lot # C7F070298

Sample Receiving:
STL Pittsburgh, PA received samples on June 7, 2006. The cooler was received within the proper temperature range.

A trip blank was received but was not listed on the chain of custody. The sample was logged in for analysis.

If project specific QC was not required for samples contained in this report, when batch QC was completed on these samples, anomalous results will be discussed below.

GC/MS Volatiles:
All non-CCC compounds that have >15% RSD were evaluated to see if a better curve could be drawn using a quadratic curve. All compounds <30% RSD will use an average response factor curve if no visible improvement is accomplished using a quadratic curve. A quadratic curve will be used for a compound where it is determined to be the "best-fit" evaluation.

GC/MS Semivolatiles:
The reporting limits for the aqueous sample were adjusted according to the amount of sample extracted.

All non-CCC compounds that have >15% RSD were evaluated to see if a better curve could be drawn using a quadratic curve. All compounds <30% RSD will use an average response factor curve if no visible improvement is accomplished using a quadratic curve. A quadratic curve will be used for a compound where it is determined to be the "best-fit" evaluation.

Chain of Custody Record

SEVERN TRENT STL®
Severn Trent Laboratories, Inc.

STL-4124 (0801)

Client	Beazer ~~Wht~~ BCA Grenada
Project Manager	Hank Pappert
Date	6-5-07
Chain of Custody Number	290386
Address	Kopper Dr
Telephone Number (Area Code)/Fax Number	412-429-2694 412-279-4512
Lab Number	
Page	1 of 1
City	Grenada
State	MS
Zip Code	38960
Site Contact	D. Uko
Lab Contact	V BovTot
Project Name and Location (State)	
Carrier/Waybill Number	
Contract/Purchase Order/Quote No.	

Analysis (Attach list if more space is needed)

Special Instructions/ Conditions of Receipt

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Matrix: Aqueous	Matrix: Sed.	Matrix: Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH	PAH+Pb,Ta 8270 SIM	BTEX 8021
water H054-060507 2x1GA	6-5-07	1:25		X			X						X	
water DUP-01-060507 2x1GA	6-5-07	1:25		X			X						X	
water FB-01-060507 2x1GA	6-5-07	1:25		X			X						X	
water H054-060507 40ml vial	6-5-07	1:25		X						X				X
water DUP 01-060507 40ml vial	6-5-07	1:25		X						X				X
water FB01-060507 40ml vial	6-5-07	1:25		X						X				X

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☐ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other______

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By: Dennis Cr Tolfe	6-5-07	3:30	1. Received By		
2. Relinquished By			2. Received By: Patrick R Darst	6/7/07	0835
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

METHODS SUMMARY

C7F070298

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Semivolatile Organics GCMS BNA 8270C	SW846 8270C	
Volatile Organics by GC/MS	SW846 8260B	SW846 5030B/826

References:

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

SAMPLE SUMMARY

C7F070298

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
J0H07	001	H054-060507	06/05/07	13:25
J0H1D	002	DUP-01-060507	06/05/07	13:25
J0H1F	003	FB-01-060507	06/05/07	13:25
J0H1H	004	TRIP BLANK	06/05/07	

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Field & Technical Services, LLC

Client Sample ID: H054-060507

GC/MS Volatiles

Lot-Sample #...:	C7F070298-001	Work Order #...:	J0H071AA	Matrix.........:	WATER
Date Sampled...:	06/05/07	Date Received..:	06/07/07	MS Run #.......:	7165121
Prep Date......:	06/14/07	Analysis Date..:	06/14/07		
Prep Batch #...:	7165209	Analysis Time..:	13:48		
Dilution Factor:	1				
		Method.........:	SW846 8260B		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Benzene	ND	5.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
m-Xylene & p-Xylene	ND	2.0	ug/L
o-Xylene	ND	1.0	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Toluene-d8	86	(71 - 118)
1,2-Dichloroethane-d4	88	(64 - 135)
4-Bromofluorobenzene	89	(70 - 118)
Dibromofluoromethane	91	(64 - 128)

Field & Technical Services, LLC

Client Sample ID: H054-060507

GC/MS Semivolatiles

Lot-Sample #...: C7F070298-001 Work Order #...: J0H071AC Matrix.........: WATER
Date Sampled...: 06/05/07 Date Received..: 06/07/07 MS Run #.......: 7159049
Prep Date......: 06/08/07 Analysis Date..: 06/21/07
Prep Batch #...: 7159072 Analysis Time..: 15:40
Dilution Factor: 0.98

Method.........: SW846 8270C

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acenaphthene	ND	10	ug/L
Acenaphthylene	ND	10	ug/L
Anthracene	ND	10	ug/L
Benzo(a)anthracene	ND	10	ug/L
Benzo(b)fluoranthene	ND	10	ug/L
Benzo(k)fluoranthene	ND	10	ug/L
Benzo(ghi)perylene	ND	10	ug/L
Benzo(a)pyrene	ND	10	ug/L
Chrysene	ND	10	ug/L
Dibenzo(a,h)anthracene	ND	10	ug/L
Fluoranthene	ND	10	ug/L
Fluorene	ND	10	ug/L
Indeno(1,2,3-cd)pyrene	ND	10	ug/L
2-Methylnaphthalene	ND	10	ug/L
Naphthalene	ND	10	ug/L
Pentachlorophenol	ND	1.0	ug/L
Phenanthrene	ND	10	ug/L
Pyrene	ND	10	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2,4,6-Tribromophenol	47	(21 - 122)
2-Fluorobiphenyl	49	(30 - 110)
2-Fluorophenol	42	(13 - 110)
Nitrobenzene-d5	56	(32 - 112)
Phenol-d5	48	(10 - 113)
Terphenyl-d14	47	(10 - 144)

Field & Technical Services, LLC

Client Sample ID: DUP-01-060507

GC/MS Volatiles

Lot-Sample #...: C7F070298-002 Work Order #...: J0H1D1AA Matrix.........: WATER
Date Sampled...: 06/05/07 Date Received..: 06/07/07 MS Run #.......: 7165121
Prep Date......: 06/14/07 Analysis Date..: 06/14/07
Prep Batch #...: 7165209 Analysis Time..: 14:13
Dilution Factor: 1

Method.........: SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Benzene	ND	5.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
m-Xylene & p-Xylene	ND	2.0	ug/L
o-Xylene	ND	1.0	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Toluene-d8	84	(71 - 118)
1,2-Dichloroethane-d4	86	(64 - 135)
4-Bromofluorobenzene	91	(70 - 118)
Dibromofluoromethane	94	(64 - 128)

Field & Technical Services, LLC

Client Sample ID: DUP-01-060507

GC/MS Semivolatiles

Lot-Sample #...: C7F070298-002 Work Order #...: J0H1D1AC Matrix.........: WATER
Date Sampled...: 06/05/07 Date Received..: 06/07/07 MS Run #.......: 7159049
Prep Date......: 06/08/07 Analysis Date..: 06/20/07
Prep Batch #...: 7159072 Analysis Time..: 19:25
Dilution Factor: 1.01

Method.........: SW846 8270C

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acenaphthene	ND	10	ug/L
Acenaphthylene	ND	10	ug/L
Anthracene	ND	10	ug/L
Benzo(a)anthracene	ND	10	ug/L
Benzo(b)fluoranthene	ND	10	ug/L
Benzo(k)fluoranthene	ND	10	ug/L
Benzo(ghi)perylene	ND	10	ug/L
Benzo(a)pyrene	ND	10	ug/L
Chrysene	ND	10	ug/L
Dibenzo(a,h)anthracene	ND	10	ug/L
Fluoranthene	ND	10	ug/L
Fluorene	ND	10	ug/L
Indeno(1,2,3-cd)pyrene	ND	10	ug/L
2-Methylnaphthalene	ND	10	ug/L
Naphthalene	ND	10	ug/L
Pentachlorophenol	ND	1.0	ug/L
Phenanthrene	ND	10	ug/L
Pyrene	ND	10	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2,4,6-Tribromophenol	55	(21 - 122)
2-Fluorobiphenyl	51	(30 - 110)
2-Fluorophenol	46	(13 - 110)
Nitrobenzene-d5	61	(32 - 112)
Phenol-d5	51	(10 - 113)
Terphenyl-d14	46	(10 - 144)

Field & Technical Services, LLC

Client Sample ID: FB-01-060507

GC/MS Volatiles

Lot-Sample #...:	C7F070298-003	Work Order #...:	J0H1F1AA	Matrix.........:	WATER
Date Sampled...:	06/05/07	Date Received..:	06/07/07	MS Run #.......:	7165121
Prep Date......:	06/14/07	Analysis Date..:	06/14/07		
Prep Batch #...:	7165209	Analysis Time..:	14:39		
Dilution Factor:	1				
		Method.........:	SW846 8260B		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Benzene	ND	5.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
m-Xylene & p-Xylene	ND	2.0	ug/L
o-Xylene	ND	1.0	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Toluene-d8	75	(71 - 118)
1,2-Dichloroethane-d4	87	(64 - 135)
4-Bromofluorobenzene	86	(70 - 118)
Dibromofluoromethane	85	(64 - 128)

Field & Technical Services, LLC

Client Sample ID: FB-01-060507

GC/MS Semivolatiles

Lot-Sample #...: C7F070298-003
Date Sampled...: 06/05/07
Prep Date......: 06/08/07
Prep Batch #...: 7159072
Dilution Factor: 1.02

Work Order #...: J0H1F1AC
Date Received..: 06/07/07
Analysis Date..: 06/20/07
Analysis Time..: 19:49

Method.........: SW846 8270C

Matrix.........: WATER
MS Run #.......: 7159049

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acenaphthene	ND	10	ug/L
Acenaphthylene	ND	10	ug/L
Anthracene	ND	10	ug/L
Benzo(a)anthracene	ND	10	ug/L
Benzo(b)fluoranthene	ND	10	ug/L
Benzo(k)fluoranthene	ND	10	ug/L
Benzo(ghi)perylene	ND	10	ug/L
Benzo(a)pyrene	ND	10	ug/L
Chrysene	ND	10	ug/L
Dibenzo(a,h)anthracene	ND	10	ug/L
Fluoranthene	ND	10	ug/L
Fluorene	ND	10	ug/L
Indeno(1,2,3-cd)pyrene	ND	10	ug/L
2-Methylnaphthalene	ND	10	ug/L
Naphthalene	ND	10	ug/L
Pentachlorophenol	ND	1.0	ug/L
Phenanthrene	ND	10	ug/L
Pyrene	ND	10	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2,4,6-Tribromophenol	60	(21 - 122)
2-Fluorobiphenyl	56	(30 - 110)
2-Fluorophenol	53	(13 - 110)
Nitrobenzene-d5	63	(32 - 112)
Phenol-d5	57	(10 - 113)
Terphenyl-d14	78	(10 - 144)

Field & Technical Services, LLC

Client Sample ID: TRIP BLANK

GC/MS Volatiles

Lot-Sample #...:	C7F070298-004	Work Order #...:	J0H1H1AA	Matrix.........:	WATER
Date Sampled...:	06/05/07	Date Received..:	06/07/07	MS Run #.......:	7165121
Prep Date......:	06/14/07	Analysis Date..:	06/14/07		
Prep Batch #...:	7165209	Analysis Time..:	15:02		
Dilution Factor:	1				
		Method.........:	SW846 8260B		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Benzene	ND	5.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
m-Xylene & p-Xylene	ND	2.0	ug/L
o-Xylene	ND	1.0	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Toluene-d8	80	(71 - 118)
1,2-Dichloroethane-d4	87	(64 - 135)
4-Bromofluorobenzene	89	(70 - 118)
Dibromofluoromethane	88	(64 - 128)

METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: C7F070298
MB Lot-Sample #: C7F140000-209

Work Order #...: J009N1AA
Matrix.........: WATER

Prep Date......: 06/14/07
Analysis Time..: 09:57

Analysis Date..: 06/14/07
Prep Batch #...: 7165209
Dilution Factor: 1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Benzene	ND	1.0	ug/L	SW846 8260B
Ethylbenzene	ND	1.0	ug/L	SW846 8260B
Toluene	ND	1.0	ug/L	SW846 8260B
o-Xylene	ND	1.0	ug/L	SW846 8260B
m-Xylene & p-Xylene	ND	2.0	ug/L	SW846 8260B

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Toluene-d8	90	(71 - 118)
1,2-Dichloroethane-d4	91	(64 - 135)
4-Bromofluorobenzene	95	(70 - 118)
Dibromofluoromethane	101	(64 - 128)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT

GC/MS Semivolatiles

Client Lot #...: C7F070298 Work Order #...: J0J8H1AA Matrix.........: WATER
MB Lot-Sample #: C7F080000-072
Prep Date......: 06/08/07 Analysis Time..: 09:42
Analysis Date..: 06/20/07 Prep Batch #...: 7159072
Dilution Factor: 1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Acenaphthene	ND	9.8	ug/L	SW846 8270C
Anthracene	ND	9.8	ug/L	SW846 8270C
Benzo(a)anthracene	ND	9.8	ug/L	SW846 8270C
Benzo(b)fluoranthene	ND	9.8	ug/L	SW846 8270C
Benzo(ghi)perylene	ND	9.8	ug/L	SW846 8270C
Benzo(a)pyrene	ND	9.8	ug/L	SW846 8270C
Chrysene	ND	9.8	ug/L	SW846 8270C
Fluoranthene	ND	9.8	ug/L	SW846 8270C
Fluorene	ND	9.8	ug/L	SW846 8270C
Indeno(1,2,3-cd)pyrene	ND	9.8	ug/L	SW846 8270C
2-Methylnaphthalene	ND	9.8	ug/L	SW846 8270C
Naphthalene	ND	9.8	ug/L	SW846 8270C
Pentachlorophenol	ND	1.0	ug/L	SW846 8270C
Phenanthrene	ND	9.8	ug/L	SW846 8270C
Pyrene	ND	9.8	ug/L	SW846 8270C
Dibenzo(a,h)anthracene	ND	9.8	ug/L	SW846 8270C
Acenaphthylene	ND	9.8	ug/L	SW846 8270C
Benzo(k)fluoranthene	ND	9.8	ug/L	SW846 8270C

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2,4,6-Tribromophenol	81	(21 - 122)
2-Fluorobiphenyl	72	(30 - 110)
2-Fluorophenol	81	(13 - 110)
Nitrobenzene-d5	81	(32 - 112)
Phenol-d5	87	(10 - 113)
Terphenyl-d14	103	(10 - 144)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: C7F070298   Work Order #...: J009N1AC   Matrix.........: WATER
LCS Lot-Sample#: C7F140000-209
Prep Date......: 06/14/07   Analysis Date..: 06/14/07
Prep Batch #...: 7165209   Analysis Time..: 11:34
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD
1,1-Dichloroethene	**97**	**(65 - 136)**	**SW846 8260B**
Trichloroethene	**105**	**(73 - 120)**	**SW846 8260B**
Chlorobenzene	**98**	**(80 - 120)**	**SW846 8260B**
Benzene	**93**	**(80 - 120)**	**SW846 8260B**
Toluene	**106**	**(80 - 123)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Toluene-d8	94	(71 - 118)
1,2-Dichloroethane-d4	79	(64 - 135)
4-Bromofluorobenzene	92	(70 - 118)
Dibromofluoromethane	89	(64 - 128)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...: C7F070298　　Work Order #...: J0J8H1AC　　Matrix.........: WATER
LCS Lot-Sample#: C7F080000-072
Prep Date......: 06/08/07　　Analysis Date..: 06/20/07
Prep Batch #...: 7159072　　Analysis Time..: 10:05
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD
Acenaphthene	**66**	**(39 - 118)**	**SW846 8270C**
Pentachlorophenol	**60**	**(10 - 140)**	**SW846 8270C**
Pyrene	**68**	**(46 - 130)**	**SW846 8270C**
Phenol	**81**	**(10 - 131)**	**SW846 8270C**
2-Chlorophenol	**77**	**(19 - 124)**	**SW846 8270C**
1,4-Dichlorobenzene	**72**	**(28 - 110)**	**SW846 8270C**
N-Nitrosodi-n-propyl-amine	**77**	**(30 - 115)**	**SW846 8270C**
1,2,4-Trichloro-benzene	**66**	**(31 - 110)**	**SW846 8270C**
4-Chloro-3-methylphenol	**67**	**(29 - 124)**	**SW846 8270C**
4-Nitrophenol	**69**	**(19 - 144)**	**SW846 8270C**
2,4-Dinitrotoluene	**69**	**(47 - 131)**	**SW846 8270C**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2,4,6-Tribromophenol	84	(21 - 122)
2-Fluorobiphenyl	75	(30 - 110)
2-Fluorophenol	86	(13 - 110)
Nitrobenzene-d5	81	(32 - 112)
Phenol-d5	90	(10 - 113)
Terphenyl-d14	86	(10 - 144)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: C7F070298   Work Order #...: J0KX81AM-MS   Matrix.........: WATER
MS Lot-Sample #: C7F080177-002   J0KX81AN-MSD
Date Sampled...: 06/07/07   Date Received..: 06/08/07   MS Run #.......: 7165121
Prep Date......: 06/14/07   Analysis Date..: 06/14/07
Prep Batch #...: 7165209   Analysis Time..: 11:57
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
1,1-Dichloroethene	102	(60 - 139)			SW846 8260B
	98	(60 - 139)	3.5	(0-48)	SW846 8260B
Trichloroethene	106	(53 - 135)			SW846 8260B
	106	(53 - 135)	0.45	(0-36)	SW846 8260B
Chlorobenzene	102	(80 - 120)			SW846 8260B
	97	(80 - 120)	4.4	(0-29)	SW846 8260B
Benzene	97	(73 - 120)			SW846 8260B
	96	(73 - 120)	1.7	(0-32)	SW846 8260B
Toluene	104	(75 - 126)			SW846 8260B
	100	(75 - 126)	4.2	(0-35)	SW846 8260B

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Toluene-d8	94	(71 - 118)
	92	(71 - 118)
1,2-Dichloroethane-d4	86	(64 - 135)
	85	(64 - 135)
4-Bromofluorobenzene	94	(70 - 118)
	90	(70 - 118)
Dibromofluoromethane	95	(64 - 128)
	90	(64 - 128)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...:	C7F070298	Work Order #...:	J0D7F1AX-MS	Matrix.........:	WATER
MS Lot-Sample #:	C7F060212-004		J0D7F1A0-MSD		
Date Sampled...:	06/05/07	Date Received..:	06/06/07	MS Run #.......:	7159049
Prep Date......:	06/08/07	Analysis Date..:	06/20/07		
Prep Batch #...:	7159072	Analysis Time..:	12:28		
Dilution Factor:	1				

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Acenaphthene	49	(26 - 118)			SW846 8270C
	61	(26 - 118)	20	(0-35)	SW846 8270C
Pentachlorophenol	72	(10 - 140)			SW846 8270C
	89	(10 - 140)	21	(0-56)	SW846 8270C
Pyrene	64	(27 - 138)			SW846 8270C
	72	(27 - 138)	11	(0-31)	SW846 8270C
Phenol	64	(10 - 131)			SW846 8270C
	85	(10 - 131)	26	(0-43)	SW846 8270C
1,4-Dichlorobenzene	48	(18 - 110)			SW846 8270C
	58	(18 - 110)	18	(0-36)	SW846 8270C
N-Nitrosodi-n-propyl-amine	64	(18 - 115)			SW846 8270C
	81	(18 - 115)	22	(0-36)	SW846 8270C
1,2,4-Trichloro-benzene	47	(22 - 110)			SW846 8270C
	56	(22 - 110)	17	(0-37)	SW846 8270C
4-Chloro-3-methylphenol	65	(21 - 124)			SW846 8270C
	76	(21 - 124)	14	(0-55)	SW846 8270C
2,4-Dinitrotoluene	64	(31 - 131)			SW846 8270C
	75	(31 - 131)	16	(0-32)	SW846 8270C
2-Chlorophenol	64	(19 - 124)			SW846 8270C
	81	(19 - 124)	21	(0-43)	SW846 8270C
4-Nitrophenol	66	(10 - 145)			SW846 8270C
	75	(10 - 145)	12	(0-34)	SW846 8270C

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2,4,6-Tribromophenol	52	(21 - 122)
	62	(21 - 122)
2-Fluorobiphenyl	38	(30 - 110)
	51	(30 - 110)
2-Fluorophenol	48	(13 - 110)
	60	(13 - 110)
Nitrobenzene-d5	48	(32 - 112)
	59	(32 - 112)
Phenol-d5	51	(10 - 113)
	65	(10 - 113)

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MATRIX SPIKE SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...: C7F070298 **Work Order #...:** J0D7F1AX-MS **Matrix.........:** WATER
MS Lot-Sample #: C7F060212-004 J0D7F1A0-MSD

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	42	(10 - 144)
	52	(10 - 144)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...: C7F070298   Work Order #...: J0D9R1A8-MS   Matrix.........: WATER
MS Lot-Sample #: C7F060212-020   J0D9R1A9-MSD
Date Sampled...: 06/05/07   Date Received..: 06/06/07   MS Run #.......: 7159049
Prep Date......: 06/08/07   Analysis Date..: 06/20/07
Prep Batch #...: 7159072   Analysis Time..: 15:33
Dilution Factor: 0.99

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Acenaphthene	66	(26 - 118)			SW846 8270C
	32	(26 - 118)	14	(0-35)	SW846 8270C
Pentachlorophenol	87	(10 - 140)			SW846 8270C
	83	(10 - 140)	4.6	(0-56)	SW846 8270C
Pyrene	96	(27 - 138)			SW846 8270C
	93	(27 - 138)	2.2	(0-31)	SW846 8270C
Phenol	83	(10 - 131)			SW846 8270C
	89	(10 - 131)	6.8	(0-43)	SW846 8270C
1,4-Dichlorobenzene	59	(18 - 110)			SW846 8270C
	62	(18 - 110)	5.4	(0-36)	SW846 8270C
N-Nitrosodi-n-propyl-amine	79	(18 - 115)			SW846 8270C
	84	(18 - 115)	6.2	(0-36)	SW846 8270C
1,2,4-Trichloro-benzene	56	(22 - 110)			SW846 8270C
	60	(22 - 110)	7.4	(0-37)	SW846 8270C
4-Chloro-3-methylphenol	71	(21 - 124)			SW846 8270C
	76	(21 - 124)	7.3	(0-55)	SW846 8270C
2,4-Dinitrotoluene	79	(31 - 131)			SW846 8270C
	81	(31 - 131)	2.0	(0-32)	SW846 8270C
2-Chlorophenol	78	(19 - 124)			SW846 8270C
	82	(19 - 124)	5.0	(0-43)	SW846 8270C
4-Nitrophenol	88	(10 - 145)			SW846 8270C
	89	(10 - 145)	1.6	(0-34)	SW846 8270C

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2,4,6-Tribromophenol	59	(21 - 122)
	62	(21 - 122)
2-Fluorobiphenyl	53	(30 - 110)
	59	(30 - 110)
2-Fluorophenol	56	(13 - 110)
	59	(13 - 110)
Nitrobenzene-d5	54	(32 - 112)
	59	(32 - 112)
Phenol-d5	66	(10 - 113)
	71	(10 - 113)

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MATRIX SPIKE SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...: C7F070298 Work Order #...: J0D9R1A8-MS Matrix.........: WATER
MS Lot-Sample #: C7F060212-020 J0D9R1A9-MSD

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	56	(10 - 144)
	62	(10 - 144)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

Beazer

BEAZER EAST, INC. C/O THREE RIVERS MANAGEMENT, INC.
ONE OXFORD CENTRE, SUITE 3000, PITTSBURGH, PA 15219-6401

RESPONSE OF BEAZER EAST, INC. TO
EPA RULE 3007 REQUEST FOR INFORMATION

April 30, 2007

Mr. Jeffrey Pallas
Chief, South Section
RCRA Enforcement & Compliance Branch
United States Environmental Protection Agency
Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street
Atlanta, Georgia 30303-8960

RE: Koppers Inc./Beazer East, Inc., Tie Plant, Mississippi
Request for Information Pursuant to Section 3007 of RCRA
HSWA Permit, Dated September 2, 1998
EPA I.D. No. MSD 007 027 543

Dear Mr. Pallas:

This correspondence responds to the February 8, 2007 Section 3007 Information Requests from the United States Environmental Protection Agency ("USEPA") pertaining to the Koppers Inc. wood treating facility located in Grenada, Mississippi ("Grenada Plant"). The information presented herein has been gathered from documents both available to and in Beazer East, Inc.'s ("Beazer's") possession as well as in reliance of individual recollections concerning events that have transpired, in certain instances, over 30 years ago. To this end, Beazer reserves the right to supplement and/or modify these responses should additional information be located. All documents referenced herein are being provided in hard copy for the USEPA's review. Documents both related to the Grenada Plant and responsive to the USEPA's Information Requests are being jointly produced by both Beazer and Koppers Inc. irrespective of the party that created and/or possesses them.

Information Request No. 1: How long did Beazer East, Inc., and any predecessor companies, operate a wood treatment facility at the site? Please provide a flow chart indicating corporate name changes, and ownership changes, where appropriate.

Response: Beazer East, Inc., formerly known as Koppers Company Inc., operated the Grenada wood treating facility ("Grenada Plant) until December 29, 1988. The Grenada Plant was built by the Ayer & Lord Tie Company ("A & L") in 1904. In 1930, A&L was acquired by the Wood Preserving Corporation, a subsidiary of The Koppers Company. In 1940, The Koppers Company liquidated the Wood Preserving Company to form its own wood preserving division. Thereafter, in 1944, The Koppers Company merged with three other companies to become Koppers Company, Inc.

Koppers Company, Inc. owned the Grenada Plant until its sale to Koppers Industries, Inc (n/k/a Koppers Inc.) on December 29, 1988. Koppers Industries, Inc. purchased not only the Grenada Plant at that time, but also the rights to the name "Koppers." As a result of the sale, Koppers Company, Inc. changed its name to Beazer Materials and Services, Inc. ("BM&S"), in January 1989, and then BM&S changed its name to Beazer East, Inc. on April 16, 1990. For convenience sake, these responses will refer to both Koppers Company, Inc. which owned and operated the Grenada Plant prior to 1989, and Beazer, which has been involved in the RCRA-guided remediation of the Grenada Plant following 1988, simply as "Beazer." Please keep in mind, however, that the two are one and the same company; only the name was changed.

Beazer understands that Koppers Industries, Inc. changed its name to Koppers Inc. in February 2003.

The two companies, Beazer and Koppers Inc. are separate entities with no common ownership. Koppers Inc. is publicly traded on the New York Stock Exchange with its own individual officers and directors. Beazer, on the other hand, is a privately owned company whose ultimate parent is the British company Hanson PLC. There are no common officers, directors, or ownership interests between the two companies. Rather, they are totally separate and distinct corporate entities.

Beazer consulted with Ms. Jill Blundon in preparing this Response and will provide flow charts indicating Beazer and Koppers Inc. corporate name and Grenada Plant ownership changes.

Information Request No. 2: Please provide a copy of the Asset Purchase Agreement between Beazer East, Inc. and Koppers Inc., including all schedules and attachments.

