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AUG 11 2004
File# DE 1247
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THIRD AMENDED
PROPOSED PLAN OF REMEDIAL ACTION

207 A Street
Wilmington, DE

DNREC Project No. DE-1247

August 2004

Delaware Department of Natural Resources and Environmental Control
Division of Air and Waste Management
Site Investigation & Restoration Branch
391 Lukens Drive
New Castle, Delaware 19720

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1.0 INTRODUCTION

The 207 A Street site (site) is located on the southern bank of the Christina River in Wilmington, Delaware, which is currently undergoing construction activities associated with the development of the Christina Landing residential townhome community. It is bounded on the south by A Street, and on the east by the Walnut Street Bridge. The site is presently owned by the BPG Residential Partners IV, LLC (BPG), who has entered into a Consent Decree for a Prospective Purchaser Agreement (PPA) and a Voluntary Cleanup Program (VCP) agreement with the Department of Natural Resources and Environmental Control Site Investigation and Restoration Branch (DNREC). BPG entered into these agreements in order to resolve their environmental liability for the site. DNREC's VCP is established under the provisions of the Delaware Hazardous Substance Cleanup Act, 7 Del. C. Chapter 91 (HSCA). Through the PPA and a VCP agreement, BPG agreed to implement the amended final plan of remedial action, dated August 2003, for the site.

Prior to the purchase of the site by BPG, the Riverfront Development Corporation (RDC) owned the site and had entered into a VCP agreement with DNREC to conduct a Remedial Investigation (RI) of the site. The purpose of the RI was to: 1) collect additional information from the site to refine site knowledge from previous investigations; 2) delineate and determine the extent of contamination, and its possible migration and environmental impacts; and 3) determine the level of risk posed by the contaminants, and based upon this analysis, evaluate remedial alternatives.

The original proposed plan of remedial action (original proposed plan) for the 207 A Street site was issued for public comment on July 22, 2002. The public comment period ended on August 12, 2002. No comments were received by DNREC. Because the owner of the site changed the intended future use of the property after the proposed plan was issued, DNREC determined that it was necessary to issue an amended proposed plan of remedial action (amended proposed plan) to account for this change in the use of the site. The amended proposed plan was issued for public comment on November 25, 2002. The public comment period ended on December 16, 2002, no comments were received by DNREC. The final plan was issued on January 31, 2003.

As a result of RDC's request to change the proposed development of the property from commercial/industrial to urban residential (i.e., apartment/condominium) in August 2002, RDC agreed to perform an updated risk assessment of the property to take into account the proposed change in land use. The updated risk assessment concluded that elevated risks to human health are posed by soil contamination at the site. DNREC has determined that the initial proposed remedy, which consisted of "hot spot" excavation and removal and containment of residual petroleum-impacted soils underneath structures and a parking lot, would still be protective of human health and the environment, provided that no areas of contaminated soil would remain exposed, such as for yards or vegetative buffers.

In January 2003, RDC informed DNREC that a possible component of the final construction plans would consist of raising the overall grade of the site from the present elevation (4 to 5 feet above sea level) to the level of the top of the rebuilt bulkhead, approximately 11 feet above sea level. At a minimum, two (2) feet of clean-fill would be added to the existing grade of site, even if the final construction plans did not require raising the overall grade of the site to 11 feet above sea level. In this case, the construction-related excavation would be in the clean fill above the

contaminated soil and the risk to construction workers would be eliminated since there would be no exposure. Another possible component of the final construction plan might also include performing construction activities in areas that extended below the clean fill. When excavation would be necessary below the clean fill in areas surrounding MW-6 and other areas containing elevated concentrations of PAHs, the soils would be over-excavated, removed and properly disposed of. The over-excavated areas would be subsequently filled with clean fill. Therefore, any necessary construction activities would then occur within the clean fill.

Prior to the issuance of an amended final plan, the RDC requested that DNREC revise the final plan to take into account the new construction plans, which required raising the overall grade of the site from the present elevation,. As a result, DNREC determined that it was necessary to issue the second amended proposed plan of remedial action (second amended proposed plan). The second amended proposed plan was issued in July 2003 and no comments were received by DNREC. DNREC issued the amended final plan of remedial action (amended final plan) on August 2003.

BPG agreed to implement the amended final plan during the development of the site. During the initial site excavation activities, the subsurface petroleum impacts were encountered that were greater (in area and concentration) than previously identified within the RI. An interim remedial action was conducted consisting of overexcavating petroleum-impacted soils and performing an additional risk assessment to address possible vapor intrusion. Based upon these findings, DNREC has determined that it is necessary to issue this third amended proposed plan of remedial action (third amended proposed plan).

This document is DNREC's third amended proposed plan for the site. It is based on the results of the previous investigations performed at the site and the IRA. This third amended proposed plan is issued under the provisions of the HSCA and the Regulations Governing Hazardous Substance Cleanup (Regulations). It presents the Department's assessment of the potential health and environmental risks posed by the site.

As described in Section 12 of the Regulations, DNREC will provide notice to the public and an opportunity for the public to comment on the third amended proposed plan. After the comment period concludes, DNREC will review and consider all of the comments received and issue a second amended final plan of remedial action (second amended final plan). The second amended final plan will designate the selected remedy for the site. The RI, the original proposed plan, the amended proposed plan, the second amended proposed plan, the third amended proposed plan, the comments received from the public, DNREC's responses to those comments, the final plan, the amended final plan, and the second amended final plan will constitute the remedial decision record for the site.

Section 2.0 presents a summary of the site description, history and previous investigations of the site. Section 3.0 provides a description of the RI results. Section 4.0 presents a summary of the IRA. Section 5.0 presents a discussion of the remedial action objectives. Section 6.0 presents the third amended proposed plan of remedial action. Section 7.0 discusses public participation requirements.

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Setting

The site is located along the southern bank of the Christina River in Wilmington, Delaware (Figures 1 & 2). The site is bordered on the west by 201/205 A Street, on the south by A Street, and to the east by the Walnut Street Bridge. The site is part of the Christina Landing residential development, which consists of several parcels, encompassing approximately nine (9) acres. The site is currently under redevelopment which, when completed, will consist of two high rise apartment towers, 63 residential townhomes, open space, sidewalks, roads, parking and related infrastructure. The surrounding land use is generally light industrial and commercial.

2.2 Site and Project History

EA, through a review of historical aerial photographs, United States Geologic Survey topographic maps, historical Sanborn fire insurance maps and city directories, investigated the historical use of the site. The 1887 and 1893 Sanborn maps indicated that the site was used as a planing mill, for coal storage and as a lumberyard owned by the Cold Spring Ice and Coal Company. By the 1920s, the site was occupied by the American Oil Company, and contained an aboveground storage tank farm, several small buildings and railroad sidings. The American Oil Company continued to operate at the property until the 1980s. Until the recent transaction of the site in January 2004, it had been used as the outdoor dining area and paved parking for the Christina River Club, formerly located at 201/205 A Street.

3.0 PREVIOUS INVESTIGATION RESULTS

EA conducted a Phase II investigation at the site in October 1999, which consisted of direct push soil and groundwater sampling. Subsurface soil samples were collected from five direct push soil borings at the site. Groundwater samples were collected from temporary monitoring wells constructed in two of the soil boring locations.

Subsequent to the Phase II investigation, a RI was conducted in June and July 2001 by EA, in which soil samples were collected from a total of seven (7) soil borings, with groundwater samples collected from permanent monitoring wells constructed in six (6) of the soil boring locations.

The samples were analyzed for contaminants listed on the Target Analyte List and the Target Compound List (TAL/TCL). The analytical results were first compared to the DNREC Uniform Risk Based Remediation Standards (URS) in a non-critical water resource area, using the unrestricted use risk scenario as a screen in order to determine potential contaminants of concern (COCs). Those chemicals whose concentrations exceeded the unrestricted use URS were selected as COCs and included in a human health risk assessment and ecological risk assessment screening.

Volatile organic compounds (VOCs) detected above the unrestricted use (i.e., residential) URS values included benzene (unrestricted use URS of 800 micrograms/kilogram (µg/kg)) in four

Phase II soil boring locations (up to 13,000 µg/kg) and four RI soil boring locations (up to 7,300 µg/kg), and chloroform (up to 390 µg/kg with an unrestricted use URS of 340 µg/kg) in two RI soil boring locations. Subsurface soil samples from five RI soil boring locations contained one or more polynuclear aromatic hydrocarbons (PAHs) at concentrations exceeding their respective unrestricted use URS values, including benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene. The highest concentrations of each of the above compounds were detected in samples collected from soil boring MW-4, located in the approximate center of the property, at a depth of 4-6' below ground surface (bgs). The observed concentrations for benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene also exceeded their respective restricted-use (i.e., commercial or industrial) URS. However, benzo(k)fluoranthene was removed from further consideration as it met the remediation attainment criteria using the 75/10X rule as outlined in the DNREC Remediation Standards Guidance. Complete analytical results from the RI are listed in table format in Appendix A.

Several metals were also identified in subsurface soils at concentrations that exceeded their unrestricted use URS, including aluminum, arsenic, iron, manganese and vanadium. However, all of the inorganic contaminant concentrations except arsenic (up to 41.4 mg/kg) were below the respective restricted use URS values. The background value for arsenic in Delaware is 11 mg/kg. Also, vanadium was removed from further consideration as it met the remediation attainment criteria using the 75/10X rule as outlined in the DNREC Remediation Standards Guidance

Groundwater sampling results from each of the sampling locations from the Phase II investigation and the RI detected benzene at concentrations exceeding its U.S. EPA Maximum Contaminant Level (MCL) for drinking water of 5 µg/L in all but one RI location. Concentrations of benzene ranged from 2 µg/L up to 580 µg/L. Naphthalene was detected above its groundwater URS of 20 µg/L in MW-2 (46 µg/L).

Arsenic was detected above its MCL of 50 µg/L in MW-4 (56.1 µg/L), while iron and manganese exceeded their Secondary MCL (SMCL) in every sample. It should be noted however, that SMCLs represent non-regulatory values that reflect aesthetic qualities such as color and taste, and are not health-based. Further, public water is available in this area, and a Groundwater Management Zone (GMZ) restricting use of groundwater in Wilmington is presently in place, both of which prevent human exposure to site groundwater.

Contaminants identified as COCs and retained for inclusion in the human health risk assessment include: aluminum, iron, manganese, benzene, benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, benzo(a)anthracene, indeno(1,2,3-cd)pyrene, naphthalene and arsenic. The calculations were conducted using the DNREC Site-Specific Calculator for Multiple Analytes (DNREC May 2000 version). The initial risk assessment that was performed assumed a commercial/industrial risk setting, and development of the site into a multi-story office building. It was performed in order to evaluate the cumulative risk associated with the exposure to soil and ingestion of groundwater on the site. The planned future use of the site consists of construction of a multi-story office complex. As such, the completed exposure pathway consisted of incidental soil ingestion, dermal contact, and inhalation of contaminated soils by construction workers. Based upon the assessment, the soil cumulative risk was calculated to be

1.4×10^{-5}, which exceeds the HSCA action level of $1X10^{-5}$, and a hazard index of 0.4, which is below the HSCA action level of 1.0.

Based upon the request to change the proposed development at the site from commercial/industrial to urban residential, a second risk assessment was performed, at DNREC's request, to take into account the proposed change in use. The exposure pathway evaluation determined that the only potential completed pathway is to construction workers. At that time, there were no completed pathways as the majority of the site was covered by asphalt. After development of the site, exposure pathways would then be also be closed as the site will be covered by buildings, hardscape, and paving. In that case, the only potential exposure route was to construction workers exposed to direct contact with subsurface soil during utility maintenance and similar activities.

