

Hazardous Waste Section  
File Room Document Transmittal Sheet

Your Name: Mary Siedlecki  
EPA ID: NCD057451270  
Facility Name: Former Heatcraft Remediation Site  
Document Group: Financial (F)  
Document Type: Other (O)  
Description: 2016 Post-Closure Care Cost Estimate  
Date of Doc: 3/22/2016  
Author of Doc: CORR Environmental

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NCD057451270

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March 22, 2016

Mr. Paul Heim  
Legal Department  
Daikin Applied Americas, Inc.  
13600 Industrial Park Blvd  
Minneapolis, Minnesota 55441

**RE: 2016 Post-Closure Care Estimate for the former HeatCraft Facility  
602 Sunnyvale Drive, Wilmington, North Carolina  
Site ID NCD #057 451 270  
CORR Project ARN 3079 (15)**

Mr. Heim:

CORR Environmental Resources, Inc. (CORR) is pleased to present the Post-Closure Care Estimate for Calendar Year 2016 for the former HeatCraft Facility in Wilmington, North Carolina.

The attached spreadsheet presents CORR's estimate for post-closure care. The Estimate is based on calendar year 2016 forecast cost calculations for the required number of years of operation of the remediation system and required groundwater monitoring tasks. As directed by the NCDEQ, Hazardous Waste Section (HWS), the CY-16 Care Estimate includes costs associated with remedial tasks which include required site assessment and corrective measures as directed by the Alternative Mechanism (aka Consent Order) where costs are projected for a full 30-year post closure period.

These costs are primarily associated with remedial operations of the groundwater recovery and treatment system, the pulse air sparging system and free phase hydrocarbon skimming system. These systems continue to operate as mandated by the HWS to reduce contaminant concentrations in both shallow and bedrock aquifers.

Assessment issues also associated with the Order include the investigation of the shallow water table aquifer extent of impacts. The calendar year 2015 assessment and remedial tasks completed included completion of the well nest OSW-10 on the adjacent Cameron Property directly east of Sunnyvale Drive and the site property. The access agreement with New Hanover County has yet to be formally approved by the County Manager's office. This delayed the installation of HWS required shallow monitoring well suite OSW-9 in CY-15. Indoor air quality sampling has also been conducted to address the possible vapor intrusion pathway as stipulated in the Order.

These corrective action issues coupled with the assessment of the extent of dissolved solvents in groundwater are considered in the CY-16 post closure care estimate. The recently completed indoor air quality sampling indicated likely vapor intrusion issues associated with the interior of the plant building. The potential for additional corrective measures or mitigation associated with the vapor intrusion pathway are also considered in the Care Estimate.

The current estimate provides a combined value total for the full completion of required corrective actions along with post closure care for a full 30-year period. The Order stipulates Daikin Applied provide financial assurance of the lesser of 100% of the approved cost to complete the corrective action or for thirty years of corrective actions.

The primary factors in the out year projections use the following assumptions:

- Assessment and possible corrective measures associated with the north creek surface water pathway. These task elements include the on-going off site assessment of the shallow water table aquifer as it relates to surface water quality in the north creek and the extent of the shallow plume east and south of the creek. Specifically the most recent data for well suite OSW-10 indicated dissolved solvent concentrations above the 2L groundwater standards for cis-1,2 DCE and vinyl chloride in the lower C horizon of the aquifer.
- The assessment data for the shallow aquifer north of the creek in the Southgate residential area has remained unimpacted since well installation in March 2013 with site related Chemicals of Concern (COCs). These sampling data indicate testing for possible vapor intrusion and mitigation may not be warranted north of the creek. The results of the offsite monitoring well sampling have determined potential vapor intrusion may not exist beyond the north creek.
- The assessment work plan for the bedrock monitoring well installation had been submitted to the HWS in 2014. The current downgradient point of compliance at OSW-4, located at the 710 Sunnyvale Drive location (at Bradford Spa's), has remained above 2L standards as of September 2015 groundwater testing. The installation of a bedrock monitoring well as proposed to the HWS would complete the assessment of the bedrock aquifer if a suitable location could be accessed. The HWS in CY-15 has provided the opportunity to conduct a groundwater fate and transport model (F/T) in lieu of a monitoring well installation. The costs for the F/T model or a monitoring well installation are similar and are forecast to be undertaken in CY-16.
- The out year costs beyond CY-24 do not anticipate full time groundwater recovery operations beyond required cap maintenance, limited monitoring and file retention activities. This also anticipates no further corrective measures would be necessary beyond CY-23/24. As required by the Order, CORR has forecast these minimal costs from CY-24 through CY-46. These estimates should meet HWS requirements for Present Value costs.

The estimated costs for the completed remedial tasks in CY-15 have been removed from the CY-16 cost estimate. The total line item value for CY-15 was \$35k, the costs for the OSW-10 well suite (\$12k) have been deducted from the CY-15 total and now the future assessment costs for CY-16 is estimated at \$23k to account for previous forecast task elements. The CY-16 total includes the F/T model of the bedrock aquifer and the required well suite on County property to determine the extent of impacts to the shallow aquifer.

Based on the just completed indoor air quality sampling and the pending report of findings, costs previously estimated for CY-16 (\$25k) will include possible vapor mitigation actions within the plant building as a required corrective action. The CY-16 valuation for possible vapor mitigation is estimated at \$10k in CY-16. This value is therefore subtracted from

the previously forecast CY-16 value and will move the remaining \$15k to CY-17 for other probable corrective actions. These can include additional shallow monitoring wells on County property directly east of the recently installed OSW-10 well suite. Future monitoring data for OSW-10 will dictate the need for additional shallow wells beyond those now required.

As discussed in last year's Estimate, the pulse air sparging system has operated for approximately four-years and its effectiveness appears to be manifesting overall lower VOC concentrations at property line monitoring wells FNW-3A and 4A. The September 2015 monitoring data indicate historic low VOC concentrations at well 4A and at recovery well EW-4. These data may suggest shallow plume concentrations beneath the plant building are subsiding with a lower mass of impacts available for recovery or downgradient offsite migration.

Offsite shallow monitoring wells OSW-5 and OSW-1 (west to east) also remain above the various 2L benchmarks. Shallow monitoring wells downgradient of these two offsite wells indicate significantly lower concentration gradient at OSW-6 with only the C horizon impacted above 2L standards. Downgradient of OSW-6, shallow well CAM-1R has no site related COCs above the 2L benchmarks. It is possible with continued non-impacted data at CAM-1R, the previously required well nest downgradient of CAM-1R (as OSW-9) on County property may not be required. As previously discussed, the closure estimate will continue to have the cost for this well nest forecast in CY-16, however this cost may be omitted in future estimates based on annual monitoring data.

The most current data for the surface water indicate the vinyl chloride constituent remains above the Class C and 2B Human Health water quality standards. The near term data sets for the surface water continue to have declining slope lines and lower vinyl chloride concentrations for sample locations CR-2 and CR-3. The September 2015 results at CR-1 indicated an increase in the vinyl chloride concentration; this may not persist however based on upgradient concentrations of vinyl chloride and ongoing corrective measures. Surface water sampling for the 1,4 dioxane constituent since September 2014 (at location CR-2) have not indicated this site related COC in the north creek surface water pathway.

The continuation of the groundwater recovery, air sparging and hydrocarbon skimming tasks are forecast to continue in CY-16 with incremental cessation of groundwater pumping in future years as data indicate declining concentration trends. The hydrocarbon skimming operation remains a short term corrective action given the very low volume of product accumulating in the extraction wells.

As discussed in the CY-15 forecast estimate, the air sparging system was designed for possible future expansion if data warrant further in-situ treatment of the (primarily) vinyl chloride plume. Any consideration for air sparging expansion must consider operations of the shallow recovery wells and the greater sediment loading to the well pumps, lift station and the water treatment system.

This additional sediment loading is mostly evidenced at recovery well EW-5 and tends to obstruct groundwater inflow to the well bore screen and the pump intake. CORR had recommended a temporary shutoff of the well pump in EW-5 over a semiannual period to determine if the sparging activity alone in this area of the property could provide improved groundwater quality absent full time pumping. This recommendation was not addressed by the HWS.

As the effectiveness of the sparging is corroborated in on-going groundwater testing, it is anticipated there could be phased shutdown of selected shallow recovery well(s) and to allow the sparge to operate in the future as a single corrective measure in the shallow aquifer as it relates to the groundwater to surface water discharge of the north creek.

The CY-16 Care Estimate for annual period includes operation of the current corrective measures, completion of the offsite assessment tasks, the F/T groundwater model and the vapor intrusion issues now in the forefront. These task item costs are presented for both CY-16 and into CY-17. Once these specific tasks are completed, future estimated costs as shown on the spreadsheet, provide for on-going operations of the remedial systems and long term groundwater monitoring (plus the 5% contingency).

This includes continued groundwater monitoring as required; however in out years it is anticipated fewer monitoring wells will require sampling and/or the frequency of testing will adjusted to annual or biennial events as a number of unimpacted or low concentration site monitoring wells have transitioned. This is also based on a future corrective remedy to include a remediation by natural attenuation of low concentration COCs during the post closure period.

The costs presented are solely dependent upon the offsite shallow well data, the bedrock formation F/T model results and the effectiveness of the sum of the active corrective measures. When the assessment results are considered and the data reported to the HWS, these costs may or may not be removed or modified in future Care Estimate forecasts.

