CORR Environmental Resources, Inc.

August 23, 2016

Ms. Mary Siedlecki
North Carolina Department of Environmental Quality
Hazardous Waste Section
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

RE: Remedial Strategy Outline
Former Heatcraft Facility
602 Sunnyvale Drive, Wilmington, North Carolina
Site ID NCD #057 451 270
CORR Project PN 3082 (16)

Ms. Siedlecki:

CORR Environmental Resources, Inc. (CORR) on behalf of Daikin Applied Americas, Inc. (DAA) is submitting a requested Remedial Strategy (RS) for the former Heatcraft site in Wilmington. The RS uses site specific information, current remedial actions and outlines the processes of corrective actions to achieve surface and groundwater remedial objectives. These objectives are related to various regulatory benchmarks for the three following potential exposure pathways:

- Groundwater to potable wells;
- Groundwater to surface water; and
- Groundwater to indoor air.

Current and historical remedial actions include the following measures:

- Groundwater recovery from the shallow water table and the bedrock aquifers;
- Onsite treatment and discharge of the recovery well outflow per the NPDES permit limits;
- Recovery of latent phase separated and emulsified hydrocarbon and mineral oils from the water table aquifer in former source areas;
- Ambient air sparging in the water table aquifer in the area upgradient of the groundwater to surface water discharge to Fork Branch (aka the North Creek);
- Soil gas recovery of vapor phase solvents beneath the building floor to mitigate indoor air impacts and to remove solvent mass from beneath the building foundation in unsaturated soils;
- Solvent and hydrocarbon source material removal from the former Solid Waste Management Unit #7 (CY2012).

These corrective actions coupled with natural degradation of the parent solvent constituents in groundwater have provided for mostly down trending concentrations at various site monitoring wells over time. Source control, insitu treatment, containment

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and solvent mass removal are the remedies for the intended results of restoration of groundwater to State 2L Standards and surface water to State 2B Standards.

Subsequent to the active remedial actions, long term strategy includes monitored natural attenuation and required post closure groundwater monitoring. The overall remedial strategy has intended flexibility to reflect the dynamic and iterative nature of contaminant behavior in groundwater systems. These include source(s) areas, preferential pathways, groundwater recharge and discharge boundaries as well as potential receptors. The environmental media impacted and the direct pathways for contaminant occurrence and migration include the following:

- Impacted unsaturated soil at concentrations above groundwater protection standards;
- Free and dissolved phase solvents and hydrocarbons entrained in the upper saturated water table aquifer above State 2L Standards;
- Shallow water table discharge to the north creek surface water and persistent vinyl chloride impacts above State 2B Standards.
- Residual impacts of dissolved phase solvents in the bedrock aquifer above State 2L Standards.
- Vapor phase solvents above the saturated water table beneath the plant building;

The ongoing remedial strategy seeks to focus on the three exposure pathways; impacted soil or source materials available to migrate via the vapor phase to indoor air; groundwater via leaching effects due to specific gravity of the solvents along with diffusion and advection within the pore spaces of the saturated zones; and removal and containment to improve ground and surface water quality.

The remedial strategy uses the following principles:

- Conceptual Site Model (CSM) using the most up to date understanding of site characterization and the behavior of the solvent and hydrocarbon impacts in ground and surface water.
- Removal of latent source material onsite which contributes ongoing solvent mass to the groundwater plume(s).
- Groundwater and surface water restoration to applicable State 2L and/or 2B Standards.
- Removal of latent solvent vapors from beneath the plant building which impact indoor air quality and contribute to impacts to shallow groundwater.
- Recovery of residual hydrocarbon and mineral oil from the water table aquifer and dissolved phase solvents entrained with the oils.

Water Table Aquifer

The shallow water table aquifer has four (4) active groundwater and four (4) hydrocarbon (both phase separated and dissolved phase) recovery wells on the property. The wells serve to both remove dissolve solvent from groundwater and to act

as a cut off and control mechanism to attenuate further migration of impacted groundwater offsite. Four recovery wells are located downgradient of the plant building foot print to act as control and cutoff wells, while four others are located in proximity to known source areas behind the plant building on the upgradient side. These four product recovery wells remove high concentration solvent and phase separated hydrocarbons and oils from the shallow water table aquifer.

