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THIRD AMENDED PROPOSED PLAN OF REMEDIAL ACTION

200 South Market Street Site
Operable Unit #3
Wilmington, DE

DNREC Project No. DE 1224

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 200 South Market 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, on the east by 201/205 A Street, on the west by Market Street, and on the north the Christina River. 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 200 South Market Street site was issued for public comment on December 17, 2001. The public comment period ended on January 7, 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 15, 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.

Since the possible design and construction plans for the site required raising the overall grade of the site from the present elevation, RDC requested that DNREC revise the final plan to take into account the new construction plans. 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.

In May 2004, three (3) underground storage tanks (USTs) were encountered at the site during construction activities. One (1) 1,500 gallon gasoline UST (UST #1) and one (1) 7,000 gallon UST (UST #2) of unknown contents were encountered and subsequently removed from the southeastern portion of the site. In addition, one (1) 3,000 gallon heating fuel UST (UST #3) was removed from the western end of the site. All UST removal activities were performed as interim response activities under the supervision of DNREC's Tank Management Branch. To efficiently address the new environmental conditions (i.e. the UST areas), the Department has divided the site into the following operable units (OUs): tax parcel ID # 2605010067, the Tower 1 location, is designated as OU-1; tax parcel ID # 2605010068, the Tower 1 parking lot, is designated as OU-2; and, the remainder of the 200 South Market Street property is designated as OU-3.

OU-1 is the future location of a proposed 23 story apartment complex (Tower 1). No new environmental conditions have been encountered to date in OU-1; therefore, the remedy detailed in DNREC's amended final plan of remedial action (amended final plan) will remain the implemented remedy for the OU-1 tax parcel. OU-2 is the future location of the Tower 1 parking lot. The discovery and removal of UST #3 in OU-2 requires a minor modification of the amended final plan of remedial action for OU-2, which will be issued under separate cover. In addition, modifications to the amended final plan are also necessary for OU-3 due to the discovery and removal of UST #1 and UST #2 in this area. 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 generally bounded by A Street to the south, the Christina River Club restaurant to the east, Market Street to the west, and the Christina River to the north. The site encompasses 4.66 acres and consists of parcel #26-050.00-006 on the tax maps of New Castle County, Delaware. 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 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 aerial photographs, United States Geologic Survey (USGS) topographic maps (Figure 1), historical fire insurance maps and city directories, investigated the historical use of the site. The 1887 and 1893 maps indicated that the site

was used as a coal and lime yard, and as a carriage works. By the 1920s, the site was used as a sand and gravel yard, and an International Harvester Company garage and warehouse. Additionally, several railroad sidings were present on site. . 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 on the site into the 1980s. Prior to the purchase of the site in January 2004, the site was a paved commercial parking lot operated by Colonial Parking.

The RDC entered into a VCP Agreement in March 2001 with DNREC to perform a RI. The objectives of the RI were to evaluate potential risks to human health, welfare and the environment posed by the site.

3.0 PREVIOUS INVESTIGATION RESULTS

In January 2000, EA conducted a Phase II investigation, which consisted of direct push soil and groundwater sampling. Subsurface soil samples were collected from five direct push soil borings (B-1, B-2, B-3, B-5 and B-9) within the site. The groundwater samples were collected from temporary wells constructed in four of the five direct push soil borings located throughout the site (W-1, W-2, W-3, and W-4). In accordance with Subsection 8.3 of the Regulations, DNREC accepted the January 2000 Phase II investigation as part of the RI. In April 2001, EA collected soil samples from a total of five subsurface soil borings (GP-1, GP-2, GP-3, GP-4, and GP-5) with groundwater samples collected from monitoring wells constructed in three of the five soil boring locations (MW-1, MW-2 and MW-3) along with one shallow surface soil sample (SS-1) and three sediment samples (SD-1, SD-2 and SD-3) from the Christina River, adjacent to the site. The following summarizes the findings of both the Phase II investigation and the RI. (See Figure 2 for sample locations.)

3.1 Subsurface Soil

Based upon the definition provided in the Remediation Standards Guidance under HSCA, the site is set in a non-critical water resource area. Comparisons with the DNREC Uniform Risk-Based Remediation Standards (URS) are for unrestricted use in a non-critical water resource area. All subsurface soil samples contained arsenic and iron in concentrations in excess of the unrestricted URS values. Complete analytical results from the RI are available in Appendix A. Manganese was detected at concentrations above the unrestricted URS value in the soil samples collected from B-1, B-2, B-3, and B-5. Lead exceeded the unrestricted URS value in subsurface soil samples from GP-3 and B-3. Aluminum was detected above the unrestricted URS value in subsurface soil samples collected from B-2, B-3, B-5 and B-9. Copper exceeded the unrestricted URS value in the subsurface soil sample from B-3. Subsurface soil sample GP-3 exceeded the unrestricted URS value for antimony.

Subsurface soil samples from B-3, B-9, GP-2 and GP-3 contained benzo(a)anthracene in excess of the unrestricted URS values. Subsurface soil samples from GP-2, GP-3, GP-4,

GP-5, B-2, B-3, B-5 and B-9 exceeded the unrestricted URS value for benzo(a)pyrene. The unrestricted URS value for benzo(b)fluoranthene was exceeded in samples B-3, B-9, GP-2 and GP-3. Indeno(1,2,3-cd)pyrene was detected above the unrestricted URS value in subsurface soil samples collected from GP-2 and GP-3. Subsurface soil samples GP-2, GP-3, GP-4, B-2, B-3, B-5 and B-9 exceeded the unrestricted URS value for dibenzo(a,h)anthracene. Subsurface soil sample GP-3 exceeded the unrestricted URS value for benzo(k)fluoranthene.

No volatile organic compounds (VOCs), pesticides, or polychlorinated biphenyls (PCBs) were detected at concentrations exceeding the respective DNREC unrestricted URS values in the subsurface soil samples collected during the RI.

3.2 Surface Soil

The site is almost completely covered with asphalt paving, with a small grassy strip on the northern portion of the site. Based upon site conditions, only one surface soil sample was collected and submitted for laboratory analysis. Based on the analytical results, iron and arsenic exceeded their respective unrestricted URS values. No VOCs, semivolatile organic compounds (SVOCs), pesticides, or PCBs were detected at concentrations exceeding the unrestricted URS values in the surface soil sample collected during the RI.

3.3 Groundwater

The results of the RI identified several metals and polynuclear aromatic hydrocarbons (PAHs) at concentrations exceeding their respective groundwater URS values. However, the results may have been biased high due to the sampling method used. The original groundwater samples were collected using a Geoprobe® and were noted as turbid during sampling. Therefore, permanent monitoring wells were constructed.

Groundwater samples from MW-1, MW-3, W-1, W-2, W-3 and W-4 exceeded the arsenic URS value for a non-critical water resource area and for protection of human health. Barium was detected at concentrations greater than the groundwater URS values in the samples collected from MW-2, W-1, W-2, W-3, and W-4. Manganese was detected at concentrations greater than the groundwater URS value in samples collected from MW-1, MW-2, MW-3, W-1, W-2, and W-4. Samples collected from MW-1, MW-2, MW-3, W-1, W-2, and W-4 exceeded the groundwater URS value for iron. Aluminum and lead were detected at concentrations greater than the respective groundwater URS values in the sample collected from W-3. Benzo(a)anthracene, benzo(b)fluoranthene, and benzo(a)pyrene were detected above the respective groundwater URS values in MW-1 and W-1. Dibenzofuran and carbazole exceeded the respective groundwater URS values in samples collected from MW-3 and W-1. Bis(2-ethylhexyl)phthalate was detected above the groundwater URS value in the samples from MW-1 and MW-2. Benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, and dibenzo(a,h)anthracene were only detected above the respective groundwater URS values in the sample from W-1. No other analyte for VOCs, SVOCs, pesticides, PCBs, and/or metals were detected at

concentrations exceeding the respective groundwater URS values in any of the seven groundwater samples.

3.4 Sediment

Sediment samples collected as part of the RI served to characterize the sediment conditions in the Christina River adjacent to the site. 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 URS values 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 value were selected as COCs and included in a human health risk assessment.

Barium, cadmium, copper, lead, mercury and zinc exceeded the respective URS values for the Protection of the Environment in all three sediment samples. Nickel and chromium were detected above the respective URS values in sample SD-1. Arsenic exceeded the URS value in samples SD-1 and SD-2. Naphthalene, phenanthrene, anthracene, fluoranthene, benzo(a)anthracene, bis(2-ethylhexyl)phthalate, chrysene, and benzo(a)pyrene exceeded the respective URS for the Protection of the Environment in all 3 sediment samples. Only sample SD-1 exceeded the respective URS values for fluorene, bis(2-ethylhexyl)phthalate, benzo(b)fluoranthene and indeno(1,2,3-cd)pyrene. No other analytes from the three sediment samples were detected at concentrations exceeding the URS values.

3.5 Results and Relative Risk

The results of the January 2000 Phase II investigation identified several metals and PAH compounds at concentrations exceeding their respective groundwater URS values. However, due to the sampling method utilized, these groundwater samples contained a high level of suspended fine sediment. The RI utilized permanent monitoring wells. The groundwater results of the permanent monitoring wells indicated that several metals and SVOCs were elevated above the respective URS values. However, 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 exposure to site groundwater.

In the initial proposed plan, a human health risk assessment was performed assuming a restricted use risk setting, and development of the site into a multi-story office building. The risk assessment was performed in order to evaluate the cumulative risk associated with the exposure to soil and ingestion of groundwater on the site. Contaminants identified as COCs and retained for inclusion in the human health risk assessment include: benzo(b)fluoranthene, benzo(a)pyrene, dibenzo(a,h)anthracene, benzo(a)anthracene, iron, manganese and arsenic. The calculations were conducted using the DNREC Site-Specific Calculator for Multiple Analytes (DNREC May 2000 version).

The only completed exposure pathway consisted of incidental soil ingestion. Based on the assessment of noncancer risks to construction workers from the incidental ingestion of chemicals in total soil and dermal contact with total soil, the risk was found to be acceptable. The soil noncancer risk or Hazard Index was calculated to be 0.436, which is below the HSCA action level of 1.0. The soil cancer risk was calculated to be $1.3X10^{-5}$, which is above the HSCA action level of $1X10^{-5}$. However, COCs were found at appreciably higher concentrations in one soil sample collected from GP-3 (0-2 ft. below ground surface) during the RI. This is indicative of a potential localized "hot spot" as a representative number of soil samples were collected.

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 land use. The results of the second risk assessment were similar to those of the first one. The exposure pathway evaluation determined that the only potential completed pathway was to construction workers. At the that time, there were no other completed pathways as the site was covered by an asphalt parking lot. After development of the site, exposure pathