Hazardous Waste Section

# File Room Document Transmittal Sheet



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|---|---|
| Your Name: | Mary Siedlecki |
| EPA ID: | NCD057451270 |
| Facility Name: | Former Heatcraft Remediation Site |
| Document Group: | Inspection/Investigation (I) |
| Document Type: | Other (O) |
| Description: | DEQ Email Discussing Indoor Air Results Downgradient of Facility and Requesting a Work Plan to Evaluate Soil Gas |
| Date of Doc: | 6/1/2016 |
| Author of Doc: | NC DEQ HWS |

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NCD057451270

| | Month | Day | Year |
|---|---|---|---|
| Date Recieved by File Room: | | | |
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Scanner's Initials:

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|---|---|
| **From:** | Siedlecki, Mary |
| **To:** | Heim, Paul; correri@verizon.net; Mateikis, Bill J |
| **Cc:** | Mccarty, Bud; Mort, Sandra L; Siedlecki, Mary |
| **Subject:** | NCD 057 451 270 Indoor Air Issues |
| **Date:** | Wednesday, June 01, 2016 11:59:21 AM |
| **Attachments:** | image001.png<br>Daikin Comparison of OFFSITE GW Conc to VI Screening Levels 05192016.pdf<br>NCD057451290 Daikin Offsite Sept 2015 Maximum Offsite GW Concentration Division VISL CALCULATOR NOV RSL BASED JANUARY 2016 FINAL.pdf<br>NCD057451270 Dailkin Anaytical Results for OWS-7 Well Suite (March 2015).pdf<br>NCD057451270 Dailkin Site Map Illustrating OWS-7 and OSW-8 Well Suits (March 2015 GWMR).pdf |

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Paul and Bill:

I am writing to ensure continued communication between Daikin Americas and DEQ. With the assistance of Sandy Mort (our toxicologist), I have assessed the potential for indoor air impacts to the residential homes downgradient of the Former Heatcraft Remediation Site in Wilmington, North Carolina.

The first attachment presents an Xcel spreadsheet that lists groundwater contaminant values for September 2015 for select monitoring wells for the facility. I selected the monitoring wells that are (1) off site property, (2) characterized by the highest contaminant concentrations, and (3) in close proximity to residential neighborhoods. For your convenience, I included the March 2016 Groundwater Screening Levels I used for screening purposes and a site map illustrating the monitoring well locations relative to residual neighborhoods. As you can see, screening levels are exceeded for all measured constituents (with one exception).

Given that the concentrations measured in the offsite monitoring wells exceed preliminary screening values, Sandy asked me to use DEQ's Vapor Intrusion Calculator to assess the risks posed by elevated groundwater contaminant values. For this calculation, I used the highest value measured for each constituent shown in the Daikin Comparison tabulation (red font). Values for *cis*-1,2-dichloroethene and *trans*-1,2-dichloroethene are not included in the calculator. A PDF of the resultant risks based on groundwater concentrations is attached (second attachment). As you can see the cancer risk for a residential setting is 1.5E-3 and the hazard quotient is greater than 75. Both values exceed acceptable risks.

Sandy and I reviewed the groundwater monitoring results for the OSW-7 and OSW-8 well suites for March 2015. Also attached for your records. Since these well suites are sampled annually, I do not have access to the March 2016 analytical results just yet. I was wondering if you could please send me a tabulation of the results for OSW-7 and OSW-8 for March 2016 at your earliest convenience. We want to confirm that the 2016 results in comparison to the 2015 results.

We believe the next step in assessing indoor air is to develop a **work plan to collect soil gas samples**. Our guidance indicates that soil gas samples may be collected immediately above the water table near monitoring wells characterized by the highest groundwater concentrations. These values can be compared to soil gas screening levels to assess whether groundwater poses a potential risk for vapor intrusion. A copy of our DWM Vapor Intrusion Guidance is available at https://deq.nc.gov/about/divisions/waste-management/waste-management-permit-guidance/dwm-vapor-intrusion-guidance. I am happy to discuss the work plan with either you or your

environmental consultant any time this week.

I also wanted to offer you the opportunity to conference in the event you have questions or concerns that I am unable to answer in a simple email. Both Sandy and I will make ourselves available should you decide to schedule a conference call. We leave that decision up to you and your team.

**Mary Siedlecki**
Project Manager
Facility Management Branch
Hazardous Waste Section
Division of Waste Management
Department of Environmental Quality

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Nothing Compares

*Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.*

| Constituent | OSW-5A (ug/L) | OSW-5B (ug/L) | OSW-1 (ug/L) | Groundwater Screening Level (ug/L) | Maximum Conc. Compared to Screening Level |
|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | < 1.0 | 3.2 | **39.4** | 1480 | Less than Screening Level |
| 1,1-Dichloroethane | 41.2 | 49.8 | **134** | 76.4 | Exceeds Screening Level |
| 1,1-Dichloroethene | 36.4 | 57.8 | **201** | 39.1 | Exceeds Screening Level |
| cis-1,2-Dichloroethene | 348 | 544 | **2660** | 22.4 | Exceeds Screening Level |
| trans-1,2-Dichloroethene | 2 | 4.1 | **55.1** | 22.4 | Exceeds Screening Level |
| Trichloroethene | < 1.0 | 40.3 | **373** | 1.04 | Exceeds Screening Level |
| Vinyl Chloride | **241** | 167 | 156 | 2.03 | Exceeds Screening Level |