The construction workers exposure to the soils will be eliminated by either (1) providing sufficient clean fill (a minimum of 2 feet) above the present site surface such that construction activities or excavation will take place within clean fill, or (2) removing the soils of the hot spot areas to reduce the soil cancer risk to an acceptable level, or (3) if construction activities must occur beneath the clean fill in the areas of the hot spots, the soils in these areas will be over-excavated, properly disposed of and subsequently filled with clean fill so that construction activities will occur within the clean fill. Therefore, it was concluded that the soil did not pose an unacceptable risk to human health, given a commercial/industrial risk setting.

The cumulative risk calculation (or hazard quotient, HQ) for noncancer risk to the construction worker was 1.3. The ingestion route of exposure accounted for 97% of the total noncancer risk. Consequently the potential for noncancer effects to the construction worker are above the risk cutoff of 1.0.

Noncancer risks are target organ dependent. The three major noncancer risk drivers were manganese (HQ = 0.68), arsenic (HQ = 0.4), and iron (HQ = 0.2). Target organs for these chemicals are the central nervous system and skin/blood for manganese and arsenic, respectively (U.S. EPA 2002b). No target organ has been identified for iron. Because no single target organ has a HI greater than 1.0, noncancer risks to construction workers is acceptable.

The results of the risk calculations showed that cancer risks to the construction worker ranged from 3×10^{-8} for benzene to 3×10^{-6} for arsenic. The total cancer risk to the construction worker was 1.4×10^{-5}. Incidental ingestion of soil accounted for 91% of cancer risks. The interpretation of the significance of the cancer risk estimates is based on the appropriate public policy. Delaware Regulations Governing Hazardous Substance Cleanup (DNREC-SIRB 1996) defers to a cleanup and background risk of 1.0×10^{-5}. Based on State regulations the total cancer risk level of 1.4×10^{-5} is above acceptable State risk levels. These risks are being driven by Sample MW-4 (3-5 ft), with a concentration of 41 mg/kg. The next highest arsenic concentration was 17 mg/kg found at MW-6 (4-6 ft). In addition to arsenic, cancer risks are being contributed to by PAH, primarily benzo(a)pyrene, with smaller contributions from dibenz(a,h)anthracene and benzo(b)fluoranthene (Table 5-6). All three of these PAH were found at appreciably higher concentrations in Sample MW-6 (4-6 ft). This is indicative of a potential localized hot spot that may require additional investigation.

Due to the site's location along the Christina River, it was necessary to assess what potential impacts, if any, the site could pose to the environmental health of the river. The site will remain paved,will be redeveloped, and the existing bulkhead will be maintained, thus precluding erosion of site soils into the river. Groundwater loading values were also calculated to evaluate the possible effects of groundwater discharge into the Christina River. Loading values for all organic and metallic analytes detected in groundwater during both the Phase II and RI investigations were calculated based upon the measured groundwater flow rate at the site and the flow rate of the Christina River. Based upon these calculations, it was determined that there were no exceedences of Delaware's Surface Water Quality Standards (DSWQS) by the discharge of site groundwater into the Christina.

4.0 INTERIM REMEDIAL ACTION ACTIVITIES

During excavation activities in June 2004 for the sanitary manholes, a series of underground petroleum pipelines and associated soil contamination were discovered. Some of these soils contained free product which DNREC required to be removed as part of the interim action (IA) performed under DNREC's oversight pursuant to HSCA. At that time, in an abundance of caution, it was decided that all other petroleum-impacted soils would be excavated to the maximum extent practicable to the water table and backfilled with clean fill as part of the IA. The impacted soils were removed and disposed of properly off-site as per the approved *Work Plan to Implement the Amended Final Plans of Remedial Action* (as amended) and the applicable regulations. In total, approximately 12,000 tons of petroleum-impacted soils were excavated and properly disposed of off-site. Additionally, approximately 120,000 gallons of potentially impacted groundwater was properly handled and disposed of off-site.

During the excavation activities, a total of 211 confirmatory soil samples were collected from the sidewalls and the floor of the excavation on a 20 foot by 20 foot grid spacing. Additionally, five (5) groundwater samples were collected in the vicinity of the petroleum-impacted soils. Based upon a review of all of the analytical data including the post-excavation results, it was determined that the only completed exposure pathway was the possible migration of vapors into the residential town home garages and crawl spaces. As a result, a vapor intrusion assessment for indoor air inhalation was conducted utilizing the United States Environmental Protection Agency (USEPA) model (Version 3.0 of the Johnson and Ettinger [J&E], 1991, soil-advanced and groundwater-advanced spreadsheets).

The initial modeling results indicated an unacceptable risk to human health for carcinogenic and non-carcinogenic compounds. However, due to the limitations associated with the model, additional site-specific soil gas data was required. This data was collected at three (3) locations, which had the highest levels of residual petroleum contamination. The results of the site-specific soil gas modeling indicate no unacceptable risks to human health, given the concrete slab foundations which are part of the already approved remedial action contained in the amended final plan for the prevention of dermal contact. Therefore, the previously proposed remedy contained within the amended final plan has been found to be protective in addressing the potential pathway of vapor intrusion. As the remedy will remain the same (i.e., the containment of the soils beneath the proposed building structures and asphalt parking lots), no further action is now required beyond the already completed IRA.

Additional confirmatory soil gas data may be collected as part of the operations and maintenance(O&M) Plan when the townhomes have been completed. Based upon the future monitoring results, additional remedial measures may be required in further amendments to the amended final plan for the site. This could include the operations and maintenance of the vapor barrier and ventilation system, which will be voluntarily installed under the concrete slab foundations, as well as possible improvements or upgrades of that system.

5.0 REMEDIAL ACTION OBJECTIVES

According to Section 8.4 (1) of the Regulations, site-specific remedial action objectives (RAOs) must be established for all plans of remedial action. The Regulations provide that DNREC set objectives for land use, resource use and cleanup levels that are protective of human health and the environment.

Qualitative objectives describe in general terms what the final results of the remedial action, if necessary, should be. The following qualitative objectives are determined to be appropriate for the site:

- Prevent residential exposure to impacted media;
- Prevent future construction worker exposure to elevated concentrations of site contaminants;
- Prevent environmental impacts, specifically to the Christina River, due to impacted media at the site; and
- Continue the use of public water for all purposes at the property and the surrounding community.

These objectives are consistent with the current proposed use of the site as residential use in an urban setting, New Castle County zoning policies, state regulations governing water supply and worker health and safety.

Based on the qualitative objectives, the quantitative objectives are:

1. Prevent human exposure to contaminated soils, groundwater and vapors contaminated by VOCs, PAHs and metals that would result in a carcinogenic risk exceeding $1X10^{-5}$ or noncarcinogenic risks exceeding a HI of 1.0 for a residential scenario.
2. Prevent erosion and discharge of soils contaminated by VOCs, PAHs, and metals into the Christina River.

6.0 PROPOSED PLAN OF REMEDIAL ACTION

Based on DNREC's evaluation of the current site information, DNREC recommends that the following remedial actions be taken at the site which are the third amended proposed plan:

- The remedy is consistent with the August 2003 amended final plan of remedial action; therefore, no further action beyond the already performed interim action is required.

7.0 PUBLIC PARTICIPATION

The Department actively solicits public comments or suggestions on the proposed plan of remedial action and welcomes opportunities to answer questions. Please direct written comments to:

DNREC Site Investigation and Restoration Branch
391 Lukens Drive
New Castle, Delaware 19720
Attention: Kristen Thornton

The comment period begins, Monday, August 9, 2004 and ends at the close of business (4:30 p.m.) Monday, August 30, 2004. If so requested, a public hearing will be held on the third amended proposed plan. The hearing time and place will be announced if said hearing is requested.

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John Blevins
Director, Division of Air and Waste Management

8/10/04
Date of Review of Proposed Plan