The value for the CY-16 Care Estimate extends to running thirty-year total costs as required by the HWS. For the out years beyond CORR's estimate of full time operation of the groundwater recovery system, the forecast operations and groundwater monitoring tasks have incrementally lower costs based on potential requirements of the HWS to maintain records and to conduct some level of groundwater monitoring beyond the original thirty year commitment (2021).

The running thirty-year total estimated value is forecast at \$726,250 and is based on the following project assumptions:

- Full groundwater treatment system O&M costs are projected for two additional calendar years at current estimated values (through 2017), with incrementally lower costs based on anticipated phased shutdown of the recovery well network through 2020-22. For the intervening years, 2023-24, CORR has estimated costs of \$15k per year as a contingency where limited operations of the shallow recovery system may be required.
- For the out years without active groundwater pumping and water treatment system operations along with groundwater monitoring, CORR has forecast an additional twenty-one years of minimal operations costs for required regulatory compliance issues and record keeping tasks. These costs extend the required thirty years to 2046 as required by the HWS;
- Out year estimates for operations and maintenance and continued monitoring beyond calendar year 2021-23 may not be required if the corrective measures meet regulatory benchmarks for closure and a no further remedial action determination. This determination cannot be predicted, however if the assessments can be completed by calendar year 2017 and these actions verify effective mitigation of the groundwater plumes and surface water quality standards are met, these costs will be removed from future Care Estimates.

The NCDENR is using the annual inflation rate calculation of 1.014% which should be applied to the total Care Estimate value. This rate is not included in the attached Table and is a function of the financial instrument provided by Daikin to the HWS. The CY-16 Care Estimate should be submitted to the HWS by March 1, 2016 for review and approval. If approved, the value estimated for the post closure period and the funding mechanism(s) must be in place by July 15, 2016.

If there are specific questions concerning various funding mechanisms, the HWS contact is:

Ms. Jenny W. Lopp  
Financial Analyst  
NCDEQ; Hazardous Waste Section  
1646 Mail Service Center  
Raleigh, North Carolina 27699-1646  
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Mr. Paul Heim  
March 22, 2016  
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If you have questions or require additional information, please contact me at 972-523-0487 or via email at [correri@verizon.net](mailto:correri@verizon.net).

Cordially,

**CORR Environmental Resources, Inc.**

Raymond Roblin, PG  
Principal

Cc: Ms. Mary Siedlecki, NCDEQ, HWS  
Ms. Jenny Lopp, NCDEQ, HWS  
Mr. Ron Pederson, AAF  
Mr. Mark Yohman, Lennox  
Site File

Attachment

Post-Closure Care Cost Estimate  
 Calendar Year 2016  
 Former HeatCraft Facility Wilmington, N.C.

YEAR	REMEDIAL TASKS	O&M	MONITORING	SUBTOTAL	CONT. 5%	TOTAL
0 (2016)	\$33,000.00	\$35,000.00	\$25,000.00	\$93,000.00	\$5,500.00	\$98,500.00
1 (2017)	\$15,000.00	\$35,000.00	\$25,000.00	\$75,000.00	\$4,250.00	\$79,250.00
2 (2018)		\$25,000.00	\$25,000.00	\$50,000.00	\$3,000.00	\$53,000.00
3 (2019)		\$25,000.00	\$25,000.00	\$50,000.00	\$2,500.00	\$52,500.00
4 (2020)		\$25,000.00	\$25,000.00	\$50,000.00	\$2,500.00	\$52,500.00
5 (2021)		\$25,000.00	\$25,000.00	\$50,000.00	\$2,500.00	\$52,500.00
6 (2022)		\$25,000.00	\$25,000.00	\$50,000.00	\$2,500.00	\$52,500.00
7 (2023)		\$15,000.00	\$10,000.00	\$25,000.00	\$2,500.00	\$27,500.00
8 (2024)		\$15,000.00	\$10,000.00	\$25,000.00	\$1,250.00	\$26,250.00
9 (2025)		\$5,000.00	\$5,000.00	\$10,000.00	\$1,250.00	\$11,250.00
10 (2026)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
11 (2027)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
12 (2028)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
13 (2029)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
14 (2030)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
15 (2031)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
16 (2032)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
17 (2033)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
18 (2034)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
19 (2035)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
20 (2036)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
21 (2037)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
22 (2038)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
23 (2039)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
24 (2040)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
25 (2041)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
26 (2042)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
27 (2043)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
28 (2044)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
29 (2045)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
30 (2046)		\$5,000.00	\$5,000.00	\$10,000.00	\$500.00	\$10,500.00
				Total Present Value		\$726,250.00