## DIVISION OF WASTE MANAGEMENT
## RESIDENTIAL VAPOR INTRUSION SCREENING CONCENTRATIONS (March, 2016)

| CAS No. | Contaminant | Ground Water Screening Level (GWSL) [1,2] ug/L | Sub-slab and Exterior Soil Gas Screening Level (SGSL) [1,2] ug/m3 | Cgw&Csg Tox Basis | Indoor Air and Crawlspace Screening Concentration (IASL)[1,2] ug/m3 — Indoor Air/Crawlspace Screening Levels at Target Risk 1.0E-04 (IASL C) to be Used if only One Carcinogen is Present | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Attenuation Factor (AF) = 0.001 | 0.03 | | IASL (A) | | IASL (B) | | IASL (C) | |
| | | GWSL=IASL (B) x 1/Henry's Constant x 1/AF | SGSL =IASL (B) x 1/AF | | TCR = 1.0E-06 THQ = 0.2 | Tox Basis | TCR = 1.0E-05 THQ = 0.2 | Tox Basis | TCR = 1.0E-04 THQ = 0.2 | Tox Basis |
| 106-46-7 | Dichlorobenzene, 1,4- | 2.59E+01 | 8.51E+01 | C | 2.55E-01 | C | 2.55E+00 | C | 2.55E+01 | C |
| 75-71-8 | Dichlorodifluoromethane | 1.49E+00 | 6.95E+02 | NC | 2.09E+01 | NC | 2.09E+01 | NC | 2.09E+01 | NC |
| 75-34-3 | Dichloroethane, 1,1- | 7.64E+01 | 5.85E+02 | C | 1.75E+00 | C | 1.75E+01 | C | 1.75E+02 | C |
| 107-06-2 | Dichloroethane, 1,2- | 2.24E+01 | 3.60E+01 | C | 1.08E-01 | C | 1.08E+00 | C | 1.46E+00 | NC |
| 75-35-4 | Dichloroethylene, 1,1- | 3.91E+01 | 1.39E+03 | NC | 4.17E+01 | NC | 4.17E+01 | NC | 4.17E+01 | NC |
| 78-87-5 | Dichloropropane, 1,2- | 7.24E+00 | 2.78E+01 | NC | 2.81E-01 | C | 8.34E-01 | NC | 8.34E-01 | NC |
| 542-75-6 | Dichloropropene, 1,3- | 2.87E+01 | 1.39E+02 | NC | 7.02E-01 | C | 4.17E+00 | NC | 4.17E+00 | NC |
| 77-73-6 | Dicyclopentadiene | 2.45E-02 | 2.09E+00 | NC | 6.26E-02 | NC | 6.26E-02 | NC | 6.26E-02 | NC |
| 75-37-6 | Difluoroethane, 1,1- | 1.01E+04 | 2.78E+05 | NC | 8.34E+03 | NC | 8.34E+03 | NC | 8.34E+03 | NC |
| 94-58-6 | Dihydrosafrole | 4.33E+03 | 7.20E+01 | C | 2.16E-01 | C | 2.16E+00 | C | 2.16E+01 | C |
| 108-20-3 | Diisopropyl Ether | 1.39E+03 | 4.87E+03 | NC | 1.46E+02 | NC | 1.46E+02 | NC | 1.46E+02 | NC |
| 68-12-2 | Dimethylformamide | 2.07E+06 | 2.09E+02 | NC | 6.26E+00 | NC | 6.26E+00 | NC | 6.26E+00 | NC |
| 57-14-7 | Dimethylhydrazine, 1,1- | 7.91E-01 | 1.39E-02 | NC | 4.17E-04 | NC | 4.17E-04 | NC | 4.17E-04 | NC |
| 540-73-8 | Dimethylhydrazine, 1,2- | 6.18E+01 | 5.85E-03 | C | 1.75E-05 | C | 1.75E-04 | C | 1.75E-03 | C |
| 513-37-1 | Dimethylvinylchloride | 4.85E-01 | 7.20E+01 | C | 2.16E-01 | C | 2.16E+00 | C | 2.16E+01 | C |
| 123-91-1 | Dioxane, 1,4- | 2.86E+04 | 1.87E+02 | C | 5.62E-01 | C | 5.62E+00 | C | 6.26E+00 | NC |
| 106-89-8 | Epichlorohydrin | 1.68E+02 | 6.95E+00 | NC | 2.09E-01 | NC | 2.09E-01 | NC | 2.09E-01 | NC |
| 106-88-7 | Epoxybutane, 1,2- | 5.67E+02 | 1.39E+02 | NC | 4.17E+00 | NC | 4.17E+00 | NC | 4.17E+00 | NC |
| 111-15-9 | Ethoxyethanol Acetate, 2- | 9.57E+04 | 4.17E+02 | NC | 1.25E+01 | NC | 1.25E+01 | NC | 1.25E+01 | NC |
| 110-80-5 | Ethoxyethanol, 2- | 2.17E+06 | 1.39E+03 | NC | 4.17E+01 | NC | 4.17E+01 | NC | 4.17E+01 | NC |
| 141-78-6 | Ethyl Acetate | 2.67E+03 | 4.87E+02 | NC | 1.46E+01 | NC | 1.46E+01 | NC | 1.46E+01 | NC |
| 140-88-5 | Ethyl Acrylate | 1.20E+02 | 5.56E+01 | NC | 1.67E+00 | NC | 1.67E+00 | NC | 1.67E+00 | NC |
| 75-00-3 | Ethyl Chloride (Chloroethane) | 4.60E+03 | 6.95E+04 | NC | 2.09E+03 | NC | 2.09E+03 | NC | 2.09E+03 | NC |
| 97-63-2 | Ethyl Methacrylate | 2.67E+03 | 2.09E+03 | NC | 6.26E+01 | NC | 6.26E+01 | NC | 6.26E+01 | NC |
| 100-41-4 | Ethylbenzene | 3.49E+01 | 3.74E+02 | C | 1.12E+00 | C | 1.12E+01 | C | 1.12E+02 | C |
| 75-21-8 | Ethylene Oxide | 5.27E+01 | 1.06E+01 | C | 3.19E-02 | C | 3.19E-01 | C | 3.19E+00 | C |
| 151-56-4 | Ethyleneimine | 2.99E+00 | 4.93E-02 | C | 1.48E-04 | C | 1.48E-03 | C | 1.48E-02 | C |
| 50-00-0 | Formaldehyde | 1.48E+05 | 6.81E+01 | NC | 2.16E-01 | C | 2.04E+00 | NC | 2.04E+00 | NC |
| 64-18-6 | Formic Acid | 9.16E+03 | 2.09E+00 | NC | 6.26E-02 | NC | 6.26E-02 | NC | 6.26E-02 | NC |
| 98-01-1 | Furfural | 6.77E+04 | 3.48E+02 | NC | 1.04E+01 | NC | 1.04E+01 | NC | 1.04E+01 | NC |
| 765-34-4 | Glycidyl | 9.98E+03 | 6.95E+00 | NC | 2.09E-01 | NC | 2.09E-01 | NC | 2.09E-01 | NC |
| 76-44-8 | Heptachlor | 1.80E+00 | 7.20E-01 | C | 2.16E-03 | C | 2.16E-02 | C | 2.16E-01 | C |
| 1024-57-3 | Heptachlor Epoxide | 1.26E+01 | 3.60E-01 | C | 1.08E-03 | C | 1.08E-02 | C | 1.08E-01 | C |
| 39635-31-9 | Heptachlorobiphenyl, 2,3,3',4,4',5,5'- (PCB 189) | Not sufficiently toxic or volatile | 8.51E-01 | C | 2.55E-03 | C | 2.55E-02 | C | 2.55E-01 | C |