Response: Beazer is providing the United States Environmental Protection Agency ("USEPA") with a copy of both the text to the December 29, 1988 Asset Purchase Agreement between Beazer and Koppers Inc. and the July 15, 2004 Amendment to the Asset Purchase Agreement, pursuant to an agreement reached during the April 11, 2007 meeting in Atlanta, GA between representatives of the USEPA, Beazer and Koppers Inc.

Information Request No. 3: Provide an electronic and a hard copy of the GEOBASE database for soils and groundwater developed in 1994.

Response: Neither Beazer nor its consultants possess a "GEOBASE database for soils and groundwater developed in 1994." In the 1990s, pursuant to its ongoing remedial duties at the Grenada Plant, Beazer requested that its then-remediation consultant, AWD Technologies, create a database containing soil and groundwater data points generated at the Grenada Plant. Presumably, this is the "GEOBASE database" which the USEPA's information request seeks. This database no longer exists.

Instead, because Beazer has changed consultants several times since that database was created, data that had been contained in the "GEOBASE database" has been incorporated into other databases containing Grenada Plant-related data. Beazer's current consultant, GeoTrans, has compiled data available to it concerning Grenada Plant soils and groundwater. Contained within the GeoTrans database are entries whose source is attributed to "GEOBASE." It is our understanding that this data was once contained in the "GEOBASE database."

Beazer is producing to the USEPA electronic copies of two GeoTrans databases. The first, entitled "Grenada 03-16-2007," contains the universe of soil and groundwater data points compiled by GeoTrans for the Grenada Plant (13,286 soil records and 40,004 groundwater records). The second, "Grenada 03-16-2007 Geobase," contains only those data points from "Grenada 03-16-2007" that identify GEOBASE as their source (7,093 soil and 18,817 groundwater records). Hard copies of the "Grenada 03-16-2007 Geobase" are also being provided to USEPA for its review.

Beazer consulted with Jennifer Abrahams, GeoTrans, and Michael Bollinger, Three Rivers Management, Inc., an affiliate of Beazer, in compiling this Response.

Information Request No. 4: What year was the adjacent Carver Circle Community built? Please include any documentation that you consulted in answering this question.

Response: Beazer sold 206 acres of property to Guy Branscome on June 10, 1955. This sale involved 176 acres located south of the central ditch on the Grenada Plant's eastern border, which remains – to this day – scrubland and/or pasture. The 1955 sale also included 30 acres of scrubland and/or pasture on the Grenada Plant's northeast border (south of Tie Plant Road) which were ultimately developed into the Tie Plant School subdivision (a/k/a "Carver Circle Community"). Mr. Branscome resold the 30 acre plot to John Andrews and Donald Ross on September 29, 1956 and they subsequently subdivided, sold and developed the land.

Review of historical aerial photos of the Grenada Plant and the nearby environs have been performed by both Dr. Raymond Ferrara and Mr. Wayne Grip[1] – both of whom conclude that the former Grenada Plant property upon which the Carver Circle Community was constructed had never been used for wood treating or ancillary Grenada Plant operations. Rather, the photos indicate that the parcel was used solely as scrubland and/or pasture prior to the 1955 sale. The following documents are being produced to the USEPA in response to this Request:

CARVER CIRCLE

- 6/10/55 Warranty Deed between Koppers Company, Inc. and Guy Branscome selling 206 acres (30 of which were ultimately developed into Carver Circle neighborhood) (EPA-GR 000303-000304)
- 9/29/56 Sale of land to be developed into Carver Circle neighborhood by Guy Branscome to John Andrews and Donald Ross (developers of Tie Plant School Subdivision) (EPA-GR 000305-000309)
- Drawing of Tie Plant School Subdivision (EPA-GR 000310-000311)

See also May 27, 2005 Ferrara Report Figure 10A to 10O as evidence land on which Carver Circle Community was built was never used for wood treating operations or storage prior to 1955 sale (EPA-GR 010932-011080); May, 2005 AeroData report for historical aerial photos depicting evolution of Grenada Plant and surrounding environs (EPA-GR 010932-011080)

Information Request No. 5: Was the Carver Circle Community built upon land that was previously part of the wood treatment facility site? Please include any documentation that you consulted in answering this question.

[1] Dr. Raymond Ferrara, Ph.D. and M.E., was retained by both Koppers Inc. and Beazer in litigation involving certain residents of the Carver Circle Community and the Grenada Plant, and is recognized as an expert in contaminant fate and transport. Currently a principal environmental scientist with Omni Environmental, Dr. Ferrara has 25 plus years experience in environmental engineering and water quality monitoring. Mr. Wayne Grip, president of AeroData, Inc. was also retained by Koppers Inc. and Beazer and is a geologist, cartographer, photographer, and photointerpreter with a 29 year history in environmental photointerpretation. Mr. Grip has mapped and interpreted over 30 wood treating facilities from an environmental standpoint.

Response: The land upon which the Carver Circle Community was built was owned by Beazer prior to 1955. Review of historical aerial photos of the Grenada Plant and its environs indicate that the land on which the Carver Circle Community is now located was scrubland and/or pasture prior to the sale and that no wood treating or ancillary operations ever took place on that acreage. At no point do the extensive historical aerial photos of the Plant indicate that the parcel ultimately developed into the Carver Circle Community was ever used for wood treating, storage or other Plant operations.

The land sold to Mr. Branscome remained undeveloped following its sale to Messrs. Andrews and Ross until it was subdivided and developed into the Carver Circle Community in the early 1960s.

Documents relied upon in responding to this Request include Figures 10A to 10O from the May 27, 2005 Raymond Ferrara expert report which contain a detailed analysis of historical aerial photos of the land which was ultimately developed into the Carver Circle Community. Beazer also relied upon the May 2005 expert report of Wayne Grip in responding to this Request.

Information Request No. 6: On a site map or diagram that shows the northeast boundary of the site, and the Carver Circle Community, please depict the entire length of the marshy area, including its dimensions.

Response: Beazer is unable to determine what the USEPA intends when it refers to the undefined term "marshy area," and requested clarification from the USEPA at the April 11, 2007 meeting. At that time, representatives of the USEPA agreed to provide additional guidance as to the physical location of the "marshy area" referenced by this Request. Once additional guidance is provided, Beazer will supplement this Response if necessary. By way of further response, Beazer refers USEPA to the May 27, 2005 expert report of Dr. Raymond Ferrara which, based upon analysis of Grenada Plant topography, depicts the evolution of the Plant's surface water drainage and watersheds. (Figures 5A through 8C). Beazer also refers USEPA to the May 2005 Opinions of Wayne Grip which contain a detailed analysis of Plant aerial photos and topography and delineates surface water drainage for the following years: 1937, 1941, 1943, 1949, 1952, 1954, 1956, 1957, 1963, 1968, 1975, 1979, 1980, 1985, 1988, 1992, 1996, and 2005.

Information Request No. 7: Did Beazer East, Inc., or any predecessor companies, ever dispose of wastewater from the wood treatment process through a spray irrigation system? If so, please explain over what period of time this was done, what chemical constituents would have been present in the wastewater, and the basis of your information.

Response: Beazer utilized spray irrigation systems as a final stage in the treatment of the Grenada Plant's effluent from 1969 until July 13, 1988. Utilization of spray irrigation fields as a wastewater treatment option came into usage at wood treating plants and other industries in the wake of the USEPA's determination during this time period to place "zero discharge" surface discharge limitations on certain wastewaters.

Spray irrigation, as the final stage of the Grenada Plant's effluent treatment system, was implemented in response to the State of Mississippi's July 31, 1971 deadline requiring Mississippi-based wood treating plants to obtain "adequate waste treatment and control." In February 1971, the State granted conceptual approval for spray irrigation to be used as a final step in the treatment of Grenada Plant effluent. From May 1, 1972 to July, 1988, Beazer was permitted by the State of Mississippi to operate a zero discharge sprayfield ("main sprayfield") located in the northeast corner of the Grenada Plant property. Process effluent was subject to treatment prior to irrigation on the main sprayfield, including carbon filtration, solar oxidation, evaporation, flocculation, and oil/water separation. Analyses of the effluent being sent to the main sprayfield demonstrated the effectiveness of the pre-treatment technology employed by Beazer. The main sprayfield applied treated effluent over several acres for biodegradation purposes, was surrounded by both a berm and a fence, and was generally not operated during rain events. That effluent irrigated on the main sprayfield was confined within the bermed area is evidenced in the clearly demarcated circles surrounding the sprayfield's nozzles visible in aerial photos taken during the unit's period of operation. During its operational history, the main sprayfield was the subject of inspections performed by state agency personnel. One such state inspection, in 1981, found the Grenada Plant's zero discharge system to be "one of the better systems to be found in this State, of the disposal of wood treating waste." USEPA, likewise, praised the technology after having reviewed many wood treating operations that utilized this technique across the country. In its 1981 Development Document for Effluent Limitations Guidelines and Standards for the Timber Products Point Source Category, USEPA recognized spray irrigation as a "viable method of treatment for [wood treating] industry [effluent] even though it is more land intensive and may be more expensive than other alternatives."

Over the years, a line of trees grew up between the main sprayfield and both Tie Plant Road to the north and the Carver Circle Community to the east. The main sprayfield was taken out of service in mid-1988 and closed as a solid waste (as opposed to hazardous waste) management unit in accordance with a closure plan approved by USEPA in January 1991. A January 22, 1987 Report of Hydrogeologic Findings analyzed the main sprayfield's soil and groundwater and, in verifying its effectiveness, found no evidence that the unit had adversely impacted Grenada Plant groundwater quality. The State agreed with these findings on February 10, 1987.

Two experimental fields were also utilized on the Grenada Plant to verify the effectiveness of biodegradation as a final treatment step for wood treating effluent. The first, referred to as the "Thompson experimental sprayfield," was created in 1969 by Dr. Warren Thompson, then a Professor at Mississippi State University, who also worked with USEPA in developing wood treating effluent standards and methods. The Thompson experimental sprayfield operated until approximately 1971 and was located on ¾ of an acre behind the main office which sloped down to the central ditch. Effluent was irrigated on the plot at the high end of the slope, and samples of the effluent/percolate were analyzed to gauge the biodegradation process. The Thompson experimental sprayfield was located either in or adjacent to the area identified by USEPA as Solid Waste Management Unit 11 which was capped and closed as part of the Grenada Plant's Interim Measures.

The second experimental field, the "pentachlorophenol experimental sprayfield," received only pentachlorophenol-containing effluent on a 70 by 140 foot plot underlain by a butyl-rubber liner and surrounded by a berm. The experimental plot also contained an underdrain system which facilitated sampling of the percolate. Analyses performed by Beazer demonstrated greater than 99% biodegradation of phenols and pentachlorophenol.

Finally, there was a temporary sprayfield located near the northeastern boundary of the Grenada Plant, as evidenced by a 1976 hand drawn map contained in a State inspection report concerning the Grenada Plant effluent system. The former Plant manager recalls that its use was discontinued shortly after its installation (approximately two to three months) and it received the same treated effluent as was biodegraded in the main sprayfield. As such, the temporary sprayfield irrigated effluent subject to an evolving multi-stage treatment process which included carbon filtration, flocculation, solar oxidation, sedimentation and oil/water separation.

The following documents are being produced to the USEPA in response to this Request:

SPRAYFIELD PERMIT

- 11/5/69 Correspondence from MDEQ to D. Wagner imposing 7/31/71 as date upon which "all companies engaged in the treatment of wood and wood products to have adequate waste treatment or control facilities in operation" (EPA-GR 003425-003426)
- 2/10/71 Correspondence from D. Wylie (MDEQ) to R. Ohlis granting conceptual approval of spray irrigation as final step in Grenada Plant effluent treatment system (EPA-GR 003427-003428)
- 8/30/71 Correspondence from Glen Wood (MDEQ) to R.S. Ohlis enclosing Tolerance Permit No. 000120 allowing Grenada Plant to discharge wood treating effluent to Bogue Creek (EPA-GR 003429-003430)
- 5/01/72 Correspondence from Glen Wood (MDEQ) to R.S. Ohlis enclosing "Zero Discharge" Operating Permit No. 001519 allowing discharge to "soil irrigation fields" (EPA-GR 003431-003432)
- 3/26/76 Correspondence from Herbert Chapman (MDEQ) to Koppers Co., Inc. enclosing "Zero Discharge" Operating of Permit No. 76-024 (EPA-GR 003433-003439

MAIN SPRAYFIELD - LOCATION/OPERATION

- 2/17/71 Correspondence from J.A. Kennedy to B.G. Bartley seeking permission to expend $30,635 on effluent project involving soil irrigation and discussing potential location of same (EPA-GR 003441-003443)
- 2/22/71 Correspondence from R.S. Ohlis to J.L. Campbell Re: Logan Wagner Property as location for sprayfield (EPA-GR 003444-003448)
- 9/09/76 Correspondence from Earl Richard (MDEQ) to Charles Branch detailing State inspection of Grenada Plant Sprayfield (including handwritten renderings of same) (EPA-GR 003449-003451)
- Grenada Plant Effluent Flow Diagram for 1977 (EPA-GR 003452)
- 1/81 EPA Development Document for Effluent Limitations Guidelines and Standards for the Timber Products Point Source Category describing soil irrigation as a "viable method of treatment for [the wood treating] industry even though it is more land intensive and may be more expensive than other alternatives." (EPA-GR 003453-003478)
- 10/26/81 Correspondence from Steve Spengler (MDEQ) to R.C. Bartlow Re: State inspection of Grenada Plant no-discharge effluent treatment and concluding that the Grenada Plant no-discharge treatment system is "one of the better systems to be found in this State, of the disposal of wood treating waste." (EPA-GR 003479)
- 2/05/85 Correspondence from T.A. Marr to R. Bartlow directing Grenada Plant not to spray irrigate effluent during rain events (EPA-GR 003480)
- 5/11/86 Correspondence from M.D. Lair (USEPA) enclosing Plan for Ground Water Monitoring Compliance Evaluation which includes description of Grenada Plant main sprayfield (EPA-GR 003481-003492)
- 1/22/87 Report of Findings Hydrogeologic Investigation submitted to MDEQ which concludes, *inter alia*, that there is no evidence that the sprayfield has adversely impacted Grenada Plant groundwater quality. (EPA-GR 003493-003649)

- 2/10/87 Correspondence from Jim Hardage (MDEQ) to Cyrus Markle stating, *inter alia*, that MDEQ agrees with the conclusions in Koppers Company, Inc.'s Hydrogeologic Investigation that the main sprayfield was not a source of groundwater contamination at the Grenada Plant. (EPA-GR 003650-003651)

See also January 9, 2006 Ferrara Report at Figure 3 for locations of Grenada Plant sprayfields (EPA-GR 012883-013012)

MAIN SPRAYFIELD EFFLUENT

- 11/28/72 Correspondence from C.W. Fisher to R.S. Ohlis enclosing analysis of Grenada Plant effluent – including water sent to main sprayfield (EPA-GR 003653-003655
- 3/14/73 Correspondence from C.W. Fisher to Kennedy enclosing analysis of Grenada Plant effluent – including water sent to main sprayfield ("final lagoon exit end") and creosote and pentachlorophenol waste (EPA-GR 003656-003659)
- 1/28/75 Correspondence from L. Whitaker, etc. to J. Gillespie containing analysis of soil filtrate from sprayfield (EPA-GR 003660)
- 9/29/76 Correspondence from Garry Garretson to R.S. Ohlis enclosing analysis of Grenada Plant effluent (EPA-GR 003661-003662)
- 10/14/76 Correspondence from R. Hepner to R. Ohlis enclosing analysis of waters sent to main sprayfield from Grenada Plant final lagoon (EPA-GR 003663-003666)
- 5/26/77 Correspondence from Thomas Marr to Warren Thompson enclosing analysis of Grenada Plant final lagoon water prior to spray irrigation (EPA-GR 003667-003668)
- 11/01/84 Correspondence from Charles Brush to Jimmy Smith enclosing analysis of Grenada Plant "spray field water" and monitoring wells (EPA-GR 003669-003735)
- 5/31/85 Correspondence from R.D. Hepner to J.A. Petkunas Re: Characterization Study of Grenada Plant effluent and Sprayfield Soil (EPA-GR 003736-003752)
- 7/11/85 Correspondence form J.A. Petkunas enclosing March 1985 Wastewater Characterization Study (including waters sent to sprayfield and sprayfield soils) (EPA-GR 003753-003768)
- 12/03/85 Correspondence from J.M. Butala to Jeffrey Spencer Re: Health effects assessment performed on samples reported in 7/11/85 Wastewater Characterization and reporting that the polychlorinated dibenzo-p-dioxin and polychlorinated dibenzofuran content in Grenada Plant effluent "is toxicologically insignificant" (EPA-GR 003769-003799)
- 4/02/87 Correspondence from R.D Hepner to J. Spencer enclosing Results of Analyses on onsite, surge tank effluent and storm run-off water collected at the Grenada plant on 1/21/87 (EPA-GR 003800-003837)
- 12/13/84 Correspondence from R.D. Hepner to T.A. Marr enclosing analysis of run-off from spray irrigation field (EPA-GR 003838-003841)
- 4/23/87 Correspondence from R.M. Morosky to James Hardage enclosing Report of Findings Spray Field Characterization (involving analysis of sprayfield soil samples) (EPA-GR 003842-003891)

MAIN SPRAYFIELD INSPECTION LOG

- Samples of Wastewater Treatment System Weekly Inspections (EPA-GR 003893-

003971)

MAIN SPRAYFIELD CLOSURE

- 6/10/88 Correspondence from R. Anderson to J. Hardage (MDEQ) enclosing RCRA closure plan for main sprayfield (EPA-GR 003973-003979)
- 5/26/89 internal memorandum to file from Kaleel Rahaim (MDEQ) concluding that Grenada Plant main sprayfield will be considered solid waste management unit (EPA-GR 003980-003982)
- 1/07/92 Correspondence from Gregory Gardner to MDNR enclosing Final Report on Sprayfield Closure (cc: James Scarbrough, USEPA) (EPA-GR 003982-004050)

CONSTRUCTION/OPERATION OF THOMPSON EXPERIMENTAL SPRAYFIELD

- 12/09/69 Correspondence from J.A. Kennedy to Robert Wright (MDEQ) Re: anticipated plant additions including proposed use of land irrigation as final step in effluent treatment (EPA-GR 004052- 4054)
- 5/21/70 Trip Report regarding Grenada Plant (includes discussion of Thompson Experimental Sprayfield) (EPA-GR 004055-004072)

See also January 9, 2006 Ferrara Report at Figure 3 for locations of Grenada Plant sprayfields (EPA-GR 012883-013012)

ANALYSIS OF EFFLUENT SENT TO THOMPSON EXPERIMENTAL SPRAYFIELD

- 11/09/70 Correspondence from C.W. Fisher to R.S Ohlis enclosing effluent analyses for Thompson experimental irrigation sprayfield (EPA-GR 004074-004076)
- 1/06/71 Correspondence from Environmental Health and Safety to R.S. Ohlis enclosing analysis of effluent sampled at Thompson experimental irrigation sprayfield (EPA-GR 004077-004079)
- 3/15/71 Correspondence from C.W. Fisher to R.S. Ohlis enclosing effluent analyses from Thompson experimental irrigation area (EPA-GR 004080-004083)
- 5/17/71 Correspondence from Environmental Health and Safety to R.S. Ohlis enclosing effluent analyses (EPA-GR 004084-004086)

PENTACHLOROPHENOL EXPERIMENTAL SPRAYFIELD – LOCATION/OPERATION

- 6/25/74 Correspondence from J.A. Kennedy to R.S. Detrick authorizing pentachlorophenol experimental sprayfield (EPA-GR 004088)
- Diagram of under drain system built into Pentachlorophenol Experimental Sprayfield to facilitate collection and analysis of effluent percolate (EPA-GR 004089)
- 3/19/75 Trip Report discussing construction of pentachlorophenol experimental sprayfield (including installation of butyl-rubber liner) (EPA-GR 004090-004096)
- 4/22/75 Trip Report evaluating effectiveness of pentachlorophenol Experimental Sprayfield (EPA-GR 004097-004102)
- 12/23/75 Correspondence from J.L Wilson to P.A. Goydan enclosing Progress Report of the Grenada Plant pentachlorophenol experimental spray irrigation field (demonstrating up to %99.9 degradation of phenols and %99.8 degradation of pentachlorophenol)

(EPA-GR 004103-004109) - 8/31/78 Correspondence from R.D. Hepner to T.A. Marr enclosing Summary Report entitled "Spray Irrigation of Pentachlorophenol Containing Wastewaters Experimental Sprayfield at Grenada, MS" (demonstrating that "penta is degraded to simple non-toxic materials") (EPA-GR 004110-004184) - 8/16/79 Correspondence from R.D. Hepner to G. Kitazawa concluding Grenada Pentachlorophenol Experimental Sprayfield project (EPA-GR 004185) - 7/23/80 Correspondence from A.C. Middleton to A. Wm. Lawrence enclosing report on performance Grenada Pentachlorophenol Experimental Sprayfield (EPA-GR 004186-004202) *See also* January 9, 2006 Ferrara Report at Figure 3 for locations of Grenada Plant sprayfields (EPA-GR 012883-013012)
TEMPORARY SPRAYFIELD – LOCATION - 9/09/76 Inspection of Grenada Plant Effluent System, including handwritten renderings of same (EPA-GR 004204-004206) - Excerpts from Willie Ellis 11/14/05 Deposition (Pages 34-37, 50-57) (EPA-GR 004207-004208) - Excerpts from Raymond Ohlis 1/07/05 Deposition (Pages 122-125) (EPA-GR 004211-004212) - Excerpts from Ray Ohlis 6/02/05 Deposition (Pages 70-73) (EPA-GR 004213-0042014) - Excerpts from Ray Ohlis 11/03/05 Deposition (Pages 50-53, 70-73,74-77) (EPA-GR 004215-004218) *See also* January 9, 2006 Ferrara Report at Figure 3 for locations of Grenada Plant sprayfields (EPA-GR 012883-013012)

Information Request No. 8: On a site map or diagram, that includes the Carver Circle Community, please depict the locations where Beazer East, Inc., or any predecessor companies, ever sprayed wastewater.

Response: Beazer is producing to USEPA the January 9, 2006 Raymond Ferrara expert report which, at Figure 3, portrays both the Carver Circle Community and the approximate locations of the four areas used by the Grenada Plant for biodegradation of wood-treating effluent: the main sprayfield; the Thompson experimental sprayfield; the pentachlorophenol experimental sprayfield; and the temporary sprayfield.

Information Request No. 9: Submit all previous sampling results for wastewater referenced in questions 7 and 8 above.

Response: As stated previously in response to Request No. 7, Beazer utilized four separate spray irrigation plots: the main sprayfield; the Thompson experimental sprayfield; the pentachlorophenol experimental sprayfield; and the temporary sprayfield.

The main sprayfield was permitted by the MDEQ as the final step in the Grenada Plant's "zero discharge" system from May 1, 1972 until July 1988. Process effluent was subject to numerous treatment methods prior to irrigation on this sprayfield ("main sprayfield"), including carbon filtration, solar oxidation, evaporation, flocculation, and oil/water separation. For a brief period, the main sprayfield was supplemented by the operation of the temporary sprayfield which received the same treated effluent as was irrigated on the main sprayfield. The temporary sprayfield was discontinued shortly after its installation (approximately two or three months). Sampling data verifying the effectiveness of the processes employed by Beazer to pre-treat wood treating effluent prior to its use in both the main and temporary sprayfield are being produced to the USEPA.

Two experimental fields were also utilized at the Grenada Plant to verify the effectiveness of biodegradation as a final treatment step for wood treating effluent. The Thompson experimental field, which operated from 1969 until 1971, was sampled to gauge the biodegradation process. The pentachlorophenol experimental sprayfield operated in the mid 1970s and contained both a rubber liner and underdrain system to facilitate sampling of the percolate. Analyses performed by Beazer demonstrate greater than 99% biodegradation of phenols and pentachlorophenol. Sampling data on wastewaters sent to and treated by these sprayfields are being produced to the USEPA.

Information Request No. 10: Please submit a site map or diagram showing the locations of the drainage ditches and swales that run between the road and the properties located in the Carver Circle Community. On this site map or diagram indicate the surface water migration pathway from the facility to and from these ditches and swales to the Carver Circle Community.

Response: Beazer is providing the USEPA with the May 27, 2005 expert report of Dr. Raymond Ferrara which contains numerous figures depicting the evolution of surface water drainage and watersheds on the Grenada Plant. (Figures 5A through 8C.) The May 27, 2005 Ferrara report also contains images demonstrating historical and current surface water flow in the off-site drainage ditches located in the Carver Circle Community. (Figures 9 and 9A). Beazer will also be providing the May 2005 Opinions of Wayne Grip, which depict historical drainage basins for the years 1937 to 1963, 1968, 1975 to 1992 and 1995 to 2005. The Grip Opinions also compare individual aerial photos with Plant topography in depicting storm and surface water drainage patterns for the following years: 1937, 1941, 1943, 1949, 1952, 1954, 1956, 1957, 1963, 1968, 1975, 1979, 1980, 1985, 1988, 1992, 1996, and 2005.

Prior to the 1988 sale of the Grenada Plant to Koppers Inc., stormwater discharges were not subject to regulation. As such, Beazer was not required to establish ponds, weirs and outfalls for collecting and sampling stormwater flow from the Grenada Plant property. Beazer understands that, as of 1992, Grenada Plant stormwaters were subject to a National Pollution Discharge and Elimination System ("NPDES") permit. Subsequently, Koppers Inc. established specific outfalls, pursuant to the Plant's NPDES permit, to control and allow sampling of, storwater flow. These outfalls, while not created, maintained or monitored by Beazer, will be referred to as "NPDES Outfalls."

As depicted in the Ferrara and Grip reports, surface water in the northern portion of the Grenada Plant – that which is adjacent to the Carver Circle Community – flows in four directions: (1) north to the northern stream and, ultimately, the Batupan Bogue (currently recognized as NPDES Outfall No. 7), (2) east to Tie Plant Road (currently recognized as NPDES Outfall No. 6), (3) to the woods south of Carver Circle (currently recognized as NPDES Outfall No. 5), and (4) south to the Central Ditch (currently recognized as NPDES Outfall No. 3).