To address the ongoing impacts of the vinyl chloride constituent to surface water as the north creek drainage, additional corrective measures in conjunction with the shallow recovery wells is ambient air sparging actions. The air sparging uses ambient compressed air injected into the lower portions of the water table aquifer to mobilize dissolved phase (focused on vinyl chloride) constituents in an effort to reduce the concentration in groundwater available to migrate to surface water. The air sparge uses a pulse technique where the compressed air is alternatively injected to the specific sparge wells independently during the on cycle of the unit. The pulsing action operates on four cycles in a 24-hour period with each well sparging independently for 15-minutes per cycle. This pulsing technique acts to allow for greater horizontal dispersion of the injected air by preventing vertical break through and bypass within the water column by over charging the aquifer with compressed air during the sparge cycle.

Bedrock Aquifer

The bedrock unit currently has a single point recovery well completed in the Pee Dee aquifer. The bedrock recovery well is intended to control horizontal migration within the aquifer. In regard to potential receptors, City of Wilmington potable water is supplied to area wide residences as confirmed during domestic water well surveys conducted in the past. No domestic potable water wells are known within the area of the likely extent of the bedrock aquifer plume.

The bedrock recovery well is located at the known point where shallow contamination migrated vertically from the water table down to the bedrock unit. The former degreasing operation utilized groundwater for the chiller component of the steam heated degreasing unit. The use of groundwater as chill ring circulating fluid likely created a drawdown effect within the well bore thereby allowing for the solvent to migrate downward to the bedrock unit. It was reported the production well(s) used at the time the degreasing process was active were not cased to isolate the upper groundwater bearing unit from the lower bedrock unit.

The bedrock recovery well has acted to remove dissolved phase solvents from the source area and to control further downgradient migration of these impacts. The use of the single bedrock recovery well has served to eliminate the presence of the parent solvents, TCE and 1,1,1 TCA from downgradient wells; however the downgradient monitoring wells remain impacted with degradation constituents above the various 2L Standards.

Soil Gas and Vapor Intrusion Issues

Recent assessment tasks focused on indoor air quality and subsurface soil gas impacts have indicated the presence of TCE within the plant building and enclosed office spaces located inside the high bay plant building. Sub slab soil gas testing has indicated the presence of elevated VOC constituent concentrations in proximity to the former degreasing area of the plant building. In reference to the indoor air quality and elevated soil gas concentrations beneath the plant floor, three pilot test Sub Slab Depressurization (SSD) wells were installed to remove these latent vapors from beneath the floor with the exhaust routed to the atmosphere above the high bay roof line. The effectiveness of the SSD technique has yet to be determined as of the date of this strategy document; however the SSD is a remedial technique to improve indoor air quality. The SSD technique removes solvent gasses from the unsaturated zone beneath the building floor and should also reduce the mass of solvent available for downgradient migration in shallow groundwater.

Based on the effectiveness of the installed SSD wells, others may be installed as sub slab and indoor air quality data warrant.

Source Investigation

At this time, no other known source of elevated solvent or hydrocarbon impacts is known. As directed or required by the NCDEQ, future assessment of former Solid Waste Management Units (SWMU) could identify latent solvent contamination at concentrations above groundwater protection values. If this condition is indicated, corrective actions would be evaluated and recommended to the NCDEQ.

Regarding offsite migration of impacted soil gas, initial assessment data indicate either no impacts or very low impacts from TCE. The low concentrations indicated in the July 2016 assessment were below the residential intrusion screening values.

Future Considerations

As with all remedial actions, future considerations for additional corrective measures will be dependent upon on-going monitoring and assessment data along with potential requirements of the NCDEQ. These considerations can include advances in remedial technology over time which can or may provide for greater effectiveness to the systems already in place. This can also include monitored natural attenuation (MNA) along with augmentation by geochemical and/or biochemical agents insitu as warranted. Risk assessment will also be utilized as a component of future remedial considerations as the corrective measures transition from the current activities to a likely final MNA remedy.

Any future changes or modifications to the remedial strategy will be fully discussed with the NCDEQ with concurrence with DAA and other stakeholders.

If you have questions or require additional information, please contact me at 972-523-0487 or via email at correri@verizon.net.

Cordially,

CORR Environmental Resources, Inc.

Raymond Roblin, PG
Principal

Cc: Mr. Paul Heim, DAA
Site File

Attachment