1. Based on November 2015 USEPA Regional Screening Level Target Air Concentrations and the USEPA VI Screening Level Calculator.
2. TCR = Target Cancer Risk; THQ=Target Hazard Quotient; C= Carcinogenic; N = Non-Carcinognic

## DIVISION OF WASTE MANAGEMENT
## RESIDENTIAL VAPOR INTRUSION SCREENING CONCENTRATIONS (March, 2016)

| CAS No. | Contaminant | Ground Water Screening Level (GWSL) [1,2] ug/L | Sub-slab and Exterior Soil Gas Screening Level (SGSL) [1,2] ug/m3 | Cgw&Csg Tox Basis | Indoor Air and Crawlspace Screening Concentration (IASL)[1,2] ug/m3 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Indoor Air/Crawlspace Screening Levels at Target Risk 1.0E-04 (IASL C) to be Used if only One Carcinogen is Present | | | | | |
| | | Attenuation Factor (AF) = 0.001 | 0.03 | | IASL (A) | | IASL (B) | | IASL (C) | |
| | | GWSL=IASL (B) x 1/Henry's Constant x 1/AF | SGSL =IASL (B) x 1/AF | | TCR = 1.0E-06 THQ = 0.2 | Tox Basis | TCR = 1.0E-05 THQ = 0.2 | Tox Basis | TCR = 1.0E-04 THQ = 0.2 | Tox Basis |
| 75-52-5 | Nitromethane | 8.92E+02 | 3.48E+01 | NC | 3.19E-01 | C | 1.04E+00 | NC | 1.04E+00 | NC |
| 79-46-9 | Nitropropane, 2- | 2.14E+00 | 3.47E-01 | C | 1.04E-03 | C | 1.04E-02 | C | 1.04E-01 | C |
| 62-75-9 | Nitrosodimethylamine, N- | 9.73E+00 | 2.41E-02 | C | 7.24E-05 | C | 7.24E-04 | C | 7.24E-03 | C |
| 924-16-3 | Nitroso-di-N-butylamine, N- | 3.25E+01 | 5.85E-01 | C | 1.75E-03 | C | 1.75E-02 | C | 1.75E-01 | C |
| 10595-95-6 | Nitrosomethylethylamine, N- | 7.57E+01 | 1.49E-01 | C | 4.46E-04 | C | 4.46E-03 | C | 4.46E-02 | C |
| 111-84-2 | Nonane, n- | 3.00E-02 | 1.39E+02 | NC | 4.17E+00 | NC | 4.17E+00 | NC | 4.17E+00 | NC |
| 32598-14-4 | Pentachlorobiphenyl, 2,3,3',4,4'- (PCB 105) | 2.21E+00 | 8.51E-01 | C | 2.55E-03 | C | 2.55E-02 | C | 2.55E-01 | C |
| 74472-37-0 | Pentachlorobiphenyl, 2,3,4,4',5- (PCB 114) | 6.76E+00 | 8.51E-01 | C | 2.55E-03 | C | 2.55E-02 | C | 2.55E-01 | C |
| 31508-00-6 | Pentachlorobiphenyl, 2,3',4,4',5- (PCB 118) | 2.17E+00 | 8.51E-01 | C | 2.55E-03 | C | 2.55E-02 | C | 2.55E-01 | C |
| 65510-44-3 | Pentachlorobiphenyl, 2',3,4,4',5- (PCB 123) | 3.29E+00 | 8.51E-01 | C | 2.55E-03 | C | 2.55E-02 | C | 2.55E-01 | C |
| 57465-28-8 | Pentachlorobiphenyl, 3,3',4,4',5- (PCB 126) | 9.51E-04 | 2.46E-04 | C | 7.39E-07 | C | 7.39E-06 | C | 7.39E-05 | C |
| 109-66-0 | Pentane, n- | 4.08E+00 | 6.95E+03 | NC | 2.09E+02 | NC | 2.09E+02 | NC | 2.09E+02 | NC |
| 75-44-5 | Phosgene | 9.16E-02 | 2.09E+00 | NC | 6.26E-02 | NC | 6.26E-02 | NC | 6.26E-02 | NC |
| 7803-51-2 | Phosphine | 6.27E-02 | 2.09E+00 | NC | 6.26E-02 | NC | 6.26E-02 | NC | 6.26E-02 | NC |
| 123-38-6 | Propionaldehyde | 5.56E+02 | 5.56E+01 | NC | 1.67E+00 | NC | 1.67E+00 | NC | 1.67E+00 | NC |
| 103-65-1 | Propyl benzene | 4.86E+02 | 6.95E+03 | NC | 2.09E+02 | NC | 2.09E+02 | NC | 2.09E+02 | NC |
| 115-07-1 | Propylene | 7.81E+01 | 2.09E+04 | NC | 6.26E+02 | NC | 6.26E+02 | NC | 6.26E+02 | NC |
| 107-98-2 | Propylene Glycol Monomethyl Ether | 1.11E+07 | 1.39E+04 | NC | 4.17E+02 | NC | 4.17E+02 | NC | 4.17E+02 | NC |
| 75-56-9 | Propylene Oxide | 2.20E+03 | 2.09E+02 | NC | 7.59E-01 | C | 6.26E+00 | NC | 6.26E+00 | NC |
| 100-42-5 | Styrene | 1.86E+03 | 6.95E+03 | NC | 2.09E+02 | NC | 2.09E+02 | NC | 2.09E+02 | NC |
| 7446-11-9 | Sulfur Trioxide | No Solubility | 6.95E+00 | NC | 2.09E-01 | NC | 2.09E-01 | NC | 2.09E-01 | NC |
| 1746-01-6 | TCDD, 2,3,7,8- | 3.61E-04 | 2.46E-05 | C | 7.39E-08 | C | 7.39E-07 | C | 7.39E-06 | C |
| 70362-50-4 | Tetrachlorobiphenyl, 3,4,4',5- (PCB 81) | 2.80E-01 | 8.51E-02 | C | 2.55E-04 | C | 2.55E-03 | C | 2.55E-02 | C |
| 630-20-6 | Tetrachloroethane, 1,1,1,2- | 3.71E+01 | 1.26E+02 | C | 3.79E-01 | C | 3.79E+00 | C | 3.79E+01 | C |
| 79-34-5 | Tetrachloroethane, 1,1,2,2- | 3.23E+01 | 1.61E+01 | C | 4.84E-02 | C | 4.84E-01 | C | 4.84E+00 | C |
| 127-18-4 | Tetrachloroethylene | 1.15E+01 | 2.78E+02 | NC | 8.34E+00 | NC | 8.34E+00 | NC | 8.34E+00 | NC |
| 811-97-2 | Tetrafluoroethane, 1,1,1,2- | 8.16E+03 | 5.56E+05 | NC | 1.67E+04 | NC | 1.67E+04 | NC | 1.67E+04 | NC |
| 109-99-9 | Tetrahydrofuran | 1.45E+05 | 1.39E+04 | NC | 4.17E+02 | NC | 4.17E+02 | NC | 4.17E+02 | NC |
| 7550-45-0 | Titanium Tetrachloride | No Solubility | 6.95E-01 | NC | 2.09E-02 | NC | 2.09E-02 | NC | 2.09E-02 | NC |
| 108-88-3 | Toluene | 3.84E+03 | 3.48E+04 | NC | 1.04E+03 | NC | 1.04E+03 | NC | 1.04E+03 | NC |
| 76-13-1 | Trichloro-1,2,2-trifluoroethane, 1,1,2- | 2.91E+02 | 2.09E+05 | NC | 6.26E+03 | NC | 6.26E+03 | NC | 6.26E+03 | NC |
| 120-82-1 | Trichlorobenzene, 1,2,4- | 7.19E+00 | 1.39E+01 | NC | 4.17E-01 | NC | 4.17E-01 | NC | 4.17E-01 | NC |
| 71-55-6 | Trichloroethane, 1,1,1- | 1.48E+03 | 3.48E+04 | NC | 1.04E+03 | NC | 1.04E+03 | NC | 1.04E+03 | NC |
| 79-00-5 | Trichloroethane, 1,1,2- | 1.24E+00 | 1.39E+00 | NC | 4.17E-02 | NC | 4.17E-02 | NC | 4.17E-02 | NC |
| 79-01-6 | Trichloroethylene | 1.04E+00 | 1.39E+01 | NC | 4.17E-01 | NC | 4.17E-01 | NC | 4.17E-01 | NC |

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|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Indoor Air/Crawlspace Screening Levels at Target Risk 1.0E-04 (IASL C) to be Used if only One Carcinogen is Present | | | | | |
| | | Attenuation Factor (AF) = 0.001 | 0.03 | | IASL (A) | | IASL (B) | | IASL (C) | |
| | | GWSL=IASL (B) x 1/Henry's Constant x 1/AF | SGSL =IASL (B) x 1/AF | Cgw&Csg Tox Basis | TCR = 1.0E-06 THQ = 0.2 | Tox Basis | TCR = 1.0E-05 THQ = 0.2 | Tox Basis | TCR = 1.0E-04 THQ = 0.2 | Tox Basis |
| 96-18-4 | Trichloropropane, 1,2,3- | 4.46E+00 | 2.09E+00 | NC | 6.26E-02 | NC | 6.26E-02 | NC | 6.26E-02 | NC |
| 96-19-5 | Trichloropropene, 1,2,3- | 8.70E-02 | 2.09E+00 | NC | 6.26E-02 | NC | 6.26E-02 | NC | 6.26E-02 | NC |
| 121-44-8 | Triethylamine | 2.40E+02 | 4.87E+01 | NC | 1.46E+00 | NC | 1.46E+00 | NC | 1.46E+00 | NC |
| 420-46-2 | Trifluoroethane, 1,1,1- | 1.33E+02 | 1.39E+05 | NC | 4.17E+03 | NC | 4.17E+03 | NC | 4.17E+03 | NC |
| 526-73-8 | Trimethylbenzene, 1,2,3- | 5.85E+00 | 3.48E+01 | NC | 1.04E+00 | NC | 1.04E+00 | NC | 1.04E+00 | NC |
| 95-63-6 | Trimethylbenzene, 1,2,4- | 5.80E+00 | 4.87E+01 | NC | 1.46E+00 | NC | 1.46E+00 | NC | 1.46E+00 | NC |
| 126-72-7 | Tris(2,3-dibromopropyl)phosphate | 4.77E+01 | 1.42E+00 | C | 4.25E-03 | C | 4.25E-02 | C | 4.25E-01 | C |
| 108-05-4 | Vinyl Acetate | 2.00E+03 | 1.39E+03 | NC | 4.17E+01 | NC | 4.17E+01 | NC | 4.17E+01 | NC |
| 593-60-2 | Vinyl Bromide | 1.24E+00 | 2.09E+01 | NC | 8.77E-02 | C | 6.26E-01 | NC | 6.26E-01 | NC |
| 75-01-4 | Vinyl Chloride | 2.03E+00 | 7.68E+01 | C | 2.30E-01 | C | 2.30E+00 | C | 2.09E+01 | NC |
| 108-38-3 | Xylene, m- | 7.11E+01 | 6.95E+02 | NC | 2.09E+01 | NC | 2.09E+01 | NC | 2.09E+01 | NC |
| 95-47-6 | Xylene, o- | 9.85E+01 | 6.95E+02 | NC | 2.09E+01 | NC | 2.09E+01 | NC | 2.09E+01 | NC |
| 106-42-3 | Xylene, P- | 7.39E+01 | 6.95E+02 | NC | 2.09E+01 | NC | 2.09E+01 | NC | 2.09E+01 | NC |
| 1330-20-7 | Xylenes | 7.69E+01 | 6.95E+02 | NC | 2.09E+01 | NC | 2.09E+01 | NC | 2.09E+01 | NC |

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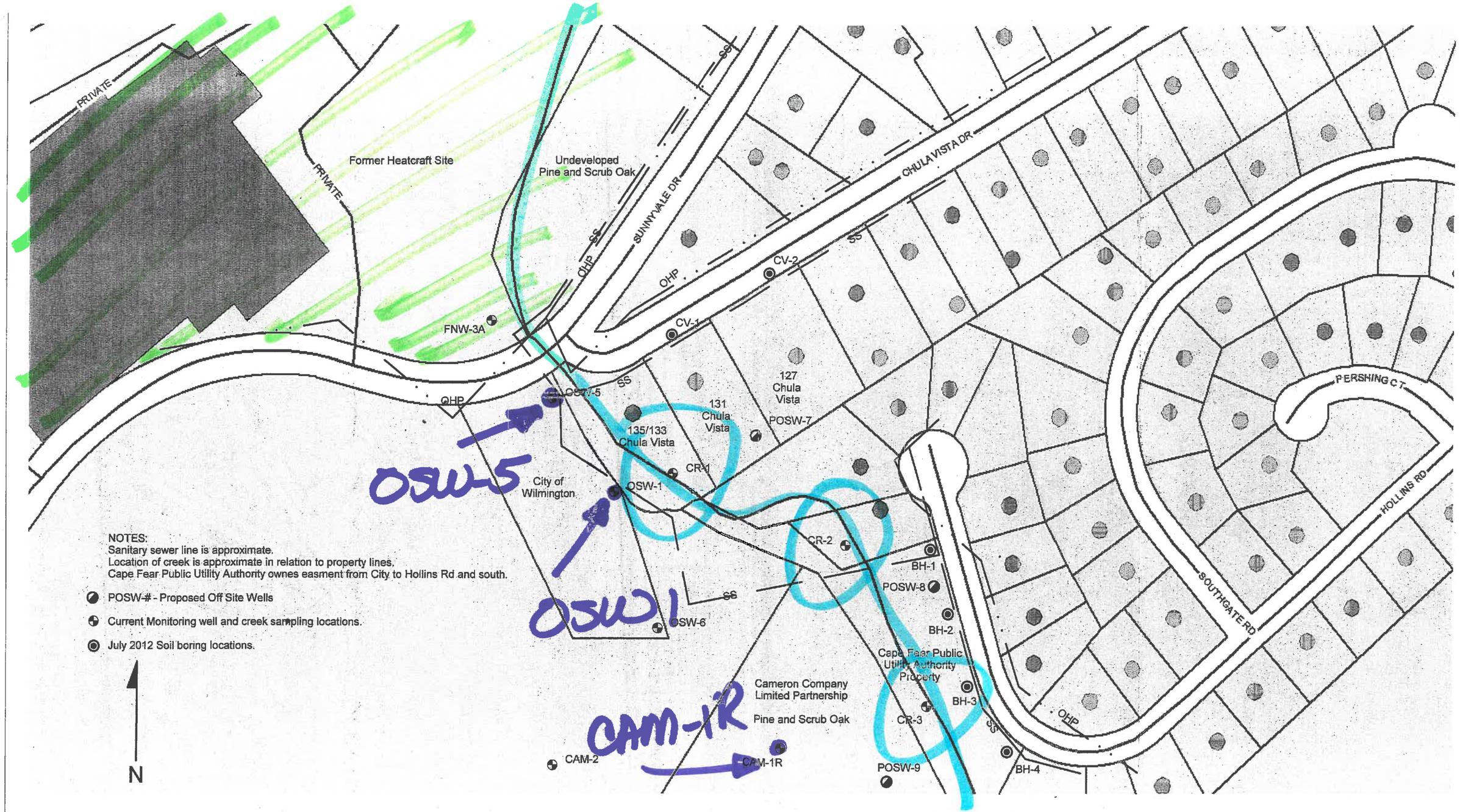
2. TCR = Target Cancer Risk; THQ=Target Hazard Quotient; C= Carcinogenic; N = Non-Carcinognic




**CORR ENVIRONMENTAL RESOURCES, INC.**

4609 Candlestick, Garland, Tx 75043

APPROVED BY: RAYMOND W ROBLIN PG

| | |
|---|---|
| DATE: | December 5, 2012 |
| DESIGNED BY: | RWR |
| CHECKED BY: | RWR |
| DRAWING NO.: | offsite wells |
| PROJECT: | ARN Pending |

| REV. NO | DATE | COMMENT |
|---|---|---|
| 0 | 1/19/12 | Initial drawing |
| 1 | 8/28/12 | Add offsite soil boring locations, subsurface and surface utilities |
| 2 | 12/5/12 | Add offsite proposed MW locations |

VERIFY SCALES:

Approximate Scale - 1" = 130'

# FIGURE 1
## NORTH CREEK OFF SITE WELLS

Former HeatCraft Facility
Wilmington, North Carolina

FILE: C:\CORR\McQUAY\WILM\CADD\2012\offsite soil boring loc Fig 1.map

**IHSB -Brownfields Vapor Intrusion Calculator - Based on OSWER VAPOR INTRUSION ASSESSMENT**
**Groundwater Concentration to Indoor Air Concentration (GWC-IAC) Calculator Version 3.45, November 2015 RSLs**

Site Name DAIKIN , Site ID NCD057451290 City , V
Sample set: September 2015 MAXIMUM GW OFFSITE CONCENTRATION (OSW-5A, OSW-5B, A

| Parameter | Symbol | Value | Instructions |
|---|---|---|---|
| Exposure Scenario | Scenario | Residential | Select residential or commercial scenario from pull down list |
| Target Risk for Carcinogens | TCR | 1.00E-05 | Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F) |
| Target Hazard Quotient for Non-Carcinogens | THQ | 0.2 | Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G) |
| Average Groundwater Temperature ($^oC$) | Tgw | 25 | Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations |

| CAS | Chemical Name | Site Groundwater Concentration Cgw (ug/L) | Calculated Indoor Air Concentration Cia ($ug/m^3$) | VI Carcinogenic Risk CR | VI Hazard HQ | Groundwater Screening Level (ug/l) | Inhalation Unit Risk IUR ($(ug/m^3)^{-1}$) | IUR Source* | Reference Concentration RfC ($mg/m^3$) | RFC Source* | Mutagenic Indicator i |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 75-34-3 | Dichloroethane, 1,1- | **1.3E+02** | 3.08E+01 | **1.8E-05** | No RfC | 7.64E+01 | 1.60E-06 | CA | | | |
| 75-35-4 | Dichloroethylene, 1,1- | **2.0E+02** | 2.14E+02 | No IUR | **1.0E+00** | 3.91E+01 | | | 2.00E-01 | I | |
| 71-55-6 | Trichloroethane, 1,1,1- | 3.9E+01 | 2.77E+01 | No IUR | 5.3E-03 | 1.48E+03 | | | 5.00E+00 | I | |
| 79-01-6 | Trichloroethylene | **3.7E+02** | 1.50E+02 | **3.1E-04** | **7.2E+01** | 1.04E+00 | see note | I | 2.00E-03 | I | TCE |
| 75-01-4 | Vinyl Chloride | **2.4E+02** | 2.74E+02 | **1.2E-03** | **2.6E+00** | 2.03E+00 | 4.40E-06 | I | 1.00E-01 | I | Mut |
| | | **Cumulative Risk/Cumulative HQ** | | **1.5E-03** | **7.57E+01** | | | | | | |