The stormwater flow towards Tie Plant Road (i.e., the current Outfall No. 6) follows historical drainage swales from the northeastern corner of the Grenada Plant property to Tie Plant Road. (*See*, *generally*, 5/05 Grip Opinions at "Historical Photo Study by Date"). Prior to creation of the NDPES Outfalls by Koppers Inc., stormwater flow in the direction of Tie Plant Road left the Grenada Plant property, in an easterly direction, via an open ditch. (*See,* 5/05 Grip Opinions, "Historical Photo Study by Date" at 12/2/1957). Over time, as the Carver Circle Community developed, this historical swale was modified to transverse the parcel at 43 Carver Circle in an easterly direction until it reached a ditch on the west side of Carver Circle. There, drainage routed the water in a northerly direction until it crossed under Carver Circle and continued north (again in open ditch) to Tie Plant Road. (*See,* 5/05 Grip Opinions, "Historical Photo Study by Date," at 2/5/1963, 10/19/1968 and 5/18/1975.) Reaching Tie Plant Road, stormwater from both Outfall No. 6 and the Community at large traveled via open ditch east and, before reaching Tie Plant Elementary School, crossed under Tie Plant Road (north), and proceeded through the woods to where it ultimately emptied into the Batupan Bogue. Subsequent modifications have sharply curtailed any potential for human exposure to Plant stormwaters discharged from Outfall No. 6. Beazer understands that, in the mid-1990s, the ditch conveying waters from Outfall No. 6 across 43 Carver Circle was enclosed in a buried metal culvert. Further, in 2005 the open ditches along Carver Circle and Tie Plant Road which convey waters from the neighborhood and Outfall No. 6 were enclosed. Where waters formerly traveled under Tie Plant Road into the woods north of the Tie Plant Elementary School, they now travel (underground) eastward, along Tie Plant Road, to a point beyond the eastern portion of Carver Circle Community. At that point, next to open fields, the waters flow in an open ditch to allow for drainage from the fields until they pass north, beneath Tie Plant Road, through the woods and ultimately into the Batupan Bogue. (*See* 5/05 Grip Opinions, "Historical Photo Study by Date," 2/11/1996 and 2/5/2005, and "Grenada Mississippi Wood Treating Facility – Section 3007 Information Request" Powerpoint dated April 11, 2007 at slides 48 ("Carver Circle Drainage circa 1996"), 50 ("Carver Circle Drainage circa 2005") and 51 ("Current Carver Circle Drainage")).

Stormwater flow to the woods south of Carver Circle Community (now Outfall No. 5) has never flowed through any swales or ditches in the Carver Circle Community. Rather, the waters have flowed, historically and currently, in a southeastern direction off the Grenada Plant property, south of the Carver Circle Community and then in a northern direction to Tie Plant Road at a point east of the Carver Circle Community. (*See*, *e.g.*, 5/05 Grip Opinions, "Historical Photo Study by Date," at 2/5/1963, 5/18/1975, 10/7/1979, 2/11/1996 and 2/4/2005).

Information Request No. 11: Submit all previous sampling results from the drainage ditches and swales referenced in question 10 above.

Response: Prior to the 1988 sale of the Grenada Plant by Beazer, on and off-site storm water was not required to be regularly analyzed or sampled. The sampling data generated prior to the Grenada Plant's sale is being produced. Further, pursuant to the Environmental Indicator Determination for the Grenada Plant, Beazer submitted to USEPA off-site litigation-derived soil, sediment and dust data gathered by Beazer, Koppers Inc. and plaintiff's attorneys. These data, which are resubmitted in response to the USEPA's Information Requests, included sediment from the drainage swales referenced in Request No. 10, and were relied upon by the USEPA in its October 18, 2005 determination that current human exposures (CA725) and migration of contaminated water (CA750) at the Grenada Plant are under control. The following documents are being produced to the USEPA in response to this Request:

STORMWATER SAMPLING (PRE '89)

- 3/18/74 Trip Report to establish program for collecting samples of Grenada Plant Stormwater (EPA-GR 004221-004225)
- 4/07/75 Report detailing Quality of Storm Water Runoff from Four Forest Products Division Plants (including Grenada) (EPA-GR 004226-004242)
- 5/27/75 Quality of Storm Water Runoff from Four Forest Products Division Plants Herbicides Investigations Supplement (including Grenada) (EPA-GR 004243-004266)

See also 9/02/05 Transmittal of on and off off-site sampling (dust, soil, sediment and surface water) pursuant to Environmental Indicator Determination for Grenada Plant from Allison Gargani to RCRA Programs Branch (EPA-GR 000313-000447); 10/18/05 Positive Environmental Indicator Determination (CA725 and CA750) for Grenada Plant (EPA-GR 000440)

Information Request No. 12: Please submit a facility map indicating the locations of Outfalls 5 and 6, and depict the storm water migration pathway from Outfalls 5 and 6 to the Carver Circle Community.

Response: Stormwater from wood treating operations in Mississippi was not subject to National Pollution Discharge and Elimination System (NPDES) permitting and monitoring requirements until 1992 – after Beazer's sale of the Grenada Plant in 1988. As such, Outfalls 5 and 6 were not designated or otherwise created while Beazer owned and operated the Grenada Plant. For further response to this Request, Beazer refers USEPA to the response of Koppers Inc. to this Request.

Information Request No. 13: Submit all previous sampling results and reports for Outfalls 5 and 6.

Response: As stated in response to Request No. 12, the creation and sampling of Outfalls 5 and 6 occurred after Beazer's sale of the Grenada Plant to Koppers Inc. Beazer does not possess sampling data from NPDES Outfalls 5 and 6, and refers USEPA to Koppers Inc.'s response to this Request.

Information Request No. 14: Has the private well located at the Tie Plant Elementary School ever been a drinking water source? If so, who used this well as a drinking water source, for what period of time, and how is this information known? Also, depict the location of this well on a map.

Response: Beazer understands that the Carver Circle Community was supplied with Grenada City/County water beginning in approximately 1976. It is unclear if the Tie Plant Elementary School well was a possible historic source of drinking water for the Carver Circle Community prior to 1976. Beazer's RCRA Facility Investigation indicates that the Tie Plant Elementary School well was closed in approximately 1976. However, Beazer has no documentation to support the use of the school well as a community water source or the actual date of the well's closure.

Beazer possesses analytical data concerning the water quality of the Grenada Plant water supply well, which is located between the Plant's central process area and the Tie Plant Elementary School well. The Grenada Plant water supply well (488 feet deep) is installed at a comparable depth to that of the Tie Plant Elementary School well (550 feet deep). Based upon regional geologic cross sections reported in the July 2003 Complete Phase II RCRA Facility Investigation Report, Beazer understands that both the Grenada Plant water supply well and the Tie Plant Elementary School are likely screened within the same aquifer. As such, and given the Grenada Plant water supply well's location, it is more likely to demonstrate any impact to the groundwater at this depth from Plant operations. Analysis of the Grenada Plant water supply well submitted to USEPA in September 2006 demonstrated "non-detect" for benzene, ethyl benzene, toluene, xylenes, polynuclear aromatic hydrocarbons, and pentachlorophenol.

Furthermore, extensive groundwater monitoring performed during the RCRA Facility Inspection demonstrates that impacted groundwater, at any depth, is not migrating towards the Carver Circle Community. The following documents are being produced to the USEPA in response to this Request:

<u>TIE PLANT SCHOOL WELL</u>

"Identification of Tie Plant School Well to USEPA"

- 3/10/94 Correspondence from Norton E. Jessup to Jacq Marie Jack enclosing Draft Report Phase II Facility Investigation Vol. I of III June 1992 (Figure 3-3 "Water Supply Wells Within Four Mile Radius of Site") (EPA-GR 000228—000231)
- 5/25/03 Correspondence from Jennifer Abrahams to RCRA Branch enclosing Complete Phase II RCRA Facility Investigation Report Volume I July 2003 (Table 2-1 "Water Supply Wells within a Two Mile Radius of Site;" Figure 2-10 "Water Supply Wells within 20Mile Radius of Site") (EPA-GR 000232-000237)

MDEQ File on all Supply Wells located 1 mile from Grenada Plant

- Water Well record from O.I. Neal Well (4/61) (EPA-GR 000239)
- Water Well record from Koppers Company Well (8/61) (EPA-GR 000240)
- Water Well record from McQuay, Inc. Well (8/18/62) (EPA-GR 000241)
- Water Well drillers log for McQuay, Inc. Well (7/11/69) (EPA-GR 000242)
- Water Well drillers log for (Unintelligible) Well (5/30/66) (EPA-GR 000243)
- Water Well drillers log for Sutton Well (7/30/69) (EPA-GR 000244-000245)
- Water Well drillers log for Tie Plant Water and Sewer District Well (12/20/72) (EPA-GR 000246-000247)
- Water Well drillers log for Neyton Well (9/28/73) (EPA-GR 000248-000249)
- Water Well drillers log for Branscone Well (9/16/64) (EPA-GR 000250)
- Water Well drillers log for Thorpe Well (5/27/78) (EPA-GR 000251)
- Water Well drillers log for Gulidge Well (8/27/82) (EPA-GR 000252)
- Water Well decommissioning form for groundwater monitoring well on Grenada Plant property (7/24/01) (EPA-GR 000253)
- Water Well decommissioning form for groundwater monitoring well on Grenada Plant property (7/24/01) (EPA-GR 000254)

Grenada Plant Supply Well

- Water Well driller log for Koppers Company (8/61) (EPA-GR 000256)
- Well Schedule for Koppers Company Well (EPA-GR 000257-000257)

Analyses of Grenada Plant Supply Well

- 4/27/82 Correspondence from R.D. Hepner to R.C. Bartlow enclosing Well Water Analyses (EPA-GR 000239-000263)
- 6/01/88 Correspondence from R.S. Ohlis enclosing 6/13/88 Correspondence from Jean

Willlis concerning analysis of Grenada Plant supply well (EPA-GR 000264-000265)

- 12/27/89 Correspondence from Mathew Plautz to J.D. Clayton enclosing laboratory results of water sample taken from the fire hydrant at the southern end of the KII facility (EPA-GR 000266-000270)
- 9/25/00 Fax Cover Sheet from Tim Basilone to Anthony Mayhan enclosing analytical results for water supply well at the KII Grenada Facility (EPA-GR 000271-000272)
- 2/24/05 analysis of Grenada Plant supply well (EPA-GR 000273-000274)
- 9/25/06 Correspondence from Jennifer Abrahams to RCRA Programs Branch enclosing Annual Sampling Results for Plant Production Well (EPA-GR 000275-000277)
- 10/27/06 Correspondence from Jennifer Abrahams to RCRA Programs Branch enclosing 2006 Annual Sampling Results for Plant Production Well with Full Laboratory Documentation (EPA-GR 0002378-000296)

Groundwater Concentrations

- Figure 1, "Groundwater Sampling Locations," GeoTrans, 3/16/03 – demonstrates where monitoring wells and single sampling events have occurred on Grenada Plant property. (EPA-GR 000298)
- Figure 3-6, "Upper Sand Zone Groundwater Locations," 8/3/99 – demonstrates the horizontal extent of benzene, pentachlorophenol and total PAH concentrations in upper sand zone groundwater located beneath Grenada Plant (EPA-GR 000299)
- Figure 3-5 "Lower Sand Zone Groundwater Locations," 8/3/99 – demonstrates the horizontal extent of benzene, pentachlorophenol and total PAH concentrations in lower sand zone groundwater located beneath Grenada Plant (EPA-GR 000300)

See also May 27, 2005 Ferrara Report of Figure 19 for locations of local water supply wells (EPA-GR 010932-011080)

Information Request No. 15: Did Beazer East, Inc., or any predecessor companies, ever treat wood products with CuCZC (copper chromated zinc chloride) in the past? Please provide dates and details of its use and disposal.

Response: Documents have been located which demonstrate that a small cylinder at the Grenada Plant was devoted to the treatment of wood with copperized chromated zinc chloride ("CuCZC") prior to 1968. It is unknown when CuCZC was first used at the Grenada Plant. Beazer is unaware of additional dates or details of CuCZC's use or disposal at the Grenada Plant. The treating cylinder which had been used for CuCZC treatment was subsequently converted to use as a blow down tank.

The RCRA Facility Investigation was supplemented at the USEPA's request with metals sampling (arsenic, chromium and copper) of the Plant's soils and groundwater. These tests revealed that arsenic, chromium and copper levels at the plant "are consistent with naturally occurring levels." *See* May 18, 2004 correspondence from Jennifer Abrahams to USEPA.

Documents relied upon to answer this Request are being produced to the USEPA.

Information Request No. 16: Did Beazer East, Inc., or any predecessor companies, ever produce sludges as a by-product of the wood treatment process? If so, please indicate what chemical constituents would have been present in such sludges. Provide all sampling data of such sludges.

Response: Given the complexities of the wood-treating process, wood preservatives – creosote and pentachlorophenol in the Grenada Plant's case – necessarily come into contact with water, sand, soil and wood fibers, creating residuals of the wood treating process. These residuals can collect in the wood treating cylinders, process tanks, the basement beneath the cylinders, on the drip track, and in oil/water separators used to treat process effluent. Depending on the circumstances of their creation, wood treating residuals can have widely varied physical characteristics and regulatory significance. For instance, the USEPA has classified bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol as K001. Other residuals take the form of wastewaters, preservative drippage and spent preservatives from wood treating operations and were ultimately listed by USEPA as F032 (from plants using chlrophenolic treating formulations) and F034 (from plants using creosote formulations) hazardous wastes following the 1988 sale of the Grenada Plant to Koppers Inc. Collectively, these sludges and residuals will be referred to simply as "wood treating residuals."

Generally speaking, the Grenada Plant did not analyze its wood treating residuals prior to Beazer's sale of the Grenada Plant in 1988 based upon Beazer's knowledge of its wastestreams. Beazer did perform limited testing of its "lagoon bottoms," which is being produced to USEPA.

Further, Beazer required representational analyses of the wood treating residuals received by the Grenada Plant from other Beazer wood treating operations for use as fuel additive in the Grenada boiler between 1983 and December 28, 1988. During that time, the use of fuel additive consisting of 5% wood treating residuals mixed with 95% untreated wood chips as Grenada Plant boiler fuel was permitted by the MDEQ and supported by the results of numerous fuel additive test burns demonstrating the boiler's destruction and removal efficiencies. The wood treating residuals the Grenada Plant used in its fuel additive was required to meet, regardless of source, specific standards detailed in the Fuel Additive Guidelines pertaining to BTU and metal content and physical characteristics. The Fuel Additive Guidelines were established by Beazer and approved by MDEQ. Wood treating residuals not meeting the Fuel Additive Guidelines were rejected as inappropriate for use as Grenada boiler fuel. The following documents are being produced to the USEPA in response to this Request:

PROCESS WASTE RECEIVED AND CHEMICAL ANALYSIS OF SAME

- Exhibit 12 AA to February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Analysis of Wastes Shipped to Grenada" (EPA-GR 007721-007722)
- Analytical Data relied upon by Joseph Santoleri in compiling Exhibit 12 AA (Analysis of Wastes Shipped to Grenada): Hazardous Waste Manifests and Fuel Additive Analyses received by Grenada Plant in connection with shipments of fuel additive from Koppers Company and Koppers Industries wood treating plants and Koppers Industries, Inc. wood treating customers. (EPA-GR 007723-008552)

See, generally, June 1, 2005 JJS-1 "Opinion of Joseph J. Santoleri, P.E." and February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Analysis of Wastes Shipped to Grenada" (EPA-GR 013013-013088)

BOILER AND PROCESS WASTE DURATION, QUANTITY AND TOTAL BURNED - Exhibit JJS-17 to February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Daily Logs of Boiler Fuel Additive Operation – 1983 to 1991" (EPA-GR 008554-008612) - Exhibit 14A to February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Cumulative Metal Weight in Process Wastes" (EPA-GR 008613-008614) - Fuel Additive-related documents relied upon by Joseph Santoleri in compiling Exhibits JJS-17 (Daily Logs of Boiler Fuel Additive Operation – 1983 to 1991) and 14A (Cumulative Metal Weight in Process Wastes): Grenada Plant Boiler Stack Charts and Fuel Additives Logs demonstrating the duration and quantity of Fuel Additive Burned from 1983 to 1991 (EPA-GR 008615-009101) *See*, generally, June 1, 2005 JJS-1 "Opinion of Joseph J. Santoleri, P.E." (EPA-GR 012786-012882) and February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Analysis of Wastes Shipped to Grenada" (EPA-GR 013013-013088)
GRENADA PROCESS WASTE ANALYSIS -10/31/85 Correspondence from Bruce Hockenberry to John Kane concerning analysis of dewatered Grenada Plant lagoon material (EPA-GR 009103) *See also* 3/14/73 Correspondence from C.W. Fisher to Kennedy enclosing analysis of Grenada Plant effluent – including water sent to main sprayfield ("final lagoon exit end") and creosote and pentachlorophenol waste (EPA-GR 003626-003659)

Information Request No. 17: Did Beazer East, Inc., or any predecessor companies, ever receive sludges from other wood treatment facilities, including other Beazer facilities? Please indicate from where sludges were received, and provide dates. Indicate what chemical constituents were present in such sludges, and submit all records showing the chemical composition of sludges received.

Response: Consistent with, and in furtherance of, USEPA's promotion of industrial boilers and furnaces to burn secondary materials in support of RCRA's "burning for energy recovery" program, and pursuant to Operating Permit No. 0960-00012, Beazer was permitted by the State of Mississippi to test the use of creosote or pentachlorophenol wood treating residuals as a fuel for the Plant's boiler ("fuel additive") beginning in 1982.

Test burns using creosote or pentachlorophenol fuel additive mixed with untreated wood chips as boiler fuel in an approximately 5% waste to 95% untreated wood chips ratio were submitted to the MDEQ demonstrating appropriate destruction and removal efficiencies (99.9% or better). Subsequent test burns on wood treating residuals mixed with untreated wood chips submitted to the State further confirmed appropriate destruction and removal efficiencies (99.99% or better) in May, 1982, December, 1984, and May, 1988.

Having allowed for public notice, comment and hearing, the MDEQ issued the Grenada Plant an Operating Permit to use either creosote or pentachlorophenol wood treating residuals mixed with untreated wood chips as boiler fuel. Beginning in 1985, the Grenada Plant required that fuel additive meet, regardless of source, specific standards established by Beazer, approved by the State, and detailed in the Fuel Additive Program Guidelines, pertaining to BTU, metal content and physical characteristics. Wood treating residuals not meeting the Fuel Additive Guidelines were rejected as inappropriate for use as Grenada boiler fuel.

The use of the Grenada Plant's Wellons Cyclo Blast wood-waste furnace to burn fuel additive was specified by a Beazer engineer, and confirmed by representatives of Wellons, as an appropriate use of the furnace. Mr. Joseph Santoleri, an independent mechanical engineer retained by Beazer and Koppers Inc., has reviewed the Grenada boiler, its design and operation during the Fuel Additive Program, and concluded that "the Grenada system was an appropriate and reasonable design for the application for which it was intended."[2] In other words, the Grenada boiler was well suited to using fuel additive.

Beazer began burning fuel additives in the Grenada boiler in July 1983. Process waste deemed suitable for use as fuel additive in the Grenada boiler consisted of creosote and

[2] Mr. Santoleri, a mechanical engineer with over 50 years experience in combustion, heat transfer, energy recovery and air pollution control and 20 years experience specifically with industrial and commercial hazardous waste incinerators, boilers and industrial furnaces was retained by both Koppers Inc. and Beazer in litigation involving residents of the Carver Circle Community and the Grenada Plant.

pentachlorophenol wood treating residuals from the following of Beazer's operations: Grenada, MS; Florence, SC; North Little Rock, AR; Carbondale, IL; Denver, CO; Gainesville, FL; Green Spring, WV; Houston, TX; Montgomery, PA; Galesburg, IL; Kansas City, MO; Guthrie, KY; Oroville, CA; and Nashua, NH.

Prior to Beazer's December 1988 sale of the Grenada Plant to Koppers Inc., a "Creosote Take Back" program was established (with MDEQ approval) allowing creosote wood treating residuals meeting the Fuel Additive Program Guidelines to be received from Beazer's wood-treating customers and used as fuel in the Grenada boiler. There is no evidence, however, that Beazer received or burned any wood treating residuals from customers under the Creosote Take Back program prior to the Grenada Plant's sale. During the period in which Beazer burned fuel additive in the Grenada boiler, the operations were subject to routine and unannounced inspections by State of Mississippi personnel and Beazer was not found to be in violation of its boiler permit.

When Beazer sold the Grenada Plant to Koppers Inc. in December 1988, the Grenada boiler continued to use fuel additive as one of its fuel sources. The following documents are being produced to the USEPA in response to this Request:

BOILER PERMITS

- 12/14/79 Correspondence from Don Watts (MDEQ) to Ray Ohlis enclosing Permit No. 0960-00012 to Operate Grenada Plant Boiler (untreated wood as fuel) (EPA-GR 007264-007269)
- 5/14/82 Correspondence from Dan McLeod (MDEQ) to Ray Ohlis enclosing Permit No. 0960-00012 granting Koppers Company, Inc. six months to test burn wood-treating process waste (mixed with untreated wood) as boiler fuel (EPA-GR 007270-007274)
- Public Notice of Koppers Company, Inc.'s Application for permit to allow the use wood treating process waste (mixed with untreated wood) as boiler fuel (EPA-GR 007275-007277)
- 12/08/82 Correspondence from Dan McLeod (MDEQ) to R.C. Bartlow enclosing Permit No. 0960-00012 allowing Grenada Plant to use wood treating process waste (mixed with

untreated wood) as boiler fuel (EPA-GR 007278-007283) - 5/16/85 Correspondence from Dan McLeod (MDEQ) to R.C. Bartlow enclosing modified Permit to Operate No. 0960-00012 allowing Grenada Plant to use wood treating process waste (mixed with untreated wood) as boiler fuel (EPA-GR 007284-007289) - 11/27/85 Correspondence from Dan McLeod (MDEQ) to J.D. Clayton enclosing Permit No. 0960-00012 allowing Grenada Plant to use wood treating process waste (mixed with untreated wood) as boiler fuel (EPA-GR 007290-007297) - 6/29/89 Correspondence from C. Adams Smith (MDEQ) to J.D. Clayton reissuing Operating Permit No. 0960-00012 allowing Grenada Plant to use wood treating process waste (mixed with untreated wood) as boiler fuel (EPA-GR 007298)
SAMPLE BOILER/AIR INSPECTIONS - 3/05/86 Correspondence from Stanley Watkins (MDEQ) to Dan McLeod (MDEQ) enclosing Inspection Report Form and Visible emissions evaluation record for Grenada Plant boiler (EPA-GR 007300-007303) - 6/26/84 Correspondence from Stanley Watkins (MDEQ) to Dan McLeod (MDEQ) enclosing Visible emissions evaluation records for Grenada Plant boiler (EPA-GR 007304-007305) - 4/02/87 MDEQ Inspection Report for Grenada Plant boiler (EPA-GR 007306-007309) - 1/14/88 MDEQ Inspection Report for Grenada Plant Boiler (EPA-GR 007370-007312) - 4/08/88 MDEQ Inspection Report for Grenada Plant (EPA-GR 007313-007316)
FUEL ADDITIVE PROGRAM - 10/17/85 Correspondence from Charles Brush to James Hardage (MDEQ) enclosing Koppers Company, Inc. test methods used by Grenada Plant in determining acceptability of fuel additive received from Koppers Company, Inc. wood treating plants for use as fuel in Grenada boiler (EPA-GR 007318-007336) - 12/10/85 Correspondence from Martin Schlesinger to R. Ohlis enclosing Fuel Additives Program Guidelines for determining acceptability of fuel additive received from Koppers Company, Inc. wood treating plants for use as fuel in Grenada boiler (EPA-GR 007337-007357) - 5/03/90 Correspondence from S.T Smith to Rock Clayton and Gary McClelland enclosing Koppers Industries, Inc.'s Fuel Additives Program Guidelines for determining acceptability of fuel additive received from Koppers wood treating plants for use as fuel in Grenada boiler (EPA-GR 007358-007367) - 6/20/86 Memorandum from C.P Brush to C.P. Markle concerning representative sampling methods used in determining acceptability of fuel additive pursuant to Fuel Additive Program Guidelines (EPA-GR 007368)
TAKE BACK PROGRAM - 10/06/87 Correspondence from A.I. Domanico Re: Residue Handling Take-Back Program Meeting (discusses seeking MDEQ approval for Take Back Program) (EPA-GR 007370-007372) - 11/09/87 Correspondence from A.I. Domanico Re: Residue Handling Take-Back Program Meeting (discusses MDEQ approval of Take Back Program as to creosote

process waste only) (EPA-GR 007373-007374)

- 3/23/88 Correspondence from A.I. Domanico Re: Residue Handling Take-Back Program Meeting (discussing fact that Take Back Program will include only creosote process wastes that meet Fuel Additive Program Guidelines) (EPA-GR 007375)
- 2/24/89 Correspondence from R.T. Baileys to John Kress RE: Analysis of Fuel Additives pursuant to Take Back Program (EPA-GR 007376)
- 4/17/89 Correspondence from David King to Ron Sutherland Re: Analysis of Fuel Additive pursuant to Take Back Program (EPA-GR 007377-007378)
- 5/31/89 Correspondence from R.S. Ohlis to J.L. Kress Re: termination of Take Back Program (EPA-GR 007379)

START/STOP BURN PROCESS WASTE

- RCRA Inspection Report describing, *inter alia*, boiler fuel history for Grenada boiler (EPA-GR 007381-007383)
- 4/27/89 (sic) Correspondence from J.D. Clayton stating that Grenada Plant ceased burning hazardous waste (K001) on April 13,1987 (EPA-GR 007384)
- 6/04/91 Correspondence from R.S. Ohlis to W.R. Donley discussing intent to cease Fuel Additive Program on June 6, 1991 and containing handwritten note from J.D. Clayton that Fuel Additive Program ceased on June 5,1991 (EPA-GR 007385)

PROCESS WASTE STACK TESTS

- 10/18/79 Correspondence from Anthony Foster to MDEQ enclosing October 1979 stack Test Results (untreated wood as fuel) (EPA-GR 007387-007424)
- 8/23/82 Correspondence from William Baldwin to Dan McLeod (MDEQ) discussing results of May 1982 Stack Test (creosote or pentachlorophenol process waste mixed with untreated wood as fuel) (EPA-GR 007425-007426)
- 8/4/82 "Boiler Stack Tests with Sludges Mixed in Fuel" detailing stack tests performed in May 1982 (sent to MDEQ) (creosote or pentachlorophenol process waste mixed with untreated wood as fuel) (EPA-GR 007427-007442)
- 12/13/84 Fuel Additive Test Burn detailing stack test performed in 8/84 (sent to MDEQ) (creosote or pentachlorophenol process waste mixed with untreated wood as fuel) (EPA-GR 007443-007471)
- 5/09/88 Internal MDEQ Memorandum from Kenneth Petre to Danny Jackson discussing results of Stack Test conducted on Grenada Plant (creosote or pentachlorophenol process waste mixed with untreated wood as fuel) (EPA-GR 007472)
- 7/01/88 Correspondence form Robert Anderson to Dan Jackson (MDEQ) enclosing 6/88 "Koppers Company, Inc. Grenada, Mississippi Wood Fired Boiler Permit Renewal Test Burn" performed in June 1988 (creosote or pentachlorophenol process waste mixed with untreated wood as fuel) (EPA-GR 007473-007718)

PROCESS WASTE RECEIVED AND CHEMICAL ANALYSIS OF SAME

- Exhibit 12 AA to February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Analysis of Wastes Shipped to Grenada" (EPA-GR 007721-007722)
- Analytical Data relied upon by Joseph Santoleri in compiling Exhibit 12 AA (Analysis of

Wastes Shipped to Grenada): Hazardous Waste Manifests and Fuel Additive Analyses received by Grenada Plant in connection with shipments of fuel additive from Koppers Company and Koppers Industries wood treating plants and Koppers Industries, Inc. wood treating customers. (EPA-GR 007723-008552) *See*, generally, June 1, 2005 JJS-1 "Opinion of Joseph J. Santoleri, P.E." and February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Analysis of Wastes Shipped to Grenada" (EPA-GR 013013-013088)
<u>BOILER AND PROCESS WASTE DURATION, QUANTITY AND TOTAL BURNED</u> - Exhibit JJS-17 to February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Daily Logs of Boiler Fuel Additive Operation – 1983 to 1991" (EPA-GR 008554-008612) - Exhibit 14A to February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Cumulative Metal Weight in Process Wastes" (EPA-GR 008613-008614) - Fuel Additive-related documents relied upon by Joseph Santoleri in compiling Exhibits JJS-17 (Daily Logs of Boiler Fuel Additive Operation – 1983 to 1991) and 14A (Cumulative Metal Weight in Process Wastes): Grenada Plant Boiler Stack Charts and Fuel Additives Logs demonstrating the duration and quantity of Fuel Additive Burned from 1983 to 1991 (EPA-GR 008615-009101) *See*, generally, June 1, 2005 JJS-1 "Opinion of Joseph J. Santoleri, P.E." (EPA-GR 012786-012882) and February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Analysis of Wastes Shipped to Grenada" (EPA-GR 013013-013088)

<u>Information Request No. 18</u>: Did Beazer East, Inc., or any predecessor companies, ever burn sludges in the boiler furnace? If so, over what period of time, and approximately how much sludge was burned?

<u>Response</u>: As noted in Response to Requests Nos. 16 and 17, Beazer was permitted by the MDEQ to utilize fuel additive – a mixture of untreated wood chips and wood treating residuals – as fuel in the Grenada boiler. Specifications established by Beazer in the Fuel Additive Guidelines limited the use of wood treating residuals as boiler fuel to only those which met certain BTU, metal content and physical characteristic limitations approved by the MDEQ. Beazer used fuel additive in the Grenada boiler from 1983 until December 28, 1988. For a discussion of the amounts of wood treating residuals used in the Grenada boiler, Beazer refers the USEPA to Exhibit JJS-17 of Joseph Santoleri's February 10, 2006 "Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion" entitled "Daily Logs of Fuel Additive Operation – 1983 to 1991."

Information Request No. 19: How was the ash left over from the burning of sludges, referenced in question 18 above, dealt with? Submit all relevant analytical data.

Response: From 1983 until April 13, 1987, ash generated from the burning of wood treating residuals mixed with untreated wood in the Grenada boiler was disposed in the southeastern corner of the Grenada Plant property in a location known as the boiler ash landfarm. After that time, boiler ash generated from the use of fuel additive was sent to the Grenada municipal county landfill.

In 1987, the landfarm was identified as a solid waste management unit, rather than a hazardous waste management unit, and certified closed by the USEPA in 1991. Analyses of fly and bottom ash generated by the Grenada boiler's use of fuel additive demonstrate the boiler's efficiency in destroying wood treating residuals and their components. The following documents are being produced to the USEPA in response to this Request:

PROCESS WASTE ASH ANALYSIS - 1/22/85 Correspondence from R.D Hepner to C.J. Vita Re: Grenada Boiler Fly and Bottom Ash Analysis (EPA-GR 009106) - 4/16/86 Correspondence from D.L. King to C.P. Brush enclosing K001 Analysis of Grenada boiler fly and bottom ash (EPA-GR 009107-009108) - 8/28/86 Correspondence from Charles Brush to Jim Hardage (MDEQ) enclosing K001 analysis of Grenada boiler ash and cinders (EPA-GR 009109-009111) - 4/26/89 Correspondence from W.R. Donley to J.R. Batchelder Re: Volume of ash generated by Grenada boiler on daily basis (EPA-GR 009115) *See also* 10/18/99 Risk Based Engineering Assessment of Grenada County Landfill (EPA-GR 009414-009575)
BOILER ASH LANDFARM – OPERATION AND CLOSURE - 2/10/87 Correspondence from Jim Hardage (MDEQ) to Cyrus Markle stating, *inter alia*,

that ash from Grenada boiler is considered to be a solid waste and that land treatment unit (boiler ash landfarm) receiving ash is considered to be solid waste management unit (EPA-GR 009116-009117)

- 3/25/87 Administrative Order No. 1209-87 holding, *inter alia*, that ash generated from the burning of EPA listed wastes (K001) in Grenada boiler is hazardous; requiring Koppers Company, Inc. to stop placing ash on landfarm (EPA-GR 009118-009120)
- 4/23/87 Correspondence from Jill Blundon to MDEQ enclosing Petition by Koppers Co., Inc. challenging the finding that ash generated from the burning of listed wastes (K001) generated hazardous waste/ash (EPA-GR 009121-009153)
- 4/27/89 (sic) Correspondence from J.D. Clayton stating that Grenada Plant ceased burning hazardous waste (K001) on April 13, 1987 and started sending Grenada boiler ash to Grenada County Municipal landfill on May 7, 1987 (EPA-GR 009154)
- Complainant's Brief in Support of Commission Order No. 1209-87 (EPA-GR 009155-009158)
- 11/03/87 Correspondence from J.T. Palmer (MDEQ) to J.M. Batchelder enclosing Commission Order No. 1280-87 confirming that ash generated from the burning of listed wastes (K001) constitutes hazardous waste (EPA-GR 009159-009162)
- 11/30/87 Correspondence from Robert Anderson to Sam Mabry (MDEQ) enclosing closure plan for boiler ash landfarm (EPA-GR 009163-009260)
- 9/06/88 Correspondence from David Bockelmann (MDEQ) to J.R. Batchelder enclosing RCRA Inspection Report describing, *inter alia*, the history of Grenada Plant boiler ash landfarm, noting that ash in landfarm was not controlled for wind or surface water dispersion (EPA-GR 009261-009269)
- 9/22/88 Correspondence from Robert Anderson to David Bockelman (MDEQ) addressing concerns regarding boiler ash wind and surface water dispersion (EPA-GR 009270-009273)
- 10/88 Hydrogeologic Investigation of Boiler Ash Disposal Area (EPA-GR 009274-009385)
- 11/07/88 Agreed Order No. 1478-88 requiring payment of $6,000 to settle alleged violations concerning, *inter alia*, containment of wind and surface water dispersion of ash stored in boiler ash landfarm (EPA-GR 009386-009388)
- 12/12/88 RCRA Site Inspection of Grenada Plant discussing, *inter alia*, inadvertent use of K001 (oil/water separator waste) as boiler fuel and subsequent disposal of resultant ash at Grenada County Municipal landfill (EPA-GR 009389261-009393)
- 2/06/89 Correspondence from Robert Anderson to USEPA Waste Compliance Section enclosing, *inter alia*, certification that boiler ash has had not been placed on Grenada Plant boiler ash landfarm as of December 1, 1987 (EPA-GR 009394-009398)
- 5/26/89 Correspondence from Mathew Plautz to William Spengler (MDEQ) responding to concerns regarding air and surface water dispersion of ash stored in Grenada Plant boiler ash landfarm (EPA-GR 009399-009403)
- 5/05/89 Correspondence from Mathew Plautz to Kaleel Rahaim (MDEQ) discussing history of Grenada Plant boiler ash landfarm (EPA-GR 009404-009405)
- 6/27/89 Correspondence from Charles Chisolm (MDEQ) to Jill Blundon enclosing Agreed Order No. 1598-89 requiring Beazer to, *inter alia*, perform a risk-based engineering study of Grenada Municipal landfill to determine alleged impact caused by inadvertent disposal

of hazardous waste (ash) (EPA-GR 009406-009412)

- 6/30/89 Correspondence from S.T. Smith to Rock Clayton stating that oil/water separator wastes (considered by EPA to constitute K001 listed wastes) would no longer be burned as fuel additive in Grenada boiler (EPA-GR 009413)
- 10/18/89 Risk-Based Engineering Assessment Grenada County Landfill concluding, *inter alia*, that "the boiler ash disposed of by Koppers Company, Inc. . . . at the Grenada County Landfill does not appear capable of presenting any measurable incremental risk to human health or the environment vie either of the two possible exposure pathways" (EPA-GR 009414-009575)
- 6/90 Closure Construction Documentation Report for Grenada Plant Boiler Ash Landfarm (EPA-GR 009576-009884)
- 7/12/90 Correspondence from James Palmer (MDEQ) to Jill Blundon stating that closure has been completed for both the Grenada Plant's surface impoundment and boiler ash landfarm (EPA-GR 009885)
- 4/93 Final Report on Groundwater Quality Assessment of Grenada Plant Boiler Ash Disposal Area (EPA-GR 009886-010325)
- 2/16/94 Correspondence from Norton Jessup and Norbert Schulz to David Peacock (MDEQ) enclosing Report on Supplemental Investigation Addendum to Boiler Ash Landfill Groundwater Quality Assessment identifying upgradient source (Heatcraft facility) of TCE groundwater contamination (EPA-GR 010326-010339)

Information Request No. 20: Did Beazer East, Inc., or any predecessor companies, ever receive burn, or use materials or sludges containing herbicides, insecticides or polychlorinated biphenyl (PCBs)? If so, please provide details of the use of materials containing such constituents, and provide any paperwork relevant to the presence of herbicides, insecticides, and PCBs on site.

Response: Beazer never received, burned or used materials containing herbicides, insecticides or polychlorinated biphenyl (PCBs) in its boiler. Beazer did, however, mix certain wood treating residuals (meeting limitations imposed by MDEQ permits and the Fuel Additive Guidelines) with untreated wood chips for use as fuel in the Grenada boiler. For additional information regarding the Fuel Additive Program and Guidelines, please see Beazer's responses to Requests Nos. 16, 17 and 18. As the owner and operator of the Grenada Plant prior to 1989, Beazer had employees that were qualified as certified applicators who treated wood using preservatives classified as pesticides.

Information Request No. 21: Did Beazer East, Inc., or any predecessor companies, ever use a metal-based preservative, such as copper chromated arsenate (CCA), during the history of operations at the site? If yes, please provide time frames, and any paperwork relevant to the presence of such chemicals at the site.

Response: Other than the CuCZC described in Beazer's response to Request No. 15, Beazer has never used metal-based preservatives, such as copper chromated arsenate (CCA), during its operations of the Grenada Plant. For information concerning CuCZC use at the Grenada Plant, please see Beazer's response to Request No. 15.

Beazer further states that it has never used "metal-based preservatives" such as CCA for use as fuel in the Grenada boiler at any time, including the duration of either the Fuel Additive or Creosote Take Back Programs.

Respectfully submitted,

BEAZER EAST, INC.,

By: Michael Bollinger
Michael Bollinger

Enclosures to be sent under separate cover as indicated below
CC: Deborah Benjamin, Esq., EPA Region 4 (w/enclosures)
Mike Bowden, EPA Region 4, SESD (w/o enclosures)
Narindar Kumar, EPA Region 4 (w/o enclosures)
Toby Cook, MDEQ/Jackson (w/o enclosures)

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April 30, 2007

Mr. Jeffrey Pallas
Chief, South Section
RCRA Enforcement & Compliance Branch
United States Environmental Protection Agency
Region 4
Atlanta Federal Center
61 Forsyth Street
Atlanta, Georgia 30303-8960

RE: Koppers Inc./Beazer East, Inc., Tie Plant, Mississippi
Request for Information Pursuant to Section 3007 of RCRA
HSWA Permit, Dated September 2, 1998
EPA I.D. No. MSD 007 027 543

Dear Mr. Pallas:

This correspondence responds to the February 8, 2007 Section 3007 Information Requests from the United States Environmental Protection Agency ("USEPA") pertaining to the Koppers Inc. wood treating facility located in Grenada, Mississippi ("Grenada Plant"). The information presented herein has been gathered from documents both available to and in Koppers Inc.'s possession as well as in reliance of individual recollections concerning events that have transpired, in certain instances, over 30 years ago. To this end, Koppers Inc. reserves the right to supplement and/or modify these responses should additional information be located. All documents referenced herein are being provided in hard copy for the USEPA's review. Documents both related to the Grenada Plant and responsive to the USEPA's Information Requests are being jointly produced by both Koppers Inc. and Beazer East, Inc. ("Beazer") irrespective of the party that created and/or possesses them.

Information Request No. 1: Please provide a copy of the Asset Purchase Agreement between Beazer East, Inc., and Koppers Inc., including all schedules and attachments.

Response: Koppers Inc. is providing the United States Environmental Protection Agency ("USEPA") with a copy of the text to both the December 29, 1988 Asset Purchase Agreement between Beazer and Koppers Inc. and the July 15, 2004 Amendment to the Asset Purchase Agreement, pursuant to an agreement reached during the April 11, 2007 meeting in Atlanta, GA between representatives of the USEPA, Beazer and Koppers Inc.

By way of further response, Koppers Inc. understands that the Grenada Plant was built by the Ayer & Lord Tie Company ("A & L") in 1904. In 1930, A&L was acquired by the Wood Preserving Corporation, a subsidiary of The Koppers Company. In 1940, The Koppers Company liquidated the Wood Preserving Company to form its own wood preserving division. Thereafter, in 1944, The Koppers Company merged with three other companies to become Koppers Company, Inc.

Koppers Company, Inc. owned the Grenada Plant until its sale to Koppers Industries, Inc (n/k/a Koppers Inc.) on December 29, 1988. Koppers Industries, Inc. purchased not only the Grenada Plant at that time, but also the rights to the name "Koppers." Koppers Industries, Inc. changed its name to Koppers Inc. in February 2003.

As a result of the sale, Koppers Company, Inc. changed its name to Beazer Materials and Services, Inc. ("BM&S"), in January 1989, and then BM&S changed its name to Beazer East, Inc. on April 16, 1990. For convenience sake, these responses will refer to both Koppers Company, Inc. which owned and operated the Grenada Plant prior to 1989, and Beazer, which has been involved in the RCRA-guided remediation of the Grenada Plant following 1988, simply as "Beazer." Please keep in mind, however, that the two are one and the same company; only the name was changed.

The entity which has owned and operated the Grenada Plant since December 29, 1988 will be referred to as Koppers Inc.

The two companies, Beazer and Koppers Inc. are separate entities with no common ownership. Koppers Inc. is publicly traded on the New York Stock Exchange with its own individual officers and directors. Beazer, on the other hand, is a privately owned company whose ultimate parent is the British company Hanson PLC. There are no common officers, directors, or ownership interests between the two companies. Rather, they are totally separate and distinct corporate entities.

Information Request No. 2: What year was the adjacent Carver Circle Community built? Please include any documentation that you consulted in answering this question.

Response: Koppers Inc. did not exist prior to 1988, so it has no firsthand knowledge of this topic. Koppers Inc. understands, however, that Koppers Company, Inc. (n/k/a Beazer East Inc and hereinafter referred to as "Beazer") owned and operated the Grenada Plant until its December 29, 1988 sale to Koppers Inc. Koppers Inc. further understands that Beazer sold 206 acres of property to Guy Branscome on June 10, 1955. This sale involved 176 acres located south of the central ditch on the Grenada Plant's eastern border, which remains – to this day – scrubland and/or pasture. The 1955 sale also included 30 acres of scrubland and/or pasture on the Grenada Plant's northeast border (south of Tie Plant Road) which were ultimately developed into the Tie Plant School subdivision (a/k/a "Carver Circle Community"). Mr. Branscome resold the 30 acre plot to John Andrews and Donald Ross on September 29, 1956 and they subsequently subdivided, sold and developed the land.

Review of historical aerial photos of the Grenada Plant and the nearby environs have been performed by both Dr. Raymond Ferrara and Mr. Wayne Grip[1] – both of whom conclude that the former Grenada Plant property upon which the Carver Circle Community was constructed had never been used for wood treating or ancillary Grenada Plant operations. Rather, the photos indicate that the parcel was used solely as scrubland and/or pasture prior to the 1955 sale. The following documents are being produced to the USEPA in response to this Request:

<u>CARVER CIRCLE</u>

- 6/10/55 Warranty Deed between Koppers Company, Inc. and Guy Branscome selling 206 acres (30 of which were ultimately developed into Carver Circle neighborhood) (EPA-GR 000303-000304)
- 9/29/56 Sale of land to be developed into Carver Circle neighborhood by Guy Branscome to John Andrews and Donald Ross (developers of Tie Plant School Subdivision) (EPA-GR 000305-000309)
- Drawing of Tie Plant School Subdivision (EPA-GR 000310-000311)

See also May 27, 2005 Ferrara Report Figure 10A to 10O as evidence land on which Carver Circle Community was built was never used for wood treating operations or storage prior to 1955 sale (EPA-GR 010932-011080); May, 2005 AeroData report for historical aerial photos depicting evolution of Grenada Plant and surrounding environs (EPA-GR 010932-011080)

<u>Information Request No. 3</u>: Was the Carver Circle Community built upon land that was previously part of the wood treatment facility site? Please include any documentation that you consulted in answering this question.

<u>Response</u>: Koppers Inc. didn't exist prior to 1988, so it has no firsthand knowledge of this topic. Koppers Inc. understands, however, that the land upon which Carver Circle was built

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- [1] Dr. Raymond Ferrara, Ph.D. and M.E., was retained by both Koppers Inc. and Beazer in litigation involving certain residents of the Carver Circle Community and the Grenada Plant, and is recognized as an expert in contaminant fate and transport. Currently a principal environmental scientist with Omni Environmental, Dr. Ferrara has 25 plus years experience in environmental engineering and water quality monitoring. Mr. Wayne Grip, president of AeroData, Inc. was also retained by Koppers Inc. and Beazer and is a geologist, cartographer, photographer, and photointerpreter with a 29 year history in environmental photointerpretation. Mr. Grip has mapped and interpreted over 30 wood treating facilities from an environmental standpoint.

was owned by Beazer prior to 1955. Review of historical aerial photos of the Grenada Plant and its environs by Dr. Ferrara and Mr. Grip indicates that the land on which the Carver Circle Community is now located was scrubland and/or pasture prior to the 1955 sale. At no point do the extensive historical aerial photos of the Plant indicate that the parcel ultimately developed into the Carver Circle Community was ever used for wood treating, storage or other Plant operations.

The land sold to Mr. Branscome remained undeveloped following its sale to Messrs. Andrews and Ross until it was subdivided and developed into the Carver Circle Community in the early 1960s.

Documents relied upon in responding to this Request include Figures 10A to 10O from the May 27, 2005 Raymond Ferrara expert report which contain a detailed analysis of historical aerial photos of the land which was ultimately developed into the Carver Circle Community. Koppers Inc. also relied upon the May 2005 expert report of Wayne Grip in responding to this Request.

Information Request No. 4: On a site map or diagram that shows the northeast boundary of the site, and the Carver Circle Community, please depict the entire length of the marshy area, including its dimensions.

Response: Koppers Inc. is unable to determine what the USEPA intends when it refers to the undefined term "marshy area," and requested clarification from the USEPA at the April 11, 2007 meeting. At that time, representatives of the USEPA agreed to provide additional guidance as to the physical location of the "marshy area" referenced by this Request. Once additional guidance is provided, Koppers Inc. will supplement this Response if necessary. By way of further response, Koppers Inc. refers USEPA to the May 27, 2005 expert report of Dr. Raymond Ferrara which, based upon analysis of Grenada Plant topography, depicts the evolution of the Plant's surface water drainage and watersheds. (Figures 5A through 8C).

Koppers Inc. also refers USEPA to the May 2005 Opinions of Wayne Grip which contain a detailed analysis of Plant aerial photos and topography and delineates surface water drainage for the following years: 1937, 1941, 1943, 1949, 1952, 1954, 1956, 1957, 1963, 1968, 1975, 1979, 1980, 1985, 1988, 1992, 1996, and 2005.

Information Request No. 5: Has Koppers Inc., ever disposed of wastewater from the wood treatment process through a spray irrigation system? If so, please explain over what period of time this was done, what chemical constituents would have been present in the wastewater, and the basis of your information.

Response: Koppers Inc. has never disposed of wastewater from the wood treatment process through a spray irrigation system at the Grenada Plant. As Koppers Inc. did not exist prior to 1988, it has no firsthand knowledge of the use of spray irrigation at the Grenada Plant prior to that time. Koppers Inc. understands, however, that utilization of spray irrigation fields as a wastewater treatment option came into usage at wood treating plants and other industries in the wake of USEPA's determination to place a "zero discharge" surface water discharge limitation on certain wastewaters. To this end, Beazer was permitted by the State of Mississippi to operate a "zero discharge" waste treatment system involving spray irrigation in the north east corner of the Grenada Plant from May 1, 1972 until July 1988. Koppers Inc. did not purchase the Grenada Plant until six months later. Process effluent was subject to treatment methods prior to irrigation on the Grenada Plant sprayfield ("main sprayfield"), including carbon filtration, solar oxidation, evaporation, flocculation, and oil/water separation. Following its discontinuation in mid-1988, the main sprayfield was closed as a solid waste (as opposed to hazardous waste) management unit by Beazer in accordance with a closure plan approved by USEPA in January 1991. A January 22, 1987 Report of Hydrogeologic Findings analyzed the main sprayfield's soil and groundwater and found no evidence that the unit had adversely impacted Grenada Plant groundwater quality. The State agreed with these findings on February 10, 1987.

It is also Koppers Inc.'s understanding that, in addition to the Grenada Plant's main sprayfield, Beazer established two experimental sprayfields that confirmed the effectiveness of biodegradation as a final treatment step for wood treating effluent. These sprayfields were designed and operated under the guidance of Dr. Warren Thompson, then a Professor at Mississippi State University, who also worked with USEPA in developing wood treating effluent standards and methods. By way of further response, Koppers Inc. refers the USEPA to Beazer's response to this Request.

Information Request No. 6: On a site map or diagram, that includes the Carver Circle Community, please depict the locations where Koppers Inc., has ever sprayed wastewater.

Response: Koppers Inc. has never disposed of wastewater from the wood treatment process through a spray irrigation system at the Grenada Plant. As Koppers Inc. did not exist prior to 1988, it has no firsthand knowledge of the use of spray irrigation at the Grenada Plant prior to that time. By way of further response, Koppers Inc. refers the USEPA to the information contained in the Response to Request No. 5.

Information Request No. 7: Please provide analytical results for the wastewater that is currently generated by the facility, and explain how wastewater is currently being disposed of.

Response: Wood-treating effluent currently generated by the Grenada Plant is treated in an on-site waste water treatment plant and discharged to the Grenada publicly owned treatment works ("POTW"). Grenada Plant discharge of treated effluent to the Grenada POTW is accomplished pursuant to Pretreatment Permit No. PT90300 which was first issued to Koppers Inc. in December 1988 and remains in effect to this day. In further response to this Request, Koppers Inc. is producing to the USEPA a process flow diagram for the Grenada Plant's waste water treatment plant, and various analyses of treated effluent, including monthly Discharge Monitoring Reports submitted to MDEQ pursuant to Pretreatment Permit No. PT90300, and the following documents:

PRETREATMENT PERMITS
- 11/01/98 Public Notice related to Koppers Company, Inc. request for permission to discharge treated effluent to Grenada Publicly Owed Treatment Works (EPA-GR 004949) - 12/30/88 Correspondence from Jerry Measley (MDEQ) to David King issuing Pretreatment Permit No. PT90300 to Grenada Plant (EPA-GR 004905-004958) - 9/12/89 Correspondence from Louis LaVallee (MDEQ) to Stephen Smith enclosing Modified Pretreatment Permit PT90300 for Grenada Plant (EPA-GR 004959-004961) - 12/05/95 Correspondence from Bryan Collins (MDEQ) to Ronald Murphy reissuing Pretreatment Permit No. 090300 to Grenada Plant (EPA-GR 004962-004986) - 9/19/01 Correspondence from Mary Coleman (MDEQ) to Thomas Henderson reissuing Pretreatment Permit No. 090300 to Grenada Plant (EPA-GR 004987-005007) - 12/27/06 Correspondence from Tommy Wall (MDEQ) to Vance Haskin enclosing draft documents concerning pending reissuance of Pretreatment Permit No. 090300 to Grenada Plant (EPA-GR 005008-005045) - March 27, 2007 correspondence from Tommy Wall (MDEQ) to Vance Haskins enclosing Pretreatment Permit No. 090300 (EPA-GR 005046-005072)
WASTE WATER TREATMENT PLANT SCHEMATICS
- 6/02/05 Process Flow Diagram for Wastewater Treatment Plant (EPA-GR 005074)
WASTE WATER TREATMENT PLANT INSPECTIONS
- NPDES Compliance Inspection Report 8/21/90 (EPA-GR 005076-005078) - NPDES Compliance Inspection 6/26/91 (EPA-GR 005079-005080) - NPDES Compliance Inspection 6/09/92 (EPA-GR 005081-005082) - NPDES Compliance Inspection 10/22/92 (EPA-GR 005083-005085) - NPDES Compliance Inspection 8/19/99 (EPA-GR 005086-005093) - Water Compliance Inspection 5/25/05 (EPA-GR 005094-005104)
WASTE WATER ANALYSIS
- 3/27/06 Correspondence from Jo Mos to Kevin Coker enclosing Dioxin report on Grenada Plant treated effluent (EPA-GR 005106-005136) - Monthly Discharge Monitoring Reports for 1989 to 2006 (in separate binders entitled "Discharge Monitoring Reports Vols. I-III") (EPA-GR 005137-007261)

Information Request No. 8: Please submit a site map or diagram showing the locations of the drainage ditches and swales that run between the road and the properties located in the Carver Circle Community. On this site map or diagram indicate the surface water migration pathway from the facility to and through these ditches and swales to the Carver Circle Community.

Response: Koppers Inc. is providing the USEPA with the May 27, 2005 expert report of Dr. Raymond Ferrara which contains numerous figures depicting the evolution of surface water drainage and watersheds on the Grenada Plant. (Figures 5A through 8C.) The May 27, 2005 Ferrara report also contains images demonstrating historical and current surface water flow in the off-site drainage ditches located in the Carver Circle Community. (Figures 9 and 9A). Koppers Inc. will also be providing the May 2005 Opinions of Wayne Grip, which depict historical drainage basins for the years 1937 to 1963, 1968, 1975 to 1992 and 1995 to 2005. The Grip Opinions also compare individual aerial photos with Plant topography to depict storm and surface water drainage patterns for the following years: 1937, 1941, 1943, 1949, 1952, 1954, 1956, 1957, 1963, 1968, 1975, 1979, 1980, 1985, 1988, 1992, 1996, and 2005.

As depicted in the Ferrara and Grip reports, surface water in the northern portion of the Grenada Plant – that which is adjacent to the Carver Circle Community – flows in four directions: (1) north to the northern stream and, ultimately, the Batupan Bogue (currently recognized as NPDES Outfall No. 7), (2) east to Tie Plant Road (currently recognized as NPDES Outfall No. 6), (3) to the woods south of Carver Circle (currently recognized as NPDES Outfall No. 5), and (4) south to the Central Ditch (currently recognized as NPDES Outfall No. 3).