If cumulative risk >1.0E-04 or cumulative HQ>1.0
Unacceptable

**Notes:**

(1) **Inhalation Pathway Exposure Parameters (RME):**

| Exposure Scenario | Units | Residential Symbol | Residential Value | Commercial Symbol | Commercial Value | Selected (based on scenario) Symbol | Selected (based on scenario) Value |
|---|---|---|---|---|---|---|---|
| Averaging time for carcinogens | (yrs) | ATc_R_GW | 70 | ATc_C_GW | 70 | ATc_GW | 70 |
| Averaging time for non-carcinogens | (yrs) | ATnc_R_GW | 26 | ATnc C GW | 25 | Atnc GW | 26 |
| Exposure duration | (yrs) | ED_R_GW | 26 | ED_C_GW | 25 | ED_GW | 26 |
| Exposure frequency | (days/yr) | EF_R_GW | 350 | EF_C_GW | 250 | EF_GW | 350 |
| Exposure time | (hr/day) | ET_R_GW | 24 | ET_C_GW | 8 | ET_GW | 24 |

(2) **Generic Attenuation Factors:**

| Source Medium of Vapors | | Residential Symbol | Residential Value | Commercial Symbol | Commercial Value | Selected (based on scenario) Symbol | Selected (based on scenario) Value |
|---|---|---|---|---|---|---|---|
| Groundwater | ( - ) | AFgw_R_GW | 0.001 | AFgw_C_GW | 0.001 | AFgw_GW | 0.001 |
| Sub-Slab and Exterior Soil Gas | ( - ) | AFss_R_GW | 0.03 | AFss_C_GW | 0.01 | AFss_GW | 0.03 |

(3) **Formulas**

Cia, target = MIN( Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

| Trichloroethylene | Residential Symbol | Residential Value | Commercial Symbol | Commercial Value | Selected (based on scenario) Symbol | Selected (based on scenario) Value |
|---|---|---|---|---|---|---|
| | mIURTCE_R_GW | 1.00E-06 | IURTCE_C_GW | 0.00E+00 | mIURTCE_GW | 1.00E-06 |
| | IURTCE_R_GW | 3.10E-06 | IURTCE_C_GW | 4.10E-06 | IURTCE_GW | 3.10E-06 |

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

| Age Cohort | Exposure Duration | Age-dependent adjustment factor |
|---|---|---|
| 0 - 2 years | 2 | 10 |
| 2 - 6 years | 4 | 3 |
| 6 - 16 years | 10 | 3 |
| 16 - 26 years | 10 | 1 |

**Mutagenic-mode-of-action (MMOA) adjustment factor** 72 This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

**Notation:**

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5

**IHSB -Brownfields Vapor Intrusion Calculator - Based on OSWER VAPOR INTRUSION ASSESSMENT**
**Groundwater Concentration to Indoor Air Concentration (GWC-IAC) Calculator Version 3.45, November 2015 RSLs**

Site Name DAIKIN , Site ID NCD057451290 City , V
Sample set: September 2015 MAXIMUM GW OFFSITE CONCENTRATION (OSW-5A, OSW-5B, A

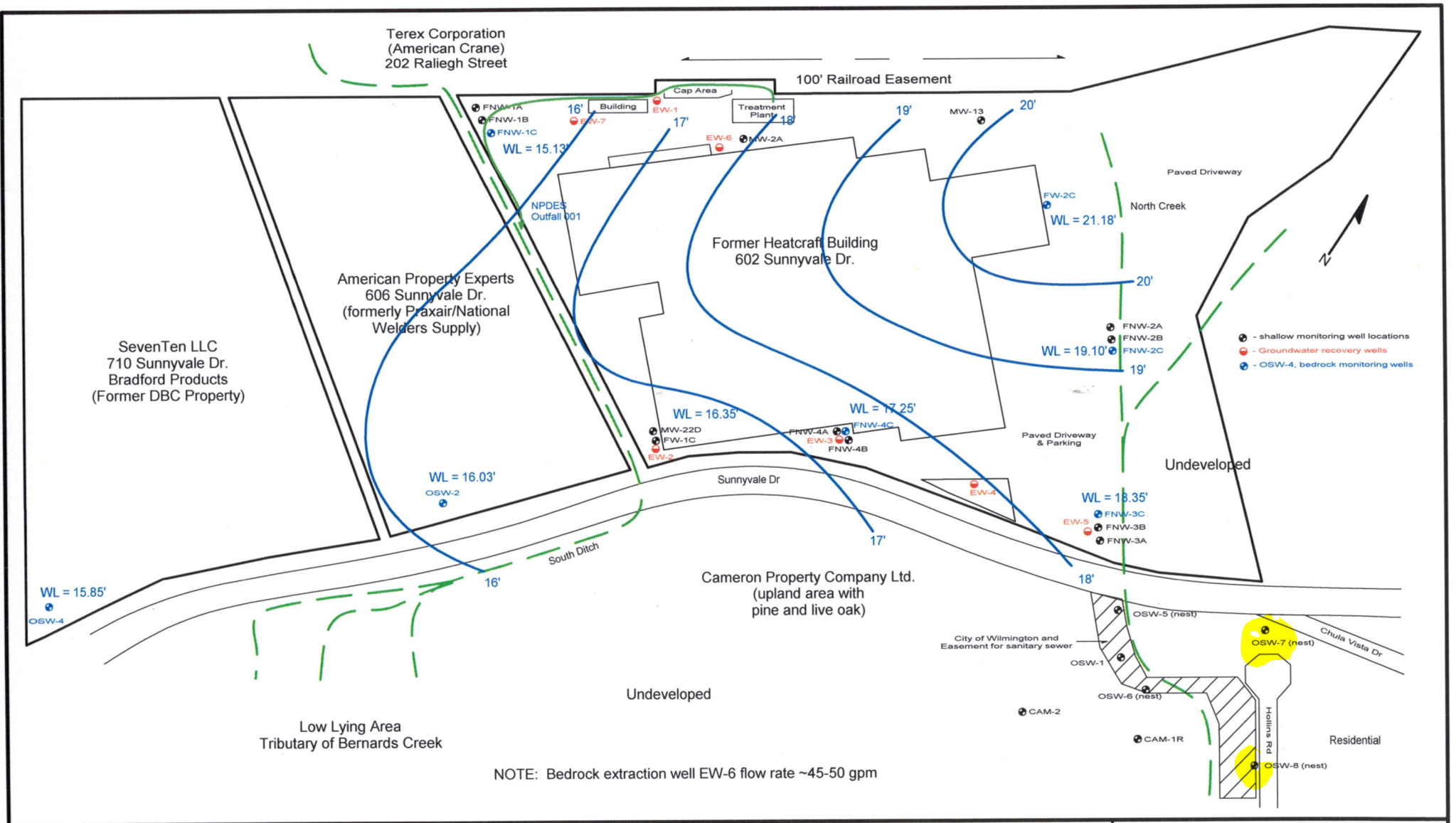
| Parameter | Symbol | Value | Instructions |
|---|---|---|---|
| Exposure Scenario | Scenario | Residential | Select residential or commercial scenario from pull down list |
| Target Risk for Carcinogens | TCR | 1.00E-05 | Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F) |
| Target Hazard Quotient for Non-Carcinogens | THQ | 0.2 | Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G) |
| Average Groundwater Temperature ($^oC$) | Tgw | 25 | Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations |

| CAS | Chemical Name | Site Groundwater Concentration | Calculated Indoor Air Concentration | VI Carcinogenic Risk | VI Hazard | Groundwater Screening Level (ug/l) | Inhalation Unit Risk | IUR Source* | Reference Concentration | RFC Source* | Mutagenic Indicator |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cgw | Cia | CR | HQ | | IUR | | RfC | | |
| | | (ug/L) | (ug/m$^3$) | | | | (ug/m$^3$)$^{-1}$ | | (mg/m$^3$) | | i |

X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

Table 1
Analytical Testing Results

| Former HeatCraft Site - Wilmington, NC | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Monitoring Well | TOC Elev. MSL Total Depth | Sample Date | Constituent Concentration (ug/L) | | | | | | | |
| | | | 1,1,1 TCA | 1,1-DCA | 1,1-DCE | c-1,2-DCE | t-1,2-DCE | TCE | VC | Total VOC |
| | | **2L Standard** | **200** | **6** | **7** | **70** | **100** | **3.0** | **0.030** | |
| OSW-5A | 17.00' TD | 8/25/11 | <1.0 | 12.3 | 4.6 | 133 | <1.0 | <1.0 | 162 | 311.9 |
| | | 4/12/12 | <1.0 | 14.8 | 12.0 | 330 | <1.0 | <1.0 | 184 | 540.8 |
| | | 7/12/12 | <1.0 | 17.6 | 9.9 | 403 | <1.0 | <1.0 | 404 | 834.5 |
| | | 9/18/12 | <1.0 | 13.6 | 10.7 | 317 | 1 | 2 | 218 | 562.1 |
| | | 3/28/13 | <1.0 | 6.1 | 4.3 | 162 | <1.0 | <1.0 | 109 | 281.4 |
| | | 9/4/13 | <1.0 | 17.8 | 17.8 | 413 | <1.0 | <1.0 | 145 | 593.6 |
| | | 2/26/14 | <1.0 | 26.8 | 36.7 | 785 | 3 | <1.0 | 76 | 927.9 |
| | | 9/9/14 | 1.4 | 31.6 | 34.8 | 471 | 1 | <1.0 | 100 | 640.2 |
| | | **3/9/15** | **6.7** | **32.8** | **51.0** | **378** | **2** | **1.99** | **69** | **541.5** |
| OSW-5B | 27.34' TD | 8/25/11 | <1.0 | 24.1 | 23.1 | 443 | <1.0 | 1.09 | 214 | 705.3 |
| | | 4/12/12 | <1.0 | 12.5 | 3.3 | 219 | 10 | 2.12 | 271 | 517.6 |
| | | 7/12/12 | <1.0 | 24.0 | 15.8 | 843 | 3.2 | <1.0 | 484 | 1,370.0 |
| | | 9/18/12 | <1.0 | 17.4 | 11.6 | 386 | 2 | <1.0 | 256 | 672.8 |
| | | 3/28/13 | <1.0 | 5.9 | 3.9 | 136 | <1.0 | <1.0 | 122 | 267.7 |
| | | 9/4/13 | 3 | 22.5 | 32.4 | 368 | 5 | <1.0 | 118 | 548.2 |
| | | 2/26/14 | <1.0 | 24.8 | 27.0 | 560 | 2.3 | 13.3 | 87 | 714.4 |
| | | 9/9/14 | 1.3 | 21.8 | 26.3 | 336 | 1.4 | 13.0 | 91 | 490.8 |
| | | **3/9/15** | **5.4** | **33.1** | **49.6** | **388** | **2.2** | **4.8** | **58** | **541.1** |
| OSW-5C | 37.63' TD | 8/25/11 | <1.0 | 2.9 | 2.9 | 82 | <1.0 | <1.0 | 21 | 109.0 |
| | | 4/10/12 | <1.0 | 14 | 2.39 | 187 | <1.0 | <1.0 | 271 | 474.8 |
| | | 7/12/12 | <1.0 | 25 | 4.11 | 298 | <1.0 | <1.0 | 416 | 742.8 |
| | | 9/18/12 | <1.0 | 48 | 8.37 | 442 | 2 | <1.0 | 773 | 1,273.4 |
| | | 3/28/13 | <1.0 | 91.3 | 30.9 | 1,210 | 5.2 | 9.85 | 1,130 | 2,477.2 |
| | | 9/4/13 | <1.0 | 107.0 | 47.1 | 1,670 | 6.7 | 17.40 | 1,860 | 3,708.2 |
| | | 2/26/14 | <1.0 | 88.3 | 34.8 | 1,410 | 4.8 | 10.70 | 1,200 | 2,748.6 |
| | | 9/9/14 | <1.0 | 162 | 119 | 3,030 | 10.5 | <1.0 | 2,180 | 5,501.5 |
| | | **3/9/15** | **<1.0** | **135** | **72** | **2,190** | **6.5** | **<1.0** | **1,870** | **4,273.3** |
| OSW-6A | 12.95' TD | 8/25/11 | <1.0 | 1.7 | 1.4 | 65 | <1.0 | 3.1 | 1.5 | 72.3 |
| | | 4/12/12 | <1.0 | <1.0 | <1.0 | 34 | <1.0 | <1.0 | <1.0 | 34.2 |
| | | 7/12/12 | <1.0 | 3.6 | 3.4 | 205 | 3 | <1.0 | 4.0 | 218.7 |
| | | 9/18/12 | <1.0 | <1.0 | <1.0 | 6.02 | <1.0 | <1.0 | <1.0 | 6.0 |
| | | 3/28/13 | <1.0 | <1.0 | <1.0 | 20.4 | <1.0 | <1.0 | <1.0 | 20.4 |
| | | 9/4/13 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| | | 2/26/14 | <1.0 | 3.2 | 2.9 | 147 | 2 | <1.0 | 6.7 | 161.4 |
| | | 9/9/14 | <1.0 | <1.0 | <1.0 | 3.0 | <1.0 | <1.0 | <1.0 | 3.0 |
| | | **3/9/15** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **0.0** |
| OSW-6B | 24.69' TD | 8/25/11 | <1.0 | 23.6 | 22.5 | 789 | 10.6 | 1.5 | 26.2 | 873.4 |
| | | 4/12/12 | <1.0 | 18.6 | 17.8 | 928 | 9.7 | 2.1 | 23.1 | 999.3 |
| | | 7/12/12 | <1.0 | 23.5 | 22.9 | 1,390 | 14.6 | 2.5 | 28.1 | 1,481.6 |
| | | 9/18/12 | <1.0 | 15.8 | 12.5 | 630 | 9.4 | 2.2 | 16.2 | 686.0 |
| | | 3/28/13 | <1.0 | 7.8 | 7.1 | 281 | 4.1 | <1.0 | 10.9 | 310.9 |
| | | 9/4/13 | <1.0 | 4.6 | 4.4 | 171 | 2.1 | <1.0 | 6.1 | 188.2 |
| | | 2/26/14 | <1.0 | 14.9 | 13.1 | 572 | 6 | 1.43 | 19 | 626.7 |
| | | 9/9/14 | <1.0 | 9.65 | 9.19 | 401 | 4.4 | <1.0 | 12 | 435.7 |
| | | **3/9/15** | **<1.0** | **1.34** | **1.26** | **53** | **<1.0** | **<1.0** | **1.42** | **56.6** |
| OSW-6C | 35.00' TD | 8/25/11 | <1.0 | 2.9 | 2.5 | 118 | 1.3 | 3.3 | 2.9 | 130.9 |
| | | 4/10/12 | <1.0 | 34.5 | 28.4 | 1,720 | 21.2 | 3.9 | 36.3 | 1,844.3 |
| OSW-6D | | Duplicate | <1.0 | 34.5 | 28.6 | 1,710 | 20.4 | 3.9 | 37.2 | 1,834.6 |
| | | 7/12/12 | <1.0 | 82.2 | 77.5 | 4,190 | 37.4 | 6.4 | 251.0 | 4,644.5 |
| | | 9/18/12 | <1.0 | 63.2 | 49.8 | 2,930 | 29.5 | 7.0 | 71.8 | 3,151.3 |
| | | 3/28/13 | <1.0 | 61.0 | 51.6 | 2,710 | 27.6 | <1.0 | 66.9 | 2,917.1 |
| | | Duplicate | <1.0 | 64.3 | 52.8 | 2,820 | 28.3 | <1.0 | 69.8 | 3,035.2 |
| | | 9/4/13 | <1.0 | 55.4 | 50.2 | 2,220 | 25.1 | 5.0 | 90.5 | 2,446.2 |
| | | 2/26/14 | <1.0 | 55.7 | 50.1 | 2,420 | 25.8 | 3.9 | 54.6 | 2,610.1 |
| | | 9/9/14 | <1.0 | 40.5 | 39.1 | 1,760 | 18.4 | 3.4 | 55.2 | 1,916.6 |
| | | **3/9/15** | **<1.0** | **31.8** | **28.9** | **1,100** | **14.1** | **2.6** | **37.2** | **1,214.6** |
| OSW-7A | 13.1' TD | 3/28/13 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 9/5/13 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 2/26/14 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 9/9/14 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | **3/11/15** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **0.0** |
| OSW-7B | 24.6' TD | 3/28/13 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 9/5/13 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 2/26/14 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 9/9/14 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | **3/11/15** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **0.0** |
| OSW-7C | 36.5' TD | 3/28/13 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 9/5/13 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 2/26/14 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 9/9/14 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | **3/11/15** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **0.0** |
| OSW-8B | 11.7' TD | 3/28/13 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 9/5/13 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 2/26/14 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 9/9/14 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | **3/11/15** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **0.0** |
| OSW-8C | 22.9' TD | 3/28/13 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 9/5/13 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 2/26/14 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | 9/9/14 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | Duplicate | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 0.0 |
| | | **3/11/15** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **<1.0** | **0.0** |




NOTE: Bedrock extraction well EW-6 flow rate ~45-50 gpm

CORR ENVIRONMENTAL RESOURCES, INC.

4609 Candlestick, Garland, Tx 75043

APPROVED BY: RAYMOND W ROBLIN, PG

| | |
|---|---|
| DATE: April 14, 2105 | |
| DESIGNED BY: RWR | |
| CHECKED BY: RWR | |
| DRAWING NO.: PD Potent Map; 3-15 | |
| PROJECT: ARN 3074 (14) | |

| REV. NO | DATE | COMMENT |
|---|---|---|
| 14 | 5-15-13 | Revised potentiometric surface contour map |
| 15 | 9-18-13 | Revised potentiometric surface contour map |
| 16 | 3-20-14 | Revised potentiometric surface contour map, measured 2-24-14 |
| 17 | 4-14-15 | Revised potentiometric surface contour map; measured 3-9-15 |

NO SCALE INTENDED

# FIGURE 2
# PEE DEE AQUIFER POTENTIOMETRIC SURFACE

Former HeatCraft Facility
Wilmington, North Carolina

FILE: C:\CORR\McQUAY\WILMCADD15\PD Potent Map; March 15