The stormwater flow towards Tie Plant Road (i.e., the current Outfall No. 6) originally followed historical drainage swales from the northeastern corner of the Grenada Plant property to Tie Plant Road. (*See*, *generally*, 5/05 Grip Opinions at "Historical Photo Study by Date"). As noted below, stormwater discharges from Mississippi wood treating plants were not subject to National Pollution Discharge Elimination System ("NPDES") regulation until 1992. Prior to that time, it was not required that the Grenada Plant establish ponds, weirs and outfalls for collecting and sampling stormwater flow. Rather, the flow in the direction of Tie Plant Road (now Outfall No. 6) left the Grenada Plant property, in an easterly direction, via an open ditch. (*See,* 5/05 Grip Opinions, "Historical Photo Study by Date" at 12/2/1957). With the development of the Carver Circle Community, this historical swale was modified to transverse the parcel at 43 Carver Circle in an easterly direction until it reached a ditch on the west side of Carver Circle. There, drainage routed the water in a northerly direction until it crossed under Carver Circle and continued north (again in open ditch) to Tie Plant Road. (*See,* 5/05 Grip Opinions, "Historical Photo Study by Date," at 2/5/1963, 10/19/1968 and 5/18/1975.) Reaching Tie Plant Road, stormwater from both Outfall No. 6 and the Community at large traveled and, before reaching

Tie Plant Elementary School, crossed under Tie Plant Road (north), and proceeded through the woods to where it ultimately emptied into the Batupan Bogue. Subsequent modifications have sharply curtailed any potential for human exposure to Plant stormwaters discharged from Outfall No. 6. In the mid-1990s the ditch conveying waters from Outfall No. 6 across 43 Carver Circle was enclosed in a buried metal culvert. Further, in 2005 the open ditches along Carver Circle and Tie Plant Road which conveyed waters from the neighborhood and Outfall No. 6 were enclosed. Where waters formerly traveled under Tie Plant Road into the woods north of the Tie Plant Elementary School, they now travel (underground) eastward, along Tie Plant Road, to a point beyond the eastern portion of Carver Circle Community. At that point, next to open fields, the waters flow in an open ditch to allow for drainage from the fields until they pass north, beneath Tie Plant Road, through the woods and ultimately into the Batupan Bogue. (*See* 5/05 Grip Opinions, "Historical Photo Study by Date," 2/11/1996 and 2/5/2005, and "Grenada Mississippi Wood Treating Facility – Section 3007 Information Request" Powerpoint dated April 11, 2007 at slides 48 ("Carver Circle Drainage circa 1996"), 50 ("Carver Circle Drainage circa 2005") and 51 ("Current Carver Circle Drainage")).

Stormwater flow to the woods south of Carver Circle Community (now Outfall No. 5) has never flowed through any swales or ditches in the Carver Circle Community. Rather, the waters have flowed, historically and currently, in a southeastern direction off the Grenada Plant property, south of the Carver Circle Community and then in a northern direction to Tie Plant Road at a point east of the Carver Circle Community. (*See, e.g.*, 5/05 Grip Opinions, "Historical Photo Study by Date," at 2/5/1963, 5/18/1975, 10/7/1979, 2/11/1996 and 2/4/2005).

Information Request No. 9: Submit all previous sampling results from the drainage ditches and swales referenced in question 8 above.

Response: Immediately following the December 29, 1988 sale of the Grenada Plant from Beazer to Koppers Inc., Plant process waters remained the subject of the "zero discharge" limitations first imposed via MDEQ permit in May 1972 and were, therefore, not discharged from Plant property via stormwater ditches. Stormwater in ditches and drainage swales, however, from Mississippi wood treating operations first became subject to National Pollution Discharge and Elimination System ("NPDES") regulations in 1992. On September 23, 1992, Koppers submitted its Wood Treater Notice of Intent for Coverage under a Wood Treater General NPDES Permit. The Grenada Plant has been operating under a valid NPDES permit since the initial permit was issued in October 1992. As part of the NPDES permitting process, the Grenada Plant established outfalls and ponds for controlling and sampling stormwater. Annual sampling on the original seven outfalls did not begin until 1995. Later, the number of outfalls was expanded to nine. The Grenada Plant's NPDES permit, which does not establish maximum levels for the monitored constituents, requires the submission of annual sampling reports – all of which are being produced to the USEPA.

Further, pursuant to the Environmental Indicator Determination for the Grenada Plant, Beazer submitted to USEPA off-site litigation-derived soil, sediment and dust data gathered by Koppers Inc., Beazer and plaintiff's attorneys. These data, which are resubmitted in response to USEPA's Information Request, included sediment from the drainage swales referenced in Request No. 8, and were relied upon by USEPA in its October 18, 2005 determination that current human exposures (CA725) and migration of contaminated water (CA750) at the Grenada Plant are under control. The following documents are being produced to the USEPA in response to this Request:

GRENADA PLANT NPDES OUTFALLS - Estimated Storm Water Runoff to Outfalls (EPA-GR 004268-004272) - 2/08/93 Correspondence from Stephen Smith to Ron Murphy enclosing Draft Storm Water Management Plant (includes map of NPDES outfalls) (EPA-GR 004273-004277) - 2007 Map of Grenada Plant Drainage Patterns/Wood Storage Areas (EPA-GR 004278)
NPDES PERMITS - 9/25/92 Correspondence from Stephen Smith to MDEQ enclosing Wood Treater Notice

of Intent for Koppers Industries, Inc. operations in Grenada, MS. (EPA-GR 004280-004283) - 10/30/92 Correspondence from Louis Lavallee (MDEQ) to Ronald Murphey enclosing Wood Treater General Permit MSR 220005 for Grenada Plant (EPA-GR 004284-004296) - Storm Water Baseline General Permit Issued to Grenada Plant on 9/12/00 (EPA-GR 004297-004319) - 3/29/04 Correspondence from Kenneth LaFleur (MDEQ) to Haley Biddy Re: MDEQ delay in reissuing NPDES Permits (EPA-GR 004320) - 4/10/06 Correspondence from Kenneth LaFleur (MDEQ) to Kevin Coker Re: Continued MDEQ delay in reissuing NPDES Permits (EPA-GR 004321)
STORMWATER SAMPLING (POST '88) - 9/12/96 Correspondence from Clift Jeter to Steve Spengler Re: Discharge Complaint enclosing sampling data (EPA-GR 004323-004379) - 11/8/96 Correspondence from Clift Jeter (MDEQ) to Scott Mills (MDEQ) Re: stormwater complaint sampling (EPA-GR 004380-004381) *See also* 9/02/05 Transmittal of on and off off-site sampling (dust, soil, sediment and surface water) pursuant to Environmental Indicator Determination for Grenada Plant from Allison Gargani to RCRA Programs Branch (EPA-GR 000313-000447); 10/18/05 Positive Environmental Indicator Determination (CA725 and CA750) for Grenada Plant (EPA-GR 000440)
NPDES ANNUAL STORMWATER ANALYSES - 1994 (EPA-GR 004384-004387) - 1995 (EPA-GR 004388-004409) - 1996 (EPA-GR 004410-004450) - 1997 (EPA-GR 004451-004508 - 1998 (EPA-GR 004509-004563) - 1999 (EPA-GR 004564-004616) - 2000 (EPA-GR 004617-004649) - 2001 (EPA-GR 004650-004695) - 2002 (EPA-GR 004696-004759 - 2003 (EPA-GR 004760-004785) - 2004 (EPA-GR 004786-004849 - 2005 (EPA-GR 004850-004902 - 2006 (EPA-GR 004903-004976)

Information Request No. 10: Please submit a facility map indicating the locations of Outfalls 5 and 6, and depict the storm water migration pathway from Outfalls 5 and 6 to the Carver Circle Community.

Response: Koppers Inc. is producing to the USEPA a recent map depicting the location of the various outfalls established pursuant to the Grenada Plant's NPDES permit. Further, Wayne Grip's May 2005 Opinions trace stormwater flow from the Grenada Plant, including

Outfall Nos. 5 and 6 following their creation in 1995. (*See,* 5/05 Grip Opinions, "Historical Photo Study by Date," at 2/11/1996 and 2/4/2005). These photos demonstrate that flow from Outfall No. 5 tracks south of the Carver Circle Community until a point where it flows northeast to Tie Plant Road.

Outfall No. 6 originally flowed via open ditch in an easterly direction across the property at 43 Carver Circle, until it reached Carver Circle. At this point, the waters were routed in a northern direction for a short while before it crossed under Carver Circle and continued north to Tie Plant Road. (*See,* 5/05 Grip Opinions, "Historical Photo Study by Date," at 2/11/1996.) Once the water reached Tie Plant Road, it traveled via open ditch east and, before it reached the Tie Plant Elementary School, crossed under Tie Plant Road (north) and proceeded through the woods to the point where it ultimately emptied into the Batupan Bogue. Subsequent modifications have sharply curtailed any potential for human exposure to stormwaters discharged from Outfall No. 6. In the mid-1990s the ditch conveying waters from Outfall No. 6 across 43 Carver Circle was enclosed in a buried metal culvert. Further, in 2005 the open ditches along Carver Circle and Tie Plant Road which conveyed waters from the neighborhood and Outfall No. 6 were enclosed. Where waters formerly traveled under Tie Plant Road into the woods north of the Tie Plant Elementary School, they now travel (underground) eastward, along Tie Plant Road, to a point beyond the eastern portion of Carver Circle Community. At that point, next to open fields, the waters flow in an open ditch to allow for drainage from the fields until they pass north, beneath Tie Plant Road, through the woods and ultimately into the Batupan Bogue. (Compare 5/05 Grip Opinions, "Historical Photo Study by Date," 2/11/1996 and 2/5/2005 with "Grenada Mississippi Wood Treating Facility – Section 3007 Information Request" Powerpoint dated April 11, 2007 at slides 48 ("Carver Circle Drainage circa 1996"), 50 ("Carver Circle Drainage circa 2005") and 51 ("Current Carver Circle Drainage")).

By way of further Response, Koppers Inc. refers the USEPA to its Response to Request No. 8.

Information Request No. 11: Submit all previous sampling results and reports for Outfalls 5 and 6.

Response: The following documents are being produced to the USEPA in response to this Request:

STORMWATER SAMPLING (POST '88) - 9/12/96 Correspondence from Clift Jeter to Steve Spengler Re: Discharge Complaint enclosing sampling data (EPA-GR 004323-004379) - 11/8/96 Correspondence from Clift Jeter (MDEQ) to Scott Mills (MDEQ) Re: stormwater complaint sampling (EPA-GR 004380-004381) *See also* 9/02/05 Transmittal of on and off off-site sampling (dust, soil, sediment and surface water) pursuant to Environmental Indicator Determination for Grenada Plant from Allison Gargani to RCRA Programs Branch (EPA-GR 000313-000447); 10/18/05 Positive Environmental Indicator Determination (CA725 and CA750) for Grenada Plant (EPA-GR 000440)
NPDES ANNUAL STORMWATER ANALYSES - 1994 (EPA-GR 004384-004387) - 1995 (EPA-GR 004388-004409) - 1996 (EPA-GR 004410-004450) - 1997 (EPA-GR 004451-004508 - 1998 (EPA-GR 004509-004563) - 1999 (EPA-GR 004564-004616) - 2000 (EPA-GR 004617-004649) - 2001 (EPA-GR 004650-004695) - 2002 (EPA-GR 004696-004759 - 2003 (EPA-GR 004760-004785) - 2004 (EPA-GR 004786-004849 - 2005 (EPA-GR 004850-004902 - 2006 (EPA-GR 004903-004976)

Information Request No. 12: Has the private well located at the Tie Plant Elementary School ever been a drinking water source? If so, who used this well as a drinking water source, for what period of time, and how is this information known? Also, depict the location of this well on a map.

Response: Koppers Inc. understands that the Carver Circle Community was supplied with Grenada City/County water beginning in approximately 1976. It is unclear if the Tie Plant

Elementary School well was a possible historic source of drinking water for the Carver Circle Community prior to 1976. Beazer's RCRA Facility Investigation indicated that the Tie Plant Elementary School well was closed in approximately 1976. However, Koppers Inc. has no documentation to support the use of the school well as a community water source or the actual date of the well's closure.

Koppers Inc. possesses analytical data concerning the water quality of the Grenada Plant water supply well, which is located between the Plant's central process area and the Tie Plant Elementary School well. The Grenada Plant water supply well (488 feet deep) is installed at a comparable depth to that of the Tie Plant Elementary School well (550 feet deep). Based upon regional geologic cross sections reported in the July 2003 Complete Phase II RCRA Facility Investigation Report, Koppers Inc. understands that both the Grenada Plant water supply well and the Tie Plant Elementary School are likely screened within the same aquifer. As such, and given the Grenada Plant water supply well's location, it is more likely to demonstrate any impact to the groundwater at this depth from Plant operations. Analysis of the Grenada Plant water supply well submitted to USEPA in September 2006 demonstrated "non-detect" for benzene, ethyl benzene, toluene, xylenes, polynuclear aromatic hydrocarbons, and pentachlorophenol. Furthermore, extensive groundwater monitoring performed during the RCRA Facility Inspection demonstrates that impacted groundwater, at any depth, is not migrating towards the Carver Circle Community. The following documents are being produced to the USEPA in response to this Request:

TIE PLANT SCHOOL WELL

"Identification of Tie Plant School Well to USEPA"

- 3/10/94 Correspondence from Norton E. Jessup to Jacq Marie Jack enclosing Draft Report Phase II Facility Investigation Vol. I of III June 1992 (Figure 3-3 "Water Supply Wells Within Four Mile Radius of Site") (EPA-GR 000228—000231)
- 5/25/03 Correspondence from Jennifer Abrahams to RCRA Branch enclosing Complete

Phase II RCRA Facility Investigation Report Volume I July 2003 (Table 2-1 "Water Supply Wells within a Two Mile Radius of Site;" Figure 2-10 "Water Supply Wells within 20Mile Radius of Site") (EPA-GR 000232-000237)

MDEQ File on all Supply Wells located 1 mile from Grenada Plant

- Water Well record from O.I. Neal Well (4/61) (EPA-GR 000239)
- Water Well record from Koppers Company Well (8/61) (EPA-GR 000240)
- Water Well record from McQuay, Inc. Well (8/18/62) (EPA-GR 000241)
- Water Well drillers log for McQuay, Inc. Well (7/11/69) (EPA-GR 000242)
- Water Well drillers log for (Unintelligible) Well (5/30/66) (EPA-GR 000243)
- Water Well drillers log for Sutton Well (7/30/69) (EPA-GR 000244-000245)
- Water Well drillers log for Tie Plant Water and Sewer District Well (12/20/72) (EPA-GR 000246-000247)
- Water Well drillers log for Neyton Well (9/28/73) (EPA-GR 000248-000249)
- Water Well drillers log for Branscone Well (9/16/64) (EPA-GR 000250)
- Water Well drillers log for Thorpe Well (5/27/78) (EPA-GR 000251)
- Water Well drillers log for Gulidge Well (8/27/82) (EPA-GR 000252)
- Water Well decommissioning form for groundwater monitoring well on Grenada Plant property (7/24/01) (EPA-GR 000253)
- Water Well decommissioning form for groundwater monitoring well on Grenada Plant property (7/24/01) (EPA-GR 000254)

Grenada Plant Supply Well

- Water Well driller log for Koppers Company (8/61) (EPA-GR 000256)
- Well Schedule for Koppers Company Well (EPA-GR 000257-000257)

Analyses of Grenada Plant Supply Well

- 4/27/82 Correspondence from R.D. Hepner to R.C. Bartlow enclosing Well Water Analyses (EPA-GR 000239-000263)
- 6/01/88 Correspondence from R.S. Ohlis enclosing 6/13/88 Correspondence from Jean Willlis concerning analysis of Grenada Plant supply well (EPA-GR 000264-000265)
- 12/27/89 Correspondence from Mathew Plautz to J.D. Clayton enclosing laboratory results of water sample taken from the fire hydrant at the southern end of the KII facility (EPA-GR 000266-000270)
- 9/25/00 Fax Cover Sheet from Tim Basilone to Anthony Mayhan enclosing analytical results for water supply well at the KII Grenada Facility (EPA-GR 000271-000272)
- 2/24/05 analysis of Grenada Plant supply well (EPA-GR 000273-000274)
- 9/25/06 Correspondence from Jennifer Abrahams to RCRA Programs Branch enclosing Annual Sampling Results for Plant Production Well (EPA-GR 000275-000277)
- 10/27/06 Correspondence from Jennifer Abrahams to RCRA Programs Branch enclosing 2006 Annual Sampling Results for Plant Production Well with Full Laboratory Documentation (EPA-GR 0002378-000296)

Groundwater Concentrations

- Figure 1, "Groundwater Sampling Locations," GeoTrans, 3/16/03 – demonstrates where monitoring wells and single sampling events have occurred on Grenada Plant property. (EPA-GR 000298)
- Figure 3-6, "Upper Sand Zone Groundwater Locations," 8/3/99 – demonstrates the horizontal extent of benzene, pentachlorophenol and total PAH concentrations in upper

sand zone groundwater located beneath Grenada Plant (EPA-GR 000299)

- Figure 3-5 "Lower Sand Zone Groundwater Locations," 8/3/99 – demonstrates the horizontal extent of benzene, pentachlorophenol and total PAH concentrations in lower sand zone groundwater located beneath Grenada Plant (EPA-GR 000300)

See also May 27, 2005 Ferrara Report of Figure 19 for locations of local water supply wells (EPA-GR 010932-011080)

Information Request No. 13: Has Koppers Inc., ever treated wood products with CuCZC (copper chromated zinc chloride) in the past? Please provide dates and details of its use and disposal.

Response: Koppers Inc. has never treated wood products with CuCZC at the Grenada Plant having only owned the Plant since 1988. Koppers Inc. understands, however, that Beazer may have used CuCZC prior to 1968. For information concerning pre-1988 Grenada Plant treating operations, Koppers Inc. refers the USEPA to Beazer's response to this Request.

Information Request No. 14: Has Koppers Inc., ever produced sludges as a by-product of the wood treatment process? If so, please indicate what chemical constituents are present is such sludges. Provide all sampling data of such sludges.

Response: Given the complexities of the wood-treating process, wood preservatives – creosote and pentachlorophenol in the Grenada Plant's case – necessarily come into contact with water, sand, soil and wood fibers, creating residuals of the wood treating process. These residuals can collect in the wood treating cylinders, process tanks, the basement beneath the cylinders, on the drip track, and in oil/water separators used to treat process effluent. Depending on the circumstances of their creation, wood treating residuals can have widely varied physical characteristics and regulatory significance. For instance, the USEPA has classified bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol as K001. Other residuals take the form of wastewaters, preservative drippage and spent preservatives from wood treating operations and were ultimately listed by USEPA as F032 (from plants using chlrophenolic treating formulations) and F034 (from plants using creosote formulations) hazardous wastes following the 1988 sale of the Grenada Plant to Koppers Inc. Collectively, these sludges and residuals will be referred to simply as "wood treating residuals."

Generally speaking, the Grenada Plant did not analyze its wood treating residuals following Koppers Inc.'s purchase of the Grenada Plant in 1988 based upon Koppers Inc.'s knowledge of its wastestreams. Koppers Inc. did, however, require representational analyses of the wood treating residuals received by the Grenada Plant from other Koppers Inc. wood treating operations for use as fuel additive in the Grenada boiler. The use of fuel additive consisting of 5% wood treating wood treating residuals mixed with 95% untreated wood chips as Grenada Plant boiler fuel was permitted by the MDEQ when Koppers Inc. purchased the Grenada Plant in 1988. Koppers Inc. used fuel additive in the Grenada boiler from December 28, 1988 until it voluntarily ceased the fuel additive program on June 5, 1991. The wood treating residuals the Grenada Plant used in its fuel additive was required to meet, regardless of source, specific standards originally established by Beazer, approved by the MDEQ, and detailed in the Fuel Additive Guidelines pertaining to BTU and metal content and physical characteristics. Wood treating residuals not meeting the Fuel Additive Guidelines were rejected as inappropriate for use as Grenada boiler fuel. Sampling results from the fuel additive may be found or summarized in the following documents that are being produced to USEPA:

PROCESS WASTE RECEIVED AND CHEMICAL ANALYSIS OF SAME - Exhibit 12 AA to February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Analysis of Wastes Shipped to Grenada" (EPA-GR 007721-007722) - Analytical Data relied upon by Joseph Santoleri in compiling Exhibit 12 AA (Analysis of Wastes Shipped to Grenada): Hazardous Waste Manifests and Fuel Additive Analyses received by Grenada Plant in connection with shipments of fuel additive from Koppers Company and Koppers Industries wood treating plants and Koppers Industries, Inc. wood treating customers. (EPA-GR 007723-008552) *See*, generally, June 1, 2005 JJS-1 "Opinion of Joseph J. Santoleri, P.E." and February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Analysis of Wastes Shipped to Grenada" (EPA-GR 013013-013088)
BOILER AND PROCESS WASTE DURATION, QUANTITY AND TOTAL BURNED

- Exhibit JJS-17 to February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Daily Logs of Boiler Fuel Additive Operation – 1983 to 1991" (EPA-GR 008554-008612)
- Exhibit 14A to February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Cumulative Metal Weight in Process Wastes" (EPA-GR 008613-008614)
- Fuel Additive-related documents relied upon by Joseph Santoleri in compiling Exhibits JJS-17 (Daily Logs of Boiler Fuel Additive Operation – 1983 to 1991) and 14A (Cumulative Metal Weight in Process Wastes): Grenada Plant Boiler Stack Charts and Fuel Additives Logs demonstrating the duration and quantity of Fuel Additive Burned from 1983 to 1991 (EPA-GR 008615-009101)

See, generally, June 1, 2005 JJS-1 "Opinion of Joseph J. Santoleri, P.E." (EPA-GR 012786-012882) and February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Analysis of Wastes Shipped to Grenada" (EPA-GR 013013-013088)

Information Request No. 15: Has Koppers Inc., ever received sludges from other wood treatment facilities? Please indicate from where sludges were received, and provide dates. Indicate what chemical constituents were present in such sludges, and submit all records showing the chemical composition of sludges received.

Response: Consistent with, and in furtherance of, USEPA's promotion of industrial boilers and furnaces to burn secondary materials in support of RCRA's "burning for energy recovery" program, and pursuant to Operating Permit No. 0960-00012, Koppers Inc. was permitted by the State of Mississippi to mix creosote and/or pentachlorophenol wood treating residuals with untreated wood at a 5:95 ratio ("fuel additive") for use as fuel in the Grenada boiler. The use of the Grenada Plant's Wellons Cyclo Blast wood-waste furnace to burn fuel additive was specified a Beazer engineer, and confirmed by representatives of Wellons, as an appropriate use of the furnace. Mr. Joseph Santoleri, an independent mechanical engineer retained by Koppers Inc. and Beazer, has reviewed the Grenada boiler, its design and operation during the Fuel Additive Program and concluded that "the Grenada system was an appropriate and reasonable design for the application for which it was intended."[2] In other words, the Grenada boiler was well suited to using fuel additive.

[2] Mr. Santoleri, a mechanical engineer with over 50 years experience in combustion, heat transfer, energy recovery and air pollution control and 20 years experience specifically with industrial and commercial hazardous waste

Test burns performed by Beazer prior to the sale of the Grenada Plant had demonstrated to the MDEQ that the Grenada boiler was capable of achieving appropriate destruction and removal efficiencies (99.9% or better) of fuel additive (creosote or pentachlorophenol fuel additive mixed with untreated wood chips) in May, 1982, December, 1984, and May, 1988. The wood preserving residuals Koppers Inc. mixed with untreated wood chips for use as fuel in the Grenada boiler was required to meet, regardless of source, specific standards originally established by Beazer, approved by MDEQ and detailed in the Fuel Additive Guidelines pertaining to BTU, metal content and physical characteristics. Wood treating residuals not meeting the Fuel Additive Guidelines were rejected as inappropriate of use as Grenada boiler fuel. Process waste deemed suitable for use as fuel additive in the Grenada boiler consisted of creosote and pentachlorophenol wood treating residuals from the following of Koppers Inc. wood treating operations: Grenada, MS; Guthrie, KY; North Little Rock, AR; Gainesville, FL; Florence, SC; Denver, CO; Carbondale, IL; and Superior, WI. Grenada boiler operational records demonstrate that the quantities of fuel additive burned in the Grenada boiler complied with applicable permit limitations.

Prior to the sale of the Grenada Plant to Koppers Inc., a "Creosote Take Back" program was established by Beazer in 1988 (with MDEQ approval) allowing creosote wood treating residuals meeting the Fuel Additive Guidelines to be received from Beazer's wood-treating customers and used as fuel in the Grenada boiler. This program was utilized by Koppers Inc. following its purchase of the Grenada Plant until May of 1989. Available records indicate that Koppers Inc. received shipments of creosote waste under the Creosote Take Back program from the following customers: General Timber and Appalachian Timber. Koppers voluntarily ceased burning all fuel additive in the Grenada boiler on June 5, 1991. During the period which Koppers Inc. burned fuel additive in the Grenada boiler, the operations were subject to routine

incinerators, boilers and industrial furnaces was retained by both Koppers Inc. and Beazer in litigation involving residents of the Carver Circle Community and the Grenada Plant.

and unannounced inspections by State of Mississippi personnel and Koppers Inc. was not found to be in violation of its boiler permit. The following documents are being produced to the USEPA in response to this Request:

BOILER PERMITS - 12/14/79 Correspondence from Don Watts (MDEQ) to Ray Ohlis enclosing Permit No. 0960-00012 to Operate Grenada Plant Boiler (untreated wood as fuel) (EPA-GR 007264-007269) - 5/14/82 Correspondence from Dan McLeod (MDEQ) to Ray Ohlis enclosing Permit No. 0960-00012 granting Koppers Company, Inc. six months to test burn wood-treating process waste (mixed with untreated wood) as boiler fuel (EPA-GR 007270-007274) - Public Notice of Koppers Company, Inc.'s Application for permit to allow the use wood treating process waste (mixed with untreated wood) as boiler fuel (EPA-GR 007275-007277) - 12/08/82 Correspondence from Dan McLeod (MDEQ) to R.C. Bartlow enclosing Permit No. 0960-00012 allowing Grenada Plant to use wood treating process waste (mixed with untreated wood) as boiler fuel (EPA-GR 007278-007283) - 5/16/85 Correspondence from Dan McLeod (MDEQ) to R.C. Bartlow enclosing modified Permit to Operate No. 0960-00012 allowing Grenada Plant to use wood treating process waste (mixed with untreated wood) as boiler fuel (EPA-GR 007284-007289) - 11/27/85 Correspondence from Dan McLeod (MDEQ) to J.D. Clayton enclosing Permit No. 0960-00012 allowing Grenada Plant to use wood treating process waste (mixed with untreated wood) as boiler fuel (EPA-GR 007290-007297) - 6/29/89 Correspondence from C. Adams Smith (MDEQ) to J.D. Clayton reissuing Operating Permit No. 0960-00012 allowing Grenada Plant to use wood treating process waste (mixed with untreated wood) as boiler fuel (EPA-GR 007298)
SAMPLE BOILER/AIR INSPECTIONS - 3/05/86 Correspondence from Stanley Watkins (MDEQ) to Dan McLeod (MDEQ) enclosing Inspection Report Form and Visible emissions evaluation record for Grenada Plant boiler (EPA-GR 007300-007303) - 6/26/84 Correspondence from Stanley Watkins (MDEQ) to Dan McLeod (MDEQ) enclosing Visible emissions evaluation records for Grenada Plant boiler (EPA-GR 007304-007305) - 4/02/87 MDEQ Inspection Report for Grenada Plant boiler (EPA-GR 007306-007309) - 1/14/88 MDEQ Inspection Report for Grenada Plant Boiler (EPA-GR 007370-007312) - 4/08/88 MDEQ Inspection Report for Grenada Plant (EPA-GR 007313-007316)
FUEL ADDITIVE PROGRAM - 10/17/85 Correspondence from Charles Brush to James Hardage (MDEQ) enclosing Koppers Company, Inc. test methods used by Grenada Plant in determining acceptability of fuel additive received from Koppers Company, Inc. wood treating plants for use as fuel in Grenada boiler (EPA-GR 007318-007336) - 12/10/85 Correspondence from Martin Schlesinger to R. Ohlis enclosing Fuel Additives Program Guidelines for determining acceptability of fuel additive received from Koppers Company, Inc. wood treating plants for use as fuel in Grenada boiler (EPA-GR 007337-007357)

- 5/03/90 Correspondence from S.T Smith to Rock Clayton and Gary McClelland enclosing Koppers Industries, Inc.'s Fuel Additives Program Guidelines for determining acceptability of fuel additive received from Koppers wood treating plants for use as fuel in Grenada boiler (EPA-GR 007358-007367)
- 6/20/86 Memorandum from C.P Brush to C.P. Markle concerning representative sampling methods used in determining acceptability of fuel additive pursuant to Fuel Additive Program Guidelines (EPA-GR 007368)

TAKE BACK PROGRAM

- 10/06/87 Correspondence from A.I. Domanico Re: Residue Handling Take-Back Program Meeting (discusses seeking MDEQ approval for Take Back Program) (EPA-GR 007370-007372)
- 11/09/87 Correspondence from A.I. Domanico Re: Residue Handling Take-Back Program Meeting (discusses MDEQ approval of Take Back Program as to creosote process waste only) (EPA-GR 007373-007374)
- 3/23/88 Correspondence from A.I. Domanico Re: Residue Handling Take-Back Program Meeting (discussing fact that Take Back Program will include only creosote process wastes that meet Fuel Additive Program Guidelines) (EPA-GR 007375)
- 2/24/89 Correspondence from R.T. Baileys to John Kress RE: Analysis of Fuel Additives pursuant to Take Back Program (EPA-GR 007376)
- 4/17/89 Correspondence from David King to Ron Sutherland Re: Analysis of Fuel Additive pursuant to Take Back Program (EPA-GR 007377-007378)
- 5/31/89 Correspondence from R.S. Ohlis to J.L. Kress Re: termination of Take Back Program (EPA-GR 007379)

START/STOP BURN PROCESS WASTE

- RCRA Inspection Report describing, *inter alia*, boiler fuel history for Grenada boiler (EPA-GR 007381-007383)
- 4/27/89 (sic) Correspondence from J.D. Clayton stating that Grenada Plant ceased burning hazardous waste (K001) on April 13,1987 (EPA-GR 007384)
- 6/04/91 Correspondence from R.S. Ohlis to W.R. Donley discussing intent to cease Fuel Additive Program on June 6, 1991 and containing handwritten note from J.D. Clayton that Fuel Additive Program ceased on June 5,1991 (EPA-GR 007385)

PROCESS WASTE STACK TESTS

- 10/18/79 Correspondence from Anthony Foster to MDEQ enclosing October 1979 stack Test Results (untreated wood as fuel) (EPA-GR 007387-007424)
- 8/23/82 Correspondence from William Baldwin to Dan McLeod (MDEQ) discussing results of May 1982 Stack Test (creosote or pentachlorophenol process waste mixed with untreated wood as fuel) (EPA-GR 007425-007426)
- 8/4/82 "Boiler Stack Tests with Sludges Mixed in Fuel" detailing stack tests performed in May 1982 (sent to MDEQ) (creosote or pentachlorophenol process waste mixed with untreated wood as fuel) (EPA-GR 007427-007442)
- 12/13/84 Fuel Additive Test Burn detailing stack test performed in 8/84 (sent to MDEQ) (creosote or pentachlorophenol process waste mixed with untreated wood as fuel) (EPA-GR 007443-007471)
- 5/09/88 Internal MDEQ Memorandum from Kenneth Petre to Danny Jackson discussing results of Stack Test conducted on Grenada Plant (creosote or pentachlorophenol process waste mixed with untreated wood as fuel) (EPA-GR 007472)

- 7/01/88 Correspondence form Robert Anderson to Dan Jackson (MDEQ) enclosing 6/88 "Koppers Company, Inc. Grenada, Mississippi Wood Fired Boiler Permit Renewal Test Burn" performed in June 1988 (creosote or pentachlorophenol process waste mixed with untreated wood as fuel) (EPA-GR 007473-007718)
PROCESS WASTE RECEIVED AND CHEMICAL ANALYSIS OF SAME - Exhibit 12 AA to February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Analysis of Wastes Shipped to Grenada" (EPA-GR 007721-007722) - Analytical Data relied upon by Joseph Santoleri in compiling Exhibit 12 AA (Analysis of Wastes Shipped to Grenada): Hazardous Waste Manifests and Fuel Additive Analyses received by Grenada Plant in connection with shipments of fuel additive from Koppers Company and Koppers Industries wood treating plants and Koppers Industries, Inc. wood treating customers. (EPA-GR 007723-008552) *See*, generally, June 1, 2005 JJS-1 "Opinion of Joseph J. Santoleri, P.E." and February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Analysis of Wastes Shipped to Grenada" (EPA-GR 013013-013088)
BOILER AND PROCESS WASTE DURATION, QUANTITY AND TOTAL BURNED - Exhibit JJS-17 to February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Daily Logs of Boiler Fuel Additive Operation – 1983 to 1991" (EPA-GR 008554-008612) - Exhibit 14A to February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Cumulative Metal Weight in Process Wastes" (EPA-GR 008613-008614) - Fuel Additive-related documents relied upon by Joseph Santoleri in compiling Exhibits JJS-17 (Daily Logs of Boiler Fuel Additive Operation – 1983 to 1991) and 14A (Cumulative Metal Weight in Process Wastes): Grenada Plant Boiler Stack Charts and Fuel Additives Logs demonstrating the duration and quantity of Fuel Additive Burned from 1983 to 1991 (EPA-GR 008615-009101) *See*, generally, June 1, 2005 JJS-1 "Opinion of Joseph J. Santoleri, P.E." (EPA-GR 012786-012882) and February 10, 2006 Joseph Santoleri Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion entitled "Analysis of Wastes Shipped to Grenada" (EPA-GR 013013-013088)

Information Request No. 16: Has Koppers Inc., ever burned sludges in the boiler furnace? If so, over what period of time, and approximately how much sludge has been burned?

Response: As noted in Response to Requests Nos. 14 and 15, Koppers Inc. was permitted by the MDEQ to utilize fuel additive – a mixture of untreated wood chips and wood treating residuals – as fuel in the Grenada boiler when it took ownership of the Grenada Plant on December 29, 1988. Koppers Inc. voluntarily ceased burning all wood treating residuals as fuel additive in the Grenada boiler on June 5, 1991. Specifications established by Beazer (and adopted by Koppers Inc.) in the Fuel Additive Guidelines limited the use of wood treating residuals as boiler fuel to only those which met certain BTU, metal content and physical characteristic limitations approved by the MDEQ. For a discussion of the amounts of wood treating residuals used in the Grenada boiler, Koppers Inc. refers the USEPA to Exhibit JJS-17 of Joseph Santoleri's February 10, 2006 "Supplemental *Barnes* Opinions, *Hobbs* Opinions and *Hill* Opinion" entitled "Daily Logs of Fuel Additive Operation – 1983 to 1991."

Information Request No. 17: How has the ash left over from the burning of sludges been dealt with? Submit all relevant analytical data.

Response: Koppers Inc. understands that Beazer disposed of ash generated from the use of fuel additive in the Grenada Boiler in the boiler ash landfarm located in the southeast corner of the Grenada Plant. Koppers Inc. further understands that Beazer continued this practice until 1987 when it commenced shipping boiler ash to the Grenada Municipal County landfill. Koppers Inc. continued the practice of shipping ash generated from the use of fuel additive in the Grenada boiler to the Grenada Municipal County landfill when it assumed ownership of the Grenada Plant in 1988. This practice continued until Koppers Inc. voluntarily ceased the fuel additive program on June 5, 1991. It is also Koppers Inc.'s understanding that Beazer managed and closed the boiler ash landfarm as a solid waste management unit pursuant to its ongoing remedial activities at the Grenada Plant. By way of further response, Koppers Inc. refers the USEPA to Beazer's response to this Request. The following documents are being produced to the USEPA in response to this Request:

PROCESS WASTE ASH ANALYSIS

- 1/22/85 Correspondence from R.D Hepner to C.J. Vita Re: Grenada Boiler Fly and Bottom Ash Analysis (EPA-GR 009106)
- 4/16/86 Correspondence from D.L. King to C.P. Brush enclosing K001 Analysis of Grenada boiler fly and bottom ash (EPA-GR 009107-009108)
- 8/28/86 Correspondence from Charles Brush to Jim Hardage (MDEQ) enclosing K001 analysis of Grenada boiler ash and cinders (EPA-GR 009109-009111)
- 4/26/89 Correspondence from W.R. Donley to J.R. Batchelder Re: Volume of ash

generated by Grenada boiler on daily basis (EPA-GR 009115)

See also 10/18/99 Risk Based Engineering Assessment of Grenada County Landfill (EPA-GR 009414-009575)

BOILER ASH LANDFARM – OPERATION AND CLOSURE

- 2/10/87 Correspondence from Jim Hardage (MDEQ) to Cyrus Markle stating, *inter alia*, that ash from Grenada boiler is considered to be a solid waste and that land treatment unit (boiler ash landfarm) receiving ash is considered to be solid waste management unit (EPA-GR 009116-009117)
- 3/25/87 Administrative Order No. 1209-87 holding, *inter alia*, that ash generated from the burning of EPA listed wastes (K001) in Grenada boiler is hazardous; requiring Koppers Company, Inc. to stop placing ash on landfarm (EPA-GR 009118-009120)
- 4/23/87 Correspondence from Jill Blundon to MDEQ enclosing Petition by Koppers Co., Inc. challenging the finding that ash generated from the burning of listed wastes (K001) generated hazardous waste/ash (EPA-GR 009121-009153)
- 4/27/89 (sic) Correspondence from J.D. Clayton stating that Grenada Plant ceased burning hazardous waste (K001) on April 13, 1987 and started sending Grenada boiler ash to Grenada County Municipal landfill on May 7, 1987 (EPA-GR 009154)
- Complainant's Brief in Support of Commission Order No. 1209-87 (EPA-GR 009155-009158)
- 11/03/87 Correspondence from J.T. Palmer (MDEQ) to J.M. Batchelder enclosing Commission Order No. 1280-87 confirming that ash generated from the burning of listed wastes (K001) constitutes hazardous waste (EPA-GR 009159-009162)
- 11/30/87 Correspondence from Robert Anderson to Sam Mabry (MDEQ) enclosing closure plan for boiler ash landfarm (EPA-GR 009163-009260)
- 9/06/88 Correspondence from David Bockelmann (MDEQ) to J.R. Batchelder enclosing RCRA Inspection Report describing, *inter alia*, the history of Grenada Plant boiler ash landfarm, noting that ash in landfarm was not controlled for wind or surface water dispersion (EPA-GR 009261-009269)
- 9/22/88 Correspondence from Robert Anderson to David Bockelman (MDEQ) addressing concerns regarding boiler ash wind and surface water dispersion (EPA-GR 009270-009273)
- 10/88 Hydrogeologic Investigation of Boiler Ash Disposal Area (EPA-GR 009274-009385)
- 11/07/88 Agreed Order No. 1478-88 requiring payment of $6,000 to settle alleged violations concerning, *inter alia*, containment of wind and surface water dispersion of ash stored in boiler ash landfarm (EPA-GR 009386-009388)
- 12/12/88 RCRA Site Inspection of Grenada Plant discussing, *inter alia*, inadvertent use of K001 (oil/water separator waste) as boiler fuel and subsequent disposal of resultant ash at Grenada County Municipal landfill (EPA-GR 009389261-009393)
- 2/06/89 Correspondence from Robert Anderson to USEPA Waste Compliance Section enclosing, *inter alia*, certification that boiler ash has had not been placed on Grenada Plant boiler ash landfarm as of December 1, 1987 (EPA-GR 009394-009398)
- 5/26/89 Correspondence from Mathew Plautz to William Spengler (MDEQ) responding to concerns regarding air and surface water dispersion of ash stored in Grenada Plant boiler ash landfarm (EPA-GR 009399-009403)
- 5/05/89 Correspondence from Mathew Plautz to Kaleel Rahaim (MDEQ) discussing history of Grenada Plant boiler ash landfarm (EPA-GR 009404-009405)
- 6/27/89 Correspondence from Charles Chisolm (MDEQ) to Jill Blundon enclosing Agreed Order No. 1598-89 requiring Beazer to, *inter alia*, perform a risk-based engineering study

of Grenada Municipal landfill to determine alleged impact caused by inadvertent disposal of hazardous waste (ash) (EPA-GR 009406-009412)
- 6/30/89 Correspondence from S.T. Smith to Rock Clayton stating that oil/water separator wastes (considered by EPA to constitute K001 listed wastes) would no longer be burned as fuel additive in Grenada boiler (EPA-GR 009413)
- 10/18/89 Risk-Based Engineering Assessment Grenada County Landfill concluding, *inter alia*, that "the boiler ash disposed of by Koppers Company, Inc. . . . at the Grenada County Landfill does not appear capable of presenting any measurable incremental risk to human health or the environment vie either of the two possible exposure pathways" (EPA-GR 009414-009575)
- 6/90 Closure Construction Documentation Report for Grenada Plant Boiler Ash Landfarm (EPA-GR 009576-009884)
- 7/12/90 Correspondence from James Palmer (MDEQ) to Jill Blundon stating that closure has been completed for both the Grenada Plant's surface impoundment and boiler ash landfarm (EPA-GR 009885)
- 4/93 Final Report on Groundwater Quality Assessment of Grenada Plant Boiler Ash Disposal Area (EPA-GR 009886-010325)
- 2/16/94 Correspondence from Norton Jessup and Norbert Schulz to David Peacock (MDEQ) enclosing Report on Supplemental Investigation Addendum to Boiler Ash Landfill Groundwater Quality Assessment identifying upgradient source (Heatcraft facility) of TCE groundwater contamination (EPA-GR 010326-010339)

Information Request No. 18: Has Koppers Inc., ever received, burned, or used materials or sludges containing herbicides, insecticides or polychlorinated biphenyl (PCBs)? If so, please provide details of the use of materials containing such constituents, and provide any paperwork relevant to the presence of herbicides, insecticides, and PCBs on site.

Response: Koppers Inc. has never received, burned or used materials in its boiler containing herbicides, insecticides or polychlorinated biphenyl (PCBs). Koppers Inc. did, however, mix certain wood treating residuals (meeting limitations imposed by MDEQ permits and the Fuel Additive Guidelines) with untreated wood chips for use as fuel in the Grenada boiler. For additional information regarding the Fuel Additive Program and Guidelines, please see Koppers Inc.'s responses to Requests Nos. 14, 15 and 16. As the current owner and operator of the Grenada Plant, Koppers Inc. has employees that are qualified as certified applicators who have treated, and continue to treat, wood using preservatives classified as pesticides.

Information Request No. 19: Has Koppers Inc., ever used a metal-based preservative, such as copper chromated arsenate (CCA), during its operations at the site? If yes, please provide time frames, and any paperwork relevant to the presence of such chemicals at the site.

Response: Koppers Inc. has never used a metal-based preservative, such as copper chromated arsenate (CCA), during its operation of the Grenada Plant. Koppers Inc. has also never used "metal-based preservatives" such as CCA for use as fuel in the Grenada boiler at any time, including the duration of either the Fuel Additive or Creosote Take Back Programs. Koppers Inc. does understand that Beazer used CuCZC prior to 1968, and refers the USEPA to Beazer's Responses for additional information on the preservative's historical use and disposal at the Grenada Plant.

Respectfully submitted,

KOPPERS INC.,

By:____________________
Leslie S. Hyde
Vice President, Safety & Environmental Affairs

Enclosures to be sent under separate cover as indicated below

cc:

Deborah Benjamin, Esq., EPA Region 4 (w/enclosures)
Mike Bowden, EPA Region 4, SESD (w/o enclosures)
Narindar Kumar, EPA Region 4 (w/o enclosures)
Toby Cook, MDEQ/Jackson (w/o enclosures)

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RECEIVED
MAY 4 - 2007
Dept of Environmental Quality
Office of Pollution Control

April 30, 2007

<u>VIA FED EX</u>
Mr. Jeffrey Pallas
Chief, South Section
RCRA Enforcement & Compliance Branch
United States Environmental Protection Agency
Region 4
Atlanta Federal Center
61 Forsyth Street
Atlanta, Georgia 30303-8960

Re: Koppers, Inc./Beazer East, Inc., Tie Plant, Mississippi
Koppers Inc. and Beazer East, Inc. Response to Request for Information Pursuant to USEPA Section 3007
HSWA Permit, Dated September 2, 1998
EPA I.D.No. MSD 007 027 543

Dear Mr. Pallas:

Enclosed are documents jointly submitted by Koppers Inc. ("Koppers") and Beazer East, Inc. ("Beazer") as part of their responses to the United States Environmental Protection Agency's Request for Information pursuant to RCRA Section 3007 ("Information Requests"). These documents respond to both the specific requests made in the U.S. EPA's Information Requests and the comments generated during the April 11, 2007 meeting between representatives of USEPA, Koppers and Beazer. The narrative responses to the Information Requests are being sent out to you, under separate cover, individually by both Koppers and Beazer.

The documents submitted in conjunction with this mailing have been individually numbered and are organized chronologically using the series "EPA-GR ######." An index is provided that lists the groupings under which the documents are maintained, each document's specific number range and the specific Request(s) to which each document responds.

Where possible, electronic documents are being supplied in addition to hard copies of said documents. As such, the following CDs are included with this mailing:

- "Koppers Inc./Beazer East, Inc. April 11, 2007 Section 3007 Information Request Grenada, Mississippi" – containing an electronic version of the Powerpoint presentation given during the April 11, 2007 meeting between representatives of USEPA, Koppers and Beazer;
- "Wayne Grip, Raymond Ferrara, Joseph Santoleri" – containing electronic copies of the expert reports generated by Wayne Grip, Dr. Raymond Ferrara and Joseph Santoleri for Koppers and Beazer in litigation filed by certain individuals who reside in the vicinity of the Koppers Inc. wood treating facility located in Grenada, Mississippi. Hard copies of these reports are also being produced, and can be found on the index under the heading "Experts" at pages 28 and 29;
- "Koppers, Inc. Grenada Facility, Grenada, MS Soil and Groundwater Databases: Grenada 03-16-2007.mdb and Grenada 03-16-2007 Geobase.mdb" – containing electronic versions of the two databases described by Beazer in response to Information Request No. 3. Note also that hard copies of only the database found in the file "Grenada 03-16-2007 Geobase.mdb" are being produced to the USEPA as listed in the attached index under the heading "GeoTrans database" at page 7.

The information attached hereto has been gathered from documents both available to and in Beazer's and/or Koppers' possession. To this end, Beazer and Koppers reserve the right to supplement and/or modify the submission of supporting documents should additional information be located. The documents produced to USEPA are being jointly produced by both Beazer and Koppers Inc., irrespective of the party that created and/or possesses them.

Should you have any questions or concerns about this or any other related matter, please do not hesitate to give me a call.

Very truly yours,

Cal R. Burnton

CRB/dmn

Enclosures to be sent under separate cover as indicated below

1771784

cc: Deborah Benjamin, Esq., EPA Region 4 (w/enclosures via first class mail)
Mike Bowden, EPA Region 4, SESD (w/o enclosures via first class mail)
Narindar Kumar, EPA Region 4 (w/o enclosures via first class mail)
Toby Cook, MDEQ/Jackson (w/o enclosures via first class mail) THIS COPY FOR

bcc: Jill Blundon, Esq. (w/o enclosures via first class mail)
Mike Bollinger (w/o enclosures via first class mail)
Dean Calland, Esq. (w/o enclosures via first class mail)

Beazer

BEAZER EAST, INC. C/O THREE RIVERS MANAGEMENT, INC.
ONE OXFORD CENTRE, SUITE 3000, PITTSBURGH, PA 15219-6401

RECEIVED
JAN 24 2007
MDEQ

Koppers
Grenada County
AI: 876
HSWA
Shanks

January 23, 2007

Mr. Jon D. Johnston
Chief, RCRA Programs Branch
Waste Management Division
United States Environmental Protection Agency
Region IV
Atlanta Federal Center
61 Forsyth Street
Atlanta, Georgia 30303-8906

Re: Request for Approval
Koppers Inc. Beneficial Reuse of Recovered DNAPL
Grenada, Mississippi
EPA ID No. MSD 007 027 543

Dear Mr. Johnston:

As you are aware, Beazer East, Inc. (Beazer) recently received United States Environmental Protection Agency, Region 4 (USEPA) approval for the July 2003 Complete Phase II RCRA Facility Investigation Report (RFI Report) for the Koppers Inc. wood-treating facility, located in Grenada, Mississippi (Site). During the RFI process, Beazer closed or addressed through direct removal action solid waste management units (SWMUs) located in the northern and southern areas of the Site. The SWMU 11 (Former Wastewater Treatment System) Interim Measures (IM), implemented between April 1999 and May 2000, were designed to mitigate further discharge of dense non-aqueous phase liquid (DNAPL) into the Central Ditch, and to eliminate potential exposure pathways to wood treating compounds in the Central Ditch sediment. To accomplish these two objectives the IM activities included:

- Excavating approximately 30,000 cubic yards of impacted sediment from the Central Ditch and placement into a corrective action management unit (CAMU);
- Relining the ditch with a geosynthetic clay liner, clean import material, and bank armor;
- Consolidating the excavated sediment in the Former Wastewater Treatment System and former wood disposal area, and installing a low-permeability cover with a geosynthetic clay liner over the excavated sediment to reduce the groundwater hydraulic gradient toward the Central Ditch;
- Installing a subsurface vertical containment barrier along the north bank of the Central Ditch, an underdrain beneath the re-lined ditch, and DNAPL recovery wells behind the containment barrier, to contain and collect DNAPL and mitigate continuing seeps into the Central Ditch; and
- Performing on-going DNAPL collection.

Writer's Direct Dial: 412/208-8860

Beazer is working cooperatively with the USEPA to assist the USEPA with their stated goal of expeditious selection and implementation of the remaining components of the Site remedy. As part of the ongoing groundwater and DNAPL remediation program, Beazer is operating on-site recovery systems that recover DNAPL from recovery well RW-5 and under drain #7. Beazer is proposing to incorporate beneficial reuse of the recovered DNAPL as a component of this comprehensive program.

The DNAPL being recovered is a coal tar distillate material that is physically and chemically identical to the feedstock and/or raw material used by Koppers in their wood preserving process. Because the properties of the recovered DNAPL are of the same quality and composition, Beazer is requesting USEPA approval to allow the recovered DNAPL to be utilized by Koppers for reuse as a raw material, feedstock, and/or ingredient in the production of wood preserving solutions and/or in wood preserving operations. Koppers has expressed their enthusiasm to reuse the DNAPL contingent upon two conditions:

- The recovered DNAPL meets Koppers' product specifications for reuse as a raw material, feedstock, and/or ingredient in the production of wood-preserving solutions and/or in wood-preserving operations at Grenada, and
- The USEPA provides written approval for use of the recovered DNAPL in their Grenada wood preserving process.

Beazer has performed a suite of analyses specified by Koppers to ensure the DNAPL is physically and chemically compatible with their production specifications. Based on the results of these analyses (Attachment A), Koppers has confirmed that the recovered DNAPL meets their raw product material specifications and, therefore, can use the material in their process.

As you are aware, under RCRA, wastes must be characterized prior to treatment, storage, and disposal. For waste determination purposes under RCRA, environmental media that contain listed hazardous wastes are classified as the listed hazardous waste (the contained-in rule). The determination of whether DNAPL contains a listed waste must be made based upon knowledge of the process that created the DNAPL at the locations at which it is found. The USEPA has suggested that site information, such as manifests, storage records, and vouchers, be used to ascertain the source of the residuals. 53 Fed. Reg. 51394 (December 21, 1988). It is the USEPA's position that if documentation to this effect is lacking, the lead agency may assume the waste is not a listed waste. 55 Red Reg. 8665, 8758 (March 8, 1990).

In addition, 40 CFR 261.4 states that "materials which are not solid wastes" include "spent wood preserving solutions that have been reclaimed and are reused for their original intended purpose." Therefore, collected DNAPL that is reused in the wood-treating process should not be classified as a solid waste, and, therefore, should not be classified as a hazardous waste.

There are five listed waste codes associated with the wood-preserving processes. These listings are tied to specific processes in the wood-preserving industry and four of these processes are relevant to the Grenada wood treating plant. For example, unused formulations of the commercial chemical product, creosote, which is discarded, is the listed hazardous waste U051. Bottom sediment sludge from the treatment of wastewaters from wood-preserving processes that use creosote and/or pentachlorophenol is listed as K001. Wastewaters, process residuals, preservative drippage and spent formulations from wood preserving processes that use chlorophenolic formulations are listed as F032. And finally, wastewaters, process residuals, preservative drippage, and spent formulations from wood-preserving processes that use creosote are listed as F034.

Given the size of the Site and the lack of documentation and physical pathway from the former operations area to the location of the DNAPL, it is not possible to determine from which, if any, of the specific process areas the DNAPL had been generated. Therefore, based upon the USEPA's guidance, Beazer does not believe that is appropriate to assume that the DNAPL contains listed wastes, and, therefore, should not be managed as a listed hazardous waste.

Concerning the characteristic hazardous waste determination, if the media does not contain a listed hazardous waste, but exhibits a characteristic of a listed hazardous waste due to the presence of hazardous waste within the media, it must be classified as a characteristic hazardous waste. With respect to the determination as to whether DNAPL recovered from the recovery well and under drain is likely to exhibit hazardous waste characteristics, Beazer has performed extensive testing of recovered DNAPL at many wood-preserving sites throughout the country. These tests have demonstrated that similar material is not characteristically hazardous.

Beazer has applied the forgoing rationale for waste classification to whether or not impacted on-site and off-site media at its former Charleston, South Carolina wood-treating facility should be classified as hazardous waste. We concluded that these materials should not be classified as hazardous waste. The USEPA Region IV and SCDHEC have concurred with Beazer's non-hazardous waste determination for management of this media. The USEPA approval letters dated May 22, 2002 and July 17, 2003 are provided as Attachment B.

Moreover, the Kentucky Department of Environmental Protection (KDEP) has concluded that DNAPL recovered from both on-site and off-site groundwater recovery systems at Koppers operating wood treating facility located in Guthrie, Kentucky should be reused by Koppers as a raw material, feedstock, and/or ingredient in the production of wood preserving solutions and/or in wood preserving operations. The KDEP approval letter dated December 06, 2006 is provided as Attachment C.

As an additional point of reference, Beazer has been successful in obtaining the West Virginia Department of Environmental Protection (WVDEP) concurrence allowing Koppers to reuse DNAPL as an ingredient in their tar manufacturing operations located in Follansbee, West Virginia. The WVDEP has approved Koppers' reuse of recovered DNAPL from site remediation activities at the following sites: Carbondale, Illinois; Charleston, South Carolina; Salisbury, Maryland; Kearney, New Jersey; Youngstown, Ohio; and Nashua, New Hampshire. An approval letter from the WVDEP dated October 21, 2005 is provided in Attachment D.

Please note that the above listed sites are non-operating closed facilities and thus the need to transport the DNAPL to a Koppers operating facility.

Upon USEPA's concurrence with Koppers reuse of the DNAPL, deployment/transfer of the material from Beazer's recovery well and under drain locations will be accomplished with a small transportable DNAPL recovery trailer. The trailer will be an enclosed unit and contain a 200 gallon capacity double walled steel tank, gas powered air compressor, and a 1 inch air diaphragm pump mounted inside the trailer. The diaphragm pump will remove the DNAPL from the well and discharge it into the 200 gallon tank. The DNAPL will then be transferred from the transportable DNAPL recovery trailer to Koppers process treatment tanks.

For tracking purposes, a Bill of Lading document will be utilized and will carry the following DOT description: "Environmentally Hazardous Substance, Liquid, N.O.S., Class 9, NA 3082, PG III (Coal Tar Distillate - recovered material for reuse – not a manufactured product)." The total volume of DNAPL that will be transported from the recovery well locations is estimated at approximately 1,000 gallons per year. We have attached a DNAPL (i.e., coal tar distillate) material safety data sheet (MSDS) that Beazer has developed at Koppers request for material identification purposes (Attachment E).

We believe that our proposed material characterization is consistent with the USEPA guidance that does not require, and even counsels against, reaching a conclusion that a waste is listed when evidence for the determination is lacking. Pursuant with above rationale for reuse of the DNAPL, and the appropriate and protective use of recovered DNAPL as a reusable ingredient in the wood-preserving process, we look forward to a favorable response and your written approval as soon as possible.

We thank you for your consideration in this matter. If you have any questions regarding this request, please call me at (412) 208-8860 or Michael Bollinger at (412) 208-8864.

Very truly yours,

Robert A. Fisher
Waste Management Operations

Enclosures

cc: Harbhajan Singh, USEPA
Jerry Cain, MDEQ
Jennifer Abrahams, GeoTrans.
Mike Bollinger, Beazer
Mike Slenska, Beazer
Jill Blundon, Beazer

Attachment A

Summary of DNAPL Physical/Chemical Analyses

ANALYSIS	ANALYTICAL METHOD	UNITS	SPECIFICATION		GRENADA
			LOWER	UPPER	
Water	ASTM D-95	Wt. %		2	3.4
Xylene Insoluble	ASTM D-893 or 8260B	Wt. %		3.5	1.3000
Specific Gravity @38C	Calculated		1.05		1.0674
Specific Gravity @15.5 C	ASTM D-4052				1.0977
Specific Gravity, API @60F	ASTM D-4052				-2.6
Specific Gravity - Fraction 235-315 C	ASTM D-4052				CNR
Specific Gravity - Fraction 315-355 C	ASTM D-4052				CNR
Distillation to 210 C	ASTM D-86	% by Wt.		25	4.7
Distillation to 235 C	ASTM D-86	% by Wt.			9.0
Distillation to 270 C	ASTM D-86	% by Wt.			33.6
Distillation to 315 C	ASTM D-86	% by Wt.			57.3
Distillation to 355 C	ASTM D-86	% by Wt.	75		74.0
Distillation Residue	ASTM D-86	% by Wt.			26.0
Naphthalene	ASTM D-5769 or 8270C	%			16
Ash	ASTM D-482	Wt. %		0.05	0.033
Sodium	ASTM D-5185 or 6010B	mg/kg (ppm)		10	2.1
Potassium	ASTM D-5185 or 6010B	mg/kg (ppm)		2	0.47
Sulfur	ASTM D-4294	Wt. %		1	0.604
Aromatic Bases	SW 846 8260B	Wt. %			ND
Flash Point	ASTM D-93A	Degree F			>210
Arsenic	ASTM D-5185 or 6010B	mg/kg (ppm)		10	2.8
Pentachlorophenol*	3560M/8270C	mg/kg (ppm)		10	1100

Notes:
C- Celsius
Wt. - Weight
F - Fahrenheit
NS - Not Sampled
ND - Not Detected
ppm - parts per million
mg/kg - milligrams per kilogram
SB - Sample boiled at 212 Deg. F
B - Estimated result. Result less than reporting limit.
CNR - Samples are multiphase with suspended matter. Can not run.
SI - No distinct flash point. Flame extinguished at 250 F, then sample ignited at 260 F.
J - Method blank contamination. The associated method blank contains the target analyte as a reportable level.

Expected Annual Volume = 1000 gal/year

Koppers comments:

Acceptable to Grenada plant

Attachment B

May 22, 2002 and July 17, 2003
Approval Letters from the USEPA Region 4

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

MAY 2 8 2002

May 22, 2002

4WD-NSMB

Mr. Mike Slenska, P.E.
Environmental Manager
Beazer East, Inc.
One Oxford Centre, Suite 3000
Pittsburgh, PA 15219

SUBJ: EPA Response to April 17, 2002 Letter, Material Terms of Agreement, Koppers Co. Inc. NPL Site, Charleston, South Carolina

Dear Mr. Slenska:

I have reviewed your April 17, 2002 letter which provided a summary of our March 7, 2002 project meeting and proposed a comprehensive agreement that would result in acceptable construction completion by September 2003 for all remaining remedy components to be implemented under the April 1998 Record of Decision. EPA concurs with the majority of the terms of the proposed comprehensive agreement as outlined in your correspondence, but offers the following points for clarification.

<u>South Marsh Remedial Action Boundary</u> - EPA believes the Final remedial action boundaries for the South Tidal Marsh accurately reflect the agreements reached by Beazer, SCDHEC and EPA during the March 7, 2002 project meeting. Final EPA approval of the remediation area in the South Marsh will be reserved pending review of the Final design documents necessary for construction and permitting.

<u>South Marsh Material Disposal</u> - EPA has determined that excavated material from the South Marsh is not listed RCRA waste, and may be handled as non-hazardous material for disposal in an approved, off-site Subtitle D landfill. This determination is made *provided* all material managed this way is properly treated via stabilization to meet transportation/disposal requirements of the Department of Transportation and the receiving landfill.

<u>Barge Canal Remediation Approach/Monitoring Program</u> - Two dimensional sediment transport/deposition modeling conducted by the U.S. Army Corps of Engineers (USACE Waterways Experiment Station, August 30, 2000) on behalf of EPA; and the May 4, 2001 Technical Memorandum prepared by URS on behalf of Beazer clearly indicates the Barge Canal is dominated by depositional dynamics. However, EPA believes a baseline monitoring event in the Barge Canal is necessary to provide further lines of evidence to justify preparation of an Explanation of Significant Differences (ESD) allowing natural sedimentation in lieu of capping

specified by the ROD. As discussed previously, EPA believes this baseline monitoring event should involve collection of a reasonable amount of sediment cores (5 to 10). Cores would be age dated using Pb-210 or Cs-137 techniques to collaborate sediment deposition rates predicted by the modeling effort; and analyzed for PAHs to determine concentration trends over the vertical profile. After the baseline event, a monitoring program of sufficient scope and longevity would be implemented to ensure the natural capping alternative remains protective of human health and the environment over the long-term. As you proposed, EPA believes the content of the Barge Canal monitoring program would be developed concurrent with completion of the South Marsh remedial design.

EPA understands that Beazer has initiated design efforts for the South Marsh remedial action and provided that Beazer agrees with the clarifications provided in this letter, EPA believes substantive dialogue regarding the scope of the Barge Canal monitoring program should be initiated in the short-term. EPA looks forward to reviewing the 90% design submittal for the South Marsh and to conducting the physical construction activities during the Fall of 2002. If you should have any questions or wish to discuss this matter in greater detail, please contact me at 404.562.8827.

Sincerely,

Craig Zeller, P.E.
Remedial Project Manager

cc. Mihir Mehta, SCDHEC
Tom Dillon, NOAA
Diane Duncan, USFWS
Priscilla Wendt, SCDNR

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

JUN 2 0 2003

July 17, 2003

4WD-NSMB

Mr. Robert Fisher, Manager
Waste Management Operations
Beazer East, Inc.
One Oxford Centre, Suite 3000
Pittsburgh, PA 15219-6401

SUBJ: Northwest Corner Area Material Characterization and Disposal Options
Koppers Co., Inc. (Charleston Plant) NPL Site
Charleston, South Carolina

Dear Mr. Fisher:

The Region 4 Office of the United States Environmental Protection Agency (EPA) has received and reviewed your letter dated June 12, 2003 regarding excess soil that has been stockpiled in the Northwest Corner Area of the site during on-going solidification and stabilization (S/S) activities.

Your rationale for determining whether soil and sediment contains a listed waste under the Resource Conservation and Recovery Act (RCRA) is consistent with our interpretation of the regulations. EPA agrees that it is difficult, if not impossible, to determine the exact source or wood-treatment process that impacted the soil being treated via S/S techniques in the Northwest Corner of the Site. Therefore, EPA concurs with Beazer's assumption that the bulked soil volume from the Northwest Corner S/S project is not a listed waste under RCRA.

Given the anticipated volume of stockpiled soil (e.g. ≈ 4,000 cubic yards) and the likelihood of future redevelopment activities on this parcel, EPA believes that off-site disposal of this material in an approved Subtitle D landfill is a better option than on-site treatment/disposal. Beazer shall ensure that the subject material is properly characterized and treated to meet appropriate standards of the receiving landfill and the Department of Transportation. If you should have any questions regarding this matter, please contact me at 404.562.8827.

Sincerely,

Craig Zeller, P.E.
Remedial Project Manager

cc. Mike Slenska, Beazer
Mihir Mehta, SCDHEC

Attachment C

December 06, 2006 Approval Letter from the KDEP

RECEIVED DEC 1 1 2006

ERNIE FLETCHER
GOVERNOR

ENVIRONMENTAL AND PUBLIC PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT
14 REILLY ROAD
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

TERESA J. HILL
SECRETARY

December 6, 2006

Mr. Robert A. Fisher
Waste Management Operations Environmental Manager
Beazer East, Inc.
One Oxford Centre
Suite 3000,
Pittsburgh, PA 15219-6401

Re: Request for Approval
Koppers Industries Inc. Beneficial Reuse of Recovered DNAPL
Guthrie, Todd County, Kentucky
EPA ID #: KYD-006-383-392
AI #: 4021

Dear Mr. Fisher:

The Kentucky Division of Waste Management (Division) received your request for the regulatory status of Recovered groundwater/dense non-aqueous phase liquid (DNAPL) on August 2, 2006 and additional supportive information on December 1, 2006 as effective commercial chemical product (401 KAR 31:010 Section 2(5)).

The Division understands that Beazer East, Inc. (Beazer) has a DNAPL remediation program at the Koppers Inc. (Koppers) wood-treating site located in Guthrie, Kentucky. Beazer states also they operate on-site and off-site recovery systems which recover DNAPL separately. As a result, Beazer is proposing a beneficial reuse of the recovered DNAPL by Koppers. The DNAPL being recovered is a coal tar distillate material. This material is physically and chemically "identical" to the feedstock and/or raw material used by Koppers in their wood preserving process as analytical results indicated.

Based on the information provided, the Division agrees that the recovered DNAPL could be reused by Koppers as raw material, feedstock, and/or ingredient in the production of wood preserving solutions and/or in wood preserving operations.

Please note that this determination is specific to the information that you provided in your August 2, 2006 letter and cannot be referenced to other process(es) without first contacting the Division for clarification and/or approval. If there is any change in the remediation process or/and the material profile which may affect the Division's determination, you must immediately bring this to the attention of the Division.

If you have any questions, please contact Maridely M. Loyselle at (502) 564-6716 extension 220.

Sincerely,

April J Webb

April J. Webb P.E., Manager
Hazardous Waste Branch
Division of Waste Management

AJW/mml

c: Otis Johnson, EPA Region 4
John Jump, Hazardous Waste Branch
Maridely M. Loyselle, Hazardous Waste Branch
Ahad Chowdhury, Hazardous Waste Branch
Madisonville Regional Field Office
File Room – Main File
Reading File

Mr. Patrick Stark
Environmental Manger
Koppers Industries Inc – Guthrie Facility
198 Fairgrounds Rd.
Guthrie, Kentucky 42234

Attachment D

October 21, 2005 Approval Letter from the WVDEP

To: Von Lonck
From: B.ll Schmidt
MDE
Beazer 1051
Sol:s.
DNAPL

dep

west virginia department of environmental protection

Division of Water and Waste Management
Office of Waste Management
601 57th Street SE
Charleston, WV 25304

Joe Manchin III, Governor
Stephanie R. Timmermeyer, Cabinet Secretary
www.wvdep.org

October 21, 2005

Robert A. Fisher
Beazer East, Inc.
Hanson Legal and Environmental Group
One Oxford Center
Pittsburgh, PA 15219

Dear Mr. Fisher:

This letter is in response to your request that the West Virginia Department of Environmental Protection concur that the Koppers Industries, Inc. Follansbee Plant may accept Dense Non-Aqueous Phase Liquids (DNAPL) generated off-site as a substitute feedstock for its processes. That concurrence is hereby affirmed.

It is my understanding that the DNAPL will be generated at several facilities and that those locations will be made known to this office prior to the beginning of shipments. In addition, if the list changes, that information will also be made known in writing. Please provide copies of the sources of the material as well as the amount of material shipped to both this office and the Wheeling Field Office.

It is important to note that this concurrence is based upon analytical results provided to this office. In the event that the facility can no longer use the material as feedstock, that the chemical composition of the DNAPL significantly changes, or that the percentage of water being shipped with the material significantly increases, this concurrence will be withdrawn.

OCT 24 2005

This concurrence does not relieve any of the parties involved of their duty to comply with the requirements of any local, state or federal agency.

If you have any questions, please call me at (304) 926-0499, extension 1278.

Sincerely,

H. Michael Dorsey
Assistant Director

cc: James Fenske, WVDEP Inspector Supervisor
Ed Hammerburg, Maryland Department of Environment Chief
WVDEP, Office of Waste Management, Permits

Attachment E

Coal Tar Distillate
Material Data Safety Sheet

Material Safety Data Sheet
Coal Tar Distillate
(Recovered Material for Reuse/Recycling)
(Not a Manufactured Product)

Section 1 — Material Identification

Trade Name: Recovered Coal Tar Distillate for Reuse/Recycling *(Not a manufactured product)*
Synonym: None

Provider: Beazer East, Inc.
One Oxford Centre
Pittsburgh, PA 15219
Emergency Telephone No.: (800) 424-9300

Section 2 — Composition/Information on Ingredients

Coal tar distillate is a complex mixture of hydrocarbons.

INGREDIENTS	CAS N0.	% by Wt.	OSHA PEL-TWA	ACGIH TLV-TWA
Coal Tar Distillate[1]	65996-92-1	100	0.2 mg/m^3	0.2 mg/m^3
Indene	95-13-6	<10	10 ppm	10 ppm
Naphthalene	91-20-3	<15	10 ppm	10 ppm
Biphenyl	92-52-4	<5	0.2 ppm	0.2 ppm
Benzene	71-43-2	<1	1 ppm	0.5 ppm
Alkylnaphthalene	—	<10	None	None
Phenanthrene	85-01-8	9-13	None	None
Benz(a)anthracene	56-55-3	0.5-2	None	None
Benzo(a)phenanthrene	218-01-9	0.5-2	None	None
Benzo(b)fluoroanthene	205-99-2	—	None	None
Benzo(k)fluoroanthene	207-08-9	—	None	None
Benzo(j)fluoroanthene	205-82-3	—	None	None
7,12-Dimethylbenz(a)anthracene	57-97-6	1-3	None	None
Indeno (1,2,3-cd) pyrene	193-39-5	0.1-0.3	None	None
Benzo(a)pyrene	50-32-8	0.5-2	None	None
Dibenz(a,h)anthracene	53-70-3	0.01-0.1	None	None
Benzo(g,h,i)perylene	191-24-2	—	None	None
7-H Dibenzo(c,g)carbazole	194-59-2	0.01-0.2	None	None
Dibenzo(a,l)pyrene	191-30-0	0.01-0.1	None	None
1-Nitropyrene	5522-43-0	0.1-0.3	None	None
Dibenz(a,j)acridine	224-42-0	0.01-0.1	None	None
Dibenz(a,h)acridine	226-36-8	0.01-0.1	None	None
Pentachlorophenol	87-86-5	0.01-0.1	0.5 mg/m^3	0.5 mg/m^3

Notes:
1 The exposure limit for coal tar pitch volatiles is used as the overall exposure limit for this material.

Section 3 — Hazard Identification

Emergency overview

CHRONIC OVEREXPOSURE (as defined by OSHA recommended standards) MAY CAUSE CANCER
WARNING
MAY BE FATAL IF SWALLOWED
HARMFUL TO THE SKIN OR IF INHALED
CAUSES EYE AND SKIN IRRITATION
AVOID PROLONGED OR REPEATED CONTACT
OBSERVE GOOD HYGIENE AND SAFETY PRACTICES WHEN HANDLING THIS MATERIAL
DO NOT USE THIS MATERIAL UNTIL MSDS & MATERIAL LABEL HAVE BEEN READ/UNDERSTOOD.
WARNING: THIS MATERIAL CONTAINS A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

HMIS Rating: Health - 2, Fire - 1, Reactivity - 0

Potential health Effects

Primary Entry Routes: Inhalation of vapors or mist, eye/skin contact, incidental or inadvertent ingestion.
Target Organs: Respiratory tract, skin, eyes, bladder, kidneys.

Acute (Immediate) Effects
Inhalation: Acute overexposure to vapor may result in respiratory tract irritation. Repeated and/or prolonged contact to high concentrations of vapor may result in respiratory difficulties, central nervous system (CNS) effects characterized by headache, drowsiness, dizziness, weakness, incoordination, circulatory system collapse, coma, and possible death.
Eye: Direct contact with liquid or vapor may cause moderate to severe irritation and burns.
Skin: Skin contact can cause severe irritation, redness, burning, rash and itching which is made worse by exposure to sunlight (photosensitization).
Ingestion: Ingestion of the material may cause gastrointestinal disturbances including irritation, nausea, vomiting, and abdominal pain. Systemic effects are similar to those described under "Inhalation".

Chronic (Long Term Effects)
Effects of long term or repeated exposure to coal tar distillates may include dermatitis, skin cancer and lung cancer and other types of cancer.

Carcinogenicity
This material or similar materials has caused cancer in laboratory animals when administered throughout the major part of their lifetime.
The IARC monographs (Vol. 35) lists creosotes from coal tars, coal tars, and coal tar pitch volatiles as Group 1 carcinogens (carcinogenic to humans). The NTP Eleventh Annual Report on Carcinogens lists coal tars and coal tar pitches as Known to be Human Carcinogens.
This material contains benzene. The IARC monographs (vol. 29) lists benzene as a Group 1 carcinogen (carcinogenic to humans). The NTP Eleventh Annual Report on Carcinogens lists benzene as a Known to be Human Carcinogen.
This material contains naphthalene. The IARC monographs (vol. 82) lists naphthalene as Group 2B carcinogen (possibly carcinogenic to humans). Naphthalene is also listed in the NTP Eleventh Annual Report on Carcinogens as Reasonably Anticipated to be a Human Carcinogen.
This material contains pentachlorophenol. Volume 41 of the IARC Monographs states that there is limited evidence for the carcinogenicity of occupational exposure to chlorophenols, including pentachlorophol. Volume 71 of the IARC Monographs states that there is sufficient evidence in experimental animals for the carcinogenicity of pentachlorophenol. ACGIH lists pentachlorophenol as Class A3, confirmed animal carcinogen with unknown relevance to humans. The IARC considers polychlorophenols as Group 2B carcinogens (possibly carcinogenic to humans). California considers pentachlorophenol as a carcinogen.

Section 4 — First Aid Measures

Inhalation: Move the person to fresh air and support breathing as required. Consult a physician if victim has continued difficulty breathing.
Eye Contact: Lift eyelids and flush immediately with flooding amounts of water for at least 15 minutes. Do not allow the victim to rub his/her eyes or keep them shut. Consult a physician or ophthalmologist if all material cannot be removed or if there is continuing irritation.
Skin Contact: Remove clothing around affected area. Wipe away loose material and wash affected area with soap and water or waterless (non-alcohol) hand cleanser. If there is a severe skin reaction or reddened or blistered skin, consult a physician.
Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center with information from this MSDS. Unless the poison control center advises otherwise, give the person one or two glasses of water or milk, then induce vomiting. After vomiting, the victim may be given a slurry of 100g. of activated charcoal in 8 oz. of water. Seek medical aid.

Section 5 — Fire Fighting Measures

Flash Point: >93°C (>200°F)
Autoignition Temperature: Not determined.
Lower Explosive Limit: Not determined.
Upper Explosive Limit: Not determined.
Extinguishing Media: Use dry chemical, carbon dioxide, or foam. Use water spray only if the preferred measures are not available.
Unusual Fire or Explosion Hazards: Vapors may travel to an ignition source and flash back. Containers may explode in heat of fire. Coal tar distillate presents a vapor explosion hazard indoors, outdoors and in sewers. Material is not sensitive to contact or static discharge.
Hazardous Combustion Products: Oxides of carbon and other toxic vapors may be given off in a fire. Thick, black acrid smoke may be generated.
Fire Fighting: Wear a self-contained breathing apparatus (SCBA) with full facepiece operated in the pressure demand or positive pressure mode and full protective clothing. Do not allow runoff from fire fighting to enter roadways or sewers. Use water to cool off containers and structures and to protect personnel.

Section 6 — Accidental Release Measures

Stop leak if there is no risk involved. Stay upwind of the spill or leak. Wear appropriate protective clothing and respiratory protection for the situation. If the material has solidified shovel into dry containers and cover. For wet spills use sand or noncombustible absorbent material. Collect spilled material and place in sealed containers for reclamation or disposal. Recycle or dispose of material according to local, state, and federal regulations. This material released into the environment must be reported to the National Response Center (1-800-424-8802). When this material is spilled or leaked the reportable quantity is 1 lb. or more).

Section 7 — Handling and Storage

Handling: Avoid prolonged or repeated breathing of vapors, mists or fumes. Avoid prolonged or repeated contact with skin or eyes. Observe good personal hygiene practices and recommended procedures. Application of certain skin creams (sun screen in conjunction with a general purpose protective cream) before working/several times during work may be beneficial. Wash exposed areas promptly and thoroughly after skin contact from working with this material and before eating, drinking, using tobacco products or rest rooms.
Storage: Store in a closed, labeled container within a cool or well shaded and dry, ventilated area. Protect containers from physical damage. Keep containers closed when not in use. Maintain good housekeeping.

Section 8 — Exposure Controls and Personal Protection

Engineering Control and Ventilation: Provide sufficient general/local exhaust ventilation in pattern/volume to control inhalation exposures below current exposure limits and areas below flammable vapor concentrations. Local exhaust is necessary for use in enclosed or confined spaces. See OSHA 29 CFR 1910.146 Permit Required Confined Space.
Respiratory Protection: Not required under normal use conditions. If ventilation does not maintain inhalation exposures below the PEL or TLV then wear NIOSH/MSHA approved respirators per the current OSHA respiratory protection standard, 29 CFR 1910.134 and the respirator manufacturer's instructions and warnings. Use NIOSH respiratory protection guidelines to select proper respiratory protection.
Eye Protection: Wear industrial safety glasses with side shields and /or goggles or faceshield as necessary for conditions. Comply with the requirements of OSHA 29 CFR 1910.133.
Skin Protection: Use impervious, chemical resistant gloves when handling. Depending on working conditions, i.e., contact potential, wear chemical resistant protective garments such as head/neck cover, aprons, jackets, coveralls, or long sleeved shirts and long pants, boots, long pants, chemical resistant overshoes, etc.

Section 9 — Physical and Chemical Properties

Physical State: Liquid.
Appearance/Odor: Brown to black. Tar odor.
Solubility: Slightly soluble in water.
Specific Gravity (H_2O=1): 1.05
Boiling Point: >180°C (>355°F)
Melting Point: NA
Flash Point: >200°F
Vapor Pressure: 1 mm at 30°C
Vapor Density (Air = 1): >1
Evaporation Rate (Ether = 1): slow
Viscosity: ND
pH: ND

Section 10 — Stability and Reactivity

Stability: Material is stable.
Polymerization: Hazardous polymerization will not occur.
Chemical Incompatibilities: None known.
Conditions to Avoid: Overheating.
Hazardous Decomposition Products: Oxides of carbon and other toxic vapors.

Section 11 — Disposal Considerations

Dispose of in accordance with local, state, and federal regulations.

Section 12 — Transport Information

U.S. Department of Transportation (DOT) regulations - 49 Code of Federal Regulations (CFR)

Shipping Name: RQ Environmentally Hazardous Substance, liquid, n.o.s., (Coal Tar Distillate, contains Benzene, Naphthalene)

Label: Class 9
ID No.: NA 3082
Hazard Class: 9
Packing Group: III
Special Provisions: None

Non-Bulk Packaging: See 173.203
Packaging Exceptions: See 173.155

Quantity Limitations –
Passenger Aircraft or Railcar: None
Cargo Aircraft Only: None

Vessel Stowage: Area A

Bulk Packaging: See 173.241

Section 13 — Regulatory Information

Component	OSHA Hazardous Chemical	CERCLA Reportable Quantity (lbs)	Extremely Hazardous Substance (40 CFR 355)	CAA Section 112 TQ	SARA Section 313
Coal Tar Distillate	YES	1	—	—	—
Indene	YES	—	—	—	—
Naphthalene	YES	100	—	—	YES
Biphenyl	YES	100	—	—	YES
Benzene	YES	10	—	—	YES
Alkylnaphthalene	YES	—	—	—	—
Phenanthrene	YES	5,000	—	—	YES
Benz(a)anthracene	YES	10	—	—	YES*
Benzo(a)phenanthrene	YES	100	—	—	—
Benzo(b)fluoranthene	YES	1	—	—	YES*
Benzo(j)fluoranthene	YES	—	—	—	YES*
Benzo(k)fluoranthene	YES	5,000	—	—	YES*
7,12-Dimethylbenz(a)anthracene	YES	1	—	—	YES*
Indeno(1,2,3-cd)pyrene	YES	100	—	—	YES*
Benzo(a)pyrene	YES	1	—	—	YES*
Dibenz(a,h)anthracene	YES	1	—	—	YES*
Benzo(g,h,i)perylene	YES	10	—	—	YES
7-H Dibenzo(c,g)carbazole	YES	—	—	—	YES*
Dibenzo(a,l)pyrene	YES	—	—	—	YES*
1-Nitropyrene	YES	—	—	—	YES*
Dibenz(a,j)acridine	YES	—	—	—	YES*
Dibenz(a,h)acridine	YES	—	—	—	YES*
Pentachlorophenol	YES	10	—	—	YES

* = Polycyclic Aromatic Compounds (PAC) category TRI threshold = 100 lbs.

Section 14 — Other Information

Prepared by John E. Francis, CIH, CSP
Prepared 8/06.
Revised 09/07/06

Toby Cook

Koppers
Grn Co.
RCRA HSWA File (red label)

GeoTrans, Inc.
A TETRA TECH COMPANY

10860 Gold Center Drive
Suite 200
Rancho Cordova, CA 95670-6070

www.geotransinc.com

916-853-1800 FAX 916-853-1860

October 27, 2006
P:\PROJECTS\BEAZER\GRENADA\2201.099\2006 plant well sample full data.doc

DEPT OF ENVIRONMENTAL QUALITY
REC'D
OCT 30 2006

RCRA Programs Branch
Waste Management Division
U.S. Environmental Protection Agency
61 Forsyth Street SW
Atlanta, Georgia 30303

Attn: Mr. Jon D. Johnston
Chief, RCRA Programs Branch
Waste Management Division

Subject: 2006 Annual Sampling Results for Plant Production Well
With Full Laboratory Documentation
Koppers Industries/Beazer East, Inc.,
Tie Plant, Mississippi
EPA I.D. No. MSD 007 027 543

Dear Mr. Johnston:

On behalf of Beazer East, Inc. (Beazer), this letter provides additional information and analytical documentation for the 2006 annual sample collected from plant production well H054 at the Koppers Industries (KI) facility in Grenada, Mississippi (site). This information is provided in response to your email dated October 18, 2006. Field & Technical Services, LLC, (FTS) is Beazer's nation-wide Operation and Maintenance contractor. FTS sampled well H054 at the Grenada site on September 18, 2006, and submitted the sample to Severn Trent Laboratory (STL) for analysis by EPA Method 8021 for benzene, ethyl benzene, toluene, and xylenes, and by EPA Method 8270 SIM for polynuclear aromatic hydrocarbons and pentachlorophenol. The complete 19-page analytical report is attached to this letter. The analytical report includes STL's letterhead on the cover page with the project manager's signature. The well H054 sample results, provided on pages 7 and 8 of the report, include the name of the company that submitted the sample for analysis (FTS). As reported to the EPA on September 25, 2006, all analyzed parameters were non-detect in the sample from well H054.

If you have any questions regarding this transmittal, please contact Mike Bollinger at (412) 208-8864.

Sincerely,

GeoTrans, Inc.

Jennifer Abrahams

Jennifer A. Abrahams, P.G.
Associate
Senior Hydrogeologist

Attachments

cc: ✓Jerry Cain, MDEQ
Mike Bollinger, Beazer
Grenada Plant Manager, KI
Leslie Hyde, KI

SEVERN TRENT STL

STL Pittsburgh
301 Alpha Drive
Pittsburgh, PA 15238

Tel: 412 963 7058 Fax: 412 963 2468
www.stl-inc.com

ANALYTICAL REPORT

Grenada Mississippi

Lot #: C6I190159

Field & Technical Services, LLC

Field & Technical Services, LL

SEVERN TRENT LABORATORIES, INC.

Veronica Bortot
Project Manager

September 22, 2006

SEVERN TRENT STL

ACCREDITED IN ACCORDANCE WITH nelac

NELAC REPORTING:

The format and content of the attached report meets NELAC standards and guidelines except as noted in the narrative. The table below presents a summary of the certifications held by STL Pittsburgh. Our primary accreditation authority for the Non-potable water and Solid & Hazardous waste programs is Pennsylvania DEP. A more detailed parameter list is available upon request. Please ask your project manager for this information when required.

Certifying State/Program	Certificate #	Program Types	STL Pittsburgh
NFESC	NA	NAVY	X
USACE	NA	Corps of Engineers	X
US Dept of Agriculture	(#S-46425)	Foreign Soil Import Permit	X
Arkansas	(#03-022-1)	WW HW	X X
California – nelac	04224CA	WW HW	X X
Connecticut	(#PH-0688)	WW HW	X X
Florida – nelac	(#E87660)	WW HW	X X
Illinois – nelac	(#200005)	WW HW	X X
Kansas – nelac	(#E-10350)	WW HW	X X
Louisiana – nelac	(#93200)	WW HW	X X
New Hampshire – nelac	(#203002)	WW --	X --
New Jersey – nelac	(PA-005)	WW HW	X X
New York – nelac	(#11182)	WW HW	X X
North Carolina	(#434)	WW HW	X X
Ohio Vap	(#CL0063)	WW HW	X X
Pennsylvania - nelac	(#02-00416)	WW HW	X X
South Carolina	(#89014001)	WW HW	X X
Utah – nelac	(STLP)	WW HW	X X
West Virginia	(#142)	WW HW	X X
Wisconsin	998027800	WW HW	X X

The codes utilized for program types are described below:

HW Hazardous Waste certification
WW Non-potable Water and/or Wastewater certification
X Laboratory has some form of certification under the specific program. Many states certify laboratories for specific parameters or tests within a category. The information in the table indicates the lab is certified in a general category of testing. Please contact the laboratory if parameter specific certification information is required.

Updated: 04/27/06

CASE NARRATIVE

Field and Technical Services
Grenada, Mississippi

STL Lot # C6I190159

Sample Receiving:
STL Pittsburgh, PA received samples on September 19, 2006. The coolers were received within the proper temperature range.

If project specific QC was not required for samples contained in this report, when batch QC was completed on these samples, anomalous results will be discussed below.

GC/MS Volatiles:
All non-CCC compounds that have >15% RSD were evaluated to see if a better curve could be drawn using a quadratic curve. All compounds <30% RSD will use an average response factor curve if no visible improvement is accomplished using a quadratic curve. A quadratic curve will be used for a compound where it is determined to be the "best-fit" evaluation.

Samples H054-091806 and DUP01-091806 were received improperly preserved at a pH of 5. The method requires a pH of 2 or less. The samples were analyzed within 7 days of the sampling date.

GC/MS Semivolatiles:
The reporting limits for the aqueous sample were adjusted according to the amount of sample extracted.

Due to the concentration of target compounds detected and/or matrix, several samples were analyzed at a dilution.

All non-CCC compounds that have >15% RSD were evaluated to see if a better curve could be drawn using a quadratic curve. All compounds <30% RSD will use an average response factor curve if no visible improvement is accomplished using a quadratic curve. A quadratic curve will be used for a compound where it is determined to be the "best-fit" evaluation.

METHODS SUMMARY

C6I190159

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Volatile Organics by GC/MS	SW846 8260B	SW846 5030B/826
8270C (SIM)	SW846 8270C SIM	SW846 3520C

References:

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

SAMPLE SUMMARY

C6I190159

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
JEJ9E	001	H054-091806	09/18/06	08:00
JEJ9L	002	DUP01-091806	09/18/06	08:00
JEJ9P	003	FB01-091806	09/18/06	08:00
JEJ9T	004	TRIP BLANK	09/18/06	

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Columbia Analytical Services INC. STL
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CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 1 OF 1

SR #

CAS Contact

Project Name: Beazer | Grenada
Project Number: 045806-091
Project Manager: Hank Pappert
Report CC:
Company/Address: FTS
200 3rd Ave
Carnegie PA 15106
Phone #: 412-429-2694
FAX#: 412-279-4512
Sampler's Signature: [signature]
Sampler's Printed Name: Aaron Hill

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☒ 8270 ☐ 625 ☐ CLP (SIM)	GC VOA's ☒ 8021 ☐ 601/602 BTEX	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
PRESERVATIVE							0	1					
H054-091806		9/18/6	0800	GW			2	3					
DUP01-091806		↓	↓	↓			↓	↓					
FB01-091806		↓	↓	↓			↓	↓					
TRIP Blank		–	–	–				↓					

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other ______

SPECIAL INSTRUCTIONS/COMMENTS
Metals

See QAPP ☐

TURNAROUND REQUIREMENTS
___ RUSH (SURCHARGES APPLY)
___ 24 hr X 48 hr ___ 5 day
___ STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
___ I. Results Only
___ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
___ III. Results + QC and Calibration Summaries
___ IV. Data Validation Report with Raw Data
___ V. Specialized Forms / Custom Report
Edata ___ Yes ___ No

INVOICE INFORMATION
PO#
BILL TO:
SUBMISSION #:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: ______ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
		Fed-ex			
Signature: [signature]	Signature: FedEx	Signature:	Signature: [signature]	Signature:	Signature:
Printed Name: Aaron Hill	Printed Name:	Printed Name:	Printed Name: John Pozenky	Printed Name:	Printed Name:
Firm: EEM	Firm:	Firm:	Firm: STL-Pgh	Firm:	Firm:
Date/Time: 9/18/6 1000	Date/Time:	Date/Time:	Date/Time: 09-19-06 1015	Date/Time:	Date/Time:

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Field & Technical Services, LLC

Client Sample ID: H054-091806

GC/MS Volatiles

Lot-Sample #...: C6I190159-001
Date Sampled...: 09/18/06
Prep Date......: 09/20/06
Prep Batch #...: 6263296
Dilution Factor: 1

Work Order #...: JEJ9E1AA
Date Received..: 09/19/06
Analysis Date..: 09/20/06
Analysis Time..: 16:17

Method.........: SW846 8260B

Matrix.........: WATER
MS Run #.......: 6263168

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Benzene	ND	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
m-Xylene & p-Xylene	ND	2.0	ug/L
o-Xylene	ND	1.0	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Toluene-d8	92	(71 - 118)
1,2-Dichloroethane-d4	90	(64 - 135)
4-Bromofluorobenzene	88	(70 - 118)
Dibromofluoromethane	95	(64 - 128)

Field & Technical Services, LLC

Client Sample ID: H054-091806

GC/MS Semivolatiles

Lot-Sample #...:	C6I190159-001	**Work Order #...:**	JEJ9E1AC	**Matrix..........:**	WATER
Date Sampled...:	09/18/06	**Date Received..:**	09/19/06	**MS Run #........:**	
Prep Date......:	09/20/06	**Analysis Date..:**	09/21/06		
Prep Batch #...:	6263264	**Analysis Time..:**	15:19		
Dilution Factor:	0.99				
		Method.........:	SW846 8270C SIM		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Pentachlorophenol	ND	0.99	ug/L
2-Methylnaphthalene	ND	9.9	ug/L
Naphthalene	ND	9.9	ug/L
Acenaphthylene	ND	9.9	ug/L
Acenaphthene	ND	9.9	ug/L
Fluorene	ND	9.9	ug/L
Phenanthrene	ND	9.9	ug/L
Anthracene	ND	9.9	ug/L
Fluoranthene	ND	9.9	ug/L
Pyrene	ND	9.9	ug/L
Benzo(a)anthracene	ND	9.9	ug/L
Chrysene	ND	9.9	ug/L
Benzo(b)fluoranthene	ND	9.9	ug/L
Benzo(k)fluoranthene	ND	9.9	ug/L
Benzo(a)pyrene	ND	9.9	ug/L
Indeno(1,2,3-cd)pyrene	ND	9.9	ug/L
Dibenzo(a,h)anthracene	ND	9.9	ug/L
Benzo(ghi)perylene	ND	9.9	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	55	(28 - 115)
Terphenyl-d14	59	(10 - 115)
2-Fluorobiphenyl	53	(34 - 115)
2-Fluorophenol	49	(24 - 115)
Phenol-d5	62	(25 - 115)
2,4,6-Tribromophenol	57	(33 - 115)

Field & Technical Services, LLC

Client Sample ID: DUP01-091806

GC/MS Volatiles

Lot-Sample #...: C6I190159-002
Date Sampled...: 09/18/06
Prep Date.......: 09/20/06
Prep Batch #...: 6263296
Dilution Factor: 1

Work Order #...: JEJ9L1AA
Date Received..: 09/19/06
Analysis Date..: 09/20/06
Analysis Time..: 16:40

Method.........: SW846 8260B

Matrix.........: WATER
MS Run #.......: 6263168

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Benzene	ND	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
m-Xylene & p-Xylene	ND	2.0	ug/L
o-Xylene	ND	1.0	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Toluene-d8	93	(71 - 118)
1,2-Dichloroethane-d4	92	(64 - 135)
4-Bromofluorobenzene	84	(70 - 118)
Dibromofluoromethane	94	(64 - 128)

Field & Technical Services, LLC

Client Sample ID: DUP01-091806

GC/MS Semivolatiles

Lot-Sample #...: C6I190159-002
Date Sampled...: 09/18/06
Prep Date......: 09/20/06
Prep Batch #...: 6263264
Dilution Factor: 1.05

Work Order #...: JEJ9L1AC
Date Received..: 09/19/06
Analysis Date..: 09/21/06
Analysis Time..: 16:44

Method.........: SW846 8270C SIM

Matrix.........: WATER
MS Run #.......:

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Pentachlorophenol	ND	1.0	ug/L
2-Methylnaphthalene	ND	10	ug/L
Naphthalene	ND	10	ug/L
Acenaphthylene	ND	10	ug/L
Acenaphthene	ND	10	ug/L
Fluorene	ND	10	ug/L
Phenanthrene	ND	10	ug/L
Anthracene	ND	10	ug/L
Fluoranthene	ND	10	ug/L
Pyrene	ND	10	ug/L
Benzo(a)anthracene	ND	10	ug/L
Chrysene	ND	10	ug/L
Benzo(b)fluoranthene	ND	10	ug/L
Benzo(k)fluoranthene	ND	10	ug/L
Benzo(a)pyrene	ND	10	ug/L
Indeno(1,2,3-cd)pyrene	ND	10	ug/L
Dibenzo(a,h)anthracene	ND	10	ug/L
Benzo(ghi)perylene	ND	10	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	55	(28 - 115)
Terphenyl-d14	72	(10 - 115)
2-Fluorobiphenyl	64	(34 - 115)
2-Fluorophenol	34	(24 - 115)
Phenol-d5	25	(25 - 115)
2,4,6-Tribromophenol	48	(33 - 115)

Field & Technical Services, LLC

Client Sample ID: FB01-091806

GC/MS Volatiles

Lot-Sample #...: C6I190159-003 **Work Order #...:** JEJ9P1AA **Matrix.........:** WATER
Date Sampled...: 09/18/06 **Date Received..:** 09/19/06 **MS Run #.......:** 6263168
Prep Date......: 09/20/06 **Analysis Date..:** 09/20/06
Prep Batch #...: 6263296 **Analysis Time..:** 17:03
Dilution Factor: 1

Method.........: SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Benzene	ND	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
m-Xylene & p-Xylene	ND	2.0	ug/L
o-Xylene	ND	1.0	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Toluene-d8	95	(71 - 118)
1,2-Dichloroethane-d4	94	(64 - 135)
4-Bromofluorobenzene	85	(70 - 118)
Dibromofluoromethane	91	(64 - 128)

Field & Technical Services, LLC

Client Sample ID: FB01-091806

GC/MS Semivolatiles

Lot-Sample #...: C6I190159-003 **Work Order #...:** JEJ9P1AC **Matrix.........:** WATER
Date Sampled...: 09/18/06 **Date Received..:** 09/19/06 **MS Run #........:**
Prep Date......: 09/20/06 **Analysis Date..:** 09/21/06
Prep Batch #...: 6263264 **Analysis Time..:** 16:16
Dilution Factor: 0.99

Method.........: SW846 8270C SIM

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Pentachlorophenol	ND	0.99	ug/L
2-Methylnaphthalene	ND	9.9	ug/L
Naphthalene	ND	9.9	ug/L
Acenaphthylene	ND	9.9	ug/L
Acenaphthene	ND	9.9	ug/L
Fluorene	ND	9.9	ug/L
Phenanthrene	ND	9.9	ug/L
Anthracene	ND	9.9	ug/L
Fluoranthene	ND	9.9	ug/L
Pyrene	ND	9.9	ug/L
Benzo(a)anthracene	ND	9.9	ug/L
Chrysene	ND	9.9	ug/L
Benzo(b)fluoranthene	ND	9.9	ug/L
Benzo(k)fluoranthene	ND	9.9	ug/L
Benzo(a)pyrene	ND	9.9	ug/L
Indeno(1,2,3-cd)pyrene	ND	9.9	ug/L
Dibenzo(a,h)anthracene	ND	9.9	ug/L
Benzo(ghi)perylene	ND	9.9	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	42	(28 - 115)
Terphenyl-d14	58	(10 - 115)
2-Fluorobiphenyl	50	(34 - 115)
2-Fluorophenol	49	(24 - 115)
Phenol-d5	32	(25 - 115)
2,4,6-Tribromophenol	56	(33 - 115)

Field & Technical Services, LLC

Client Sample ID: TRIP BLANK

GC/MS Volatiles

Lot-Sample #...:	C6I190159-004	**Work Order #...:**	JEJ9T1AA	**Matrix..........:**	WATER
Date Sampled...:	09/18/06	**Date Received..:**	09/19/06	**MS Run #........:**	6263168
Prep Date......:	09/20/06	**Analysis Date..:**	09/20/06		
Prep Batch #...:	6263296	**Analysis Time..:**	17:26		
Dilution Factor:	1				
		Method.........:	SW846 8260B		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Benzene	ND	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
m-Xylene & p-Xylene	ND	2.0	ug/L
o-Xylene	ND	1.0	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Toluene-d8	89	(71 - 118)
1,2-Dichloroethane-d4	92	(64 - 135)
4-Bromofluorobenzene	82	(70 - 118)
Dibromofluoromethane	90	(64 - 128)

METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: C6I190159 Work Order #...: JEM5R1AA Matrix.........: WATER
MB Lot-Sample #: C6I200000-296

Prep Date......: 09/20/06 Analysis Time..: 08:38
Analysis Date..: 09/20/06 Prep Batch #...: 6263296
Dilution Factor: 1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Benzene	ND	1.0	ug/L	SW846 8260B
Ethylbenzene	ND	1.0	ug/L	SW846 8260B
Toluene	ND	1.0	ug/L	SW846 8260B
o-Xylene	ND	1.0	ug/L	SW846 8260B
m-Xylene & p-Xylene	ND	2.0	ug/L	SW846 8260B

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Toluene-d8	101	(71 - 118)
1,2-Dichloroethane-d4	81	(64 - 135)
4-Bromofluorobenzene	83	(70 - 118)
Dibromofluoromethane	91	(64 - 128)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT

GC/MS Semivolatiles

Client Lot #...: C6I190159
MB Lot-Sample #: C6I200000-264

Work Order #...: JEMQH1AA

Matrix.........: WATER

Analysis Date..: 09/21/06
Dilution Factor: 1

Prep Date......: 09/20/06
Prep Batch #...: 6263264

Analysis Time..: 13:54

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
2-Methylnaphthalene	ND	10	ug/L	SW846 8270C SIM
Pentachlorophenol	ND	1.0	ug/L	SW846 8270C SIM
Naphthalene	ND	10	ug/L	SW846 8270C SIM
Acenaphthylene	ND	10	ug/L	SW846 8270C SIM
Acenaphthene	ND	10	ug/L	SW846 8270C SIM
Fluorene	ND	10	ug/L	SW846 8270C SIM
Phenanthrene	ND	10	ug/L	SW846 8270C SIM
Anthracene	ND	10	ug/L	SW846 8270C SIM
Fluoranthene	ND	10	ug/L	SW846 8270C SIM
Pyrene	ND	10	ug/L	SW846 8270C SIM
Benzo(a)anthracene	ND	10	ug/L	SW846 8270C SIM
Chrysene	ND	10	ug/L	SW846 8270C SIM
Benzo(b)fluoranthene	ND	10	ug/L	SW846 8270C SIM
Benzo(k)fluoranthene	ND	10	ug/L	SW846 8270C SIM
Benzo(a)pyrene	ND	10	ug/L	SW846 8270C SIM
Indeno(1,2,3-cd)pyrene	ND	10	ug/L	SW846 8270C SIM
Dibenzo(a,h)anthracene	ND	10	ug/L	SW846 8270C SIM
Benzo(ghi)perylene	ND	10	ug/L	SW846 8270C SIM

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	33	(28 - 115)
Terphenyl-d14	48	(10 - 115)
2-Fluorobiphenyl	42	(34 - 115)
2-Fluorophenol	40	(24 - 115)
Phenol-d5	38	(25 - 115)
2,4,6-Tribromophenol	56	(33 - 115)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: C6I190159 Work Order #...: JEM5R1AC Matrix.........: WATER
LCS Lot-Sample#: C6I200000-296
Prep Date......: 09/20/06 Analysis Date..: 09/20/06
Prep Batch #...: 6263296 Analysis Time..: 09:39
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD
1,1-Dichloroethene	**97**	**(65 - 136)**	**SW846 8260B**
Trichloroethene	**88**	**(73 - 120)**	**SW846 8260B**
Chlorobenzene	**88**	**(80 - 120)**	**SW846 8260B**
Benzene	**84**	**(80 - 120)**	**SW846 8260B**
Toluene	**88**	**(80 - 123)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Toluene-d8	101	(71 - 118)
1,2-Dichloroethane-d4	85	(64 - 135)
4-Bromofluorobenzene	85	(70 - 118)
Dibromofluoromethane	90	(64 - 128)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...: C6I190159   Work Order #...: JEMQH1AC-LCS   Matrix.........: WATER
LCS Lot-Sample#: C6I200000-264   JEMQH1AD-LCSD
Prep Date......: 09/20/06   Analysis Date..: 09/21/06
Prep Batch #...: 6263264   Analysis Time..: 14:22
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
2-Methylnaphthalene	43	(35 - 115)			SW846 8270C SIM
	44	(35 - 115)	3.7	(0-22)	SW846 8270C SIM
Naphthalene	42	(28 - 115)			SW846 8270C SIM
	44	(28 - 115)	3.6	(0-31)	SW846 8270C SIM
Acenaphthylene	43	(29 - 115)			SW846 8270C SIM
	45	(29 - 115)	4.2	(0-29)	SW846 8270C SIM
Acenaphthene	41	(38 - 115)			SW846 8270C SIM
	43	(38 - 115)	3.9	(0-22)	SW846 8270C SIM
Fluorene	42	(35 - 115)			SW846 8270C SIM
	44	(35 - 115)	4.2	(0-29)	SW846 8270C SIM
Phenanthrene	44	(37 - 115)			SW846 8270C SIM
	45	(37 - 115)	2.0	(0-29)	SW846 8270C SIM
Anthracene	43	(28 - 115)			SW846 8270C SIM
	44	(28 - 115)	0.80	(0-32)	SW846 8270C SIM
Fluoranthene	47	(39 - 115)			SW846 8270C SIM
	48	(39 - 115)	2.0	(0-31)	SW846 8270C SIM
Pyrene	44	(34 - 115)			SW846 8270C SIM
	45	(34 - 115)	0.70	(0-34)	SW846 8270C SIM
Benzo(a)anthracene	44	(40 - 115)			SW846 8270C SIM
	47	(40 - 115)	6.7	(0-23)	SW846 8270C SIM
Chrysene	46	(39 - 115)			SW846 8270C SIM
	47	(39 - 115)	3.0	(0-29)	SW846 8270C SIM
Benzo(b)fluoranthene	42	(40 - 115)			SW846 8270C SIM
	43	(40 - 115)	2.4	(0-31)	SW846 8270C SIM
Benzo(k)fluoranthene	43	(35 - 115)			SW846 8270C SIM
	46	(35 - 115)	6.8	(0-30)	SW846 8270C SIM
Benzo(a)pyrene	45	(29 - 115)			SW846 8270C SIM
	47	(29 - 115)	4.4	(0-25)	SW846 8270C SIM
Indeno(1,2,3-cd)pyrene	50	(20 - 115)			SW846 8270C SIM
	51	(20 - 115)	3.9	(0-48)	SW846 8270C SIM
Dibenzo(a,h)anthracene	50	(15 - 115)			SW846 8270C SIM
	52	(15 - 115)	3.9	(0-50)	SW846 8270C SIM
Benzo(ghi)perylene	50	(17 - 122)			SW846 8270C SIM
	53	(17 - 122)	4.8	(0-55)	SW846 8270C SIM

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LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...: C6I190159 **Work Order #...:** JEMQH1AC-LCS **Matrix.........:** WATER
LCS Lot-Sample#: C6I200000-264 JEMQH1AD-LCSD

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	44	(28 - 115)
	48	(28 - 115)
Terphenyl-d14	46	(10 - 115)
	45	(10 - 115)
2-Fluorobiphenyl	44	(34 - 115)
	45	(34 - 115)
2-Fluorophenol	44	(24 - 115)
	43	(24 - 115)
Phenol-d5	50	(25 - 115)
	31	(25 - 115)
2,4,6-Tribromophenol	47	(33 - 115)
	47	(33 - 115)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: C6I190159 **Work Order #...:** JEDLL1D8-MS **Matrix.........:** WATER
MS Lot-Sample #: C6I150184-001 JEDLL1D9-MSD
Date Sampled...: 09/14/06 **Date Received..:** 09/15/06 **MS Run #.......:** 6263168
Prep Date......: 09/20/06 **Analysis Date..:** 09/20/06
Prep Batch #...: 6263296 **Analysis Time..:** 10:03
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
1,1-Dichloroethene	**102**	**(60 - 139)**			**SW846 8260B**
	98	**(60 - 139)**	**4.3**	**(0-48)**	**SW846 8260B**
Trichloroethene	**90**	**(53 - 135)**			**SW846 8260B**
	93	**(53 - 135)**	**2.5**	**(0-36)**	**SW846 8260B**
Chlorobenzene	**93**	**(80 - 120)**			**SW846 8260B**
	92	**(80 - 120)**	**0.41**	**(0-29)**	**SW846 8260B**
Benzene	**91**	**(73 - 120)**			**SW846 8260B**
	92	**(73 - 120)**	**1.1**	**(0-32)**	**SW846 8260B**
Toluene	**94**	**(75 - 126)**			**SW846 8260B**
	94	**(75 - 126)**	**0.25**	**(0-35)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Toluene-d8	96	(71 - 118)
	95	(71 - 118)
1,2-Dichloroethane-d4	85	(64 - 135)
	90	(64 - 135)
4-Bromofluorobenzene	82	(70 - 118)
	81	(70 - 118)
Dibromofluoromethane	90	(64 - 128)
	94	(64 - 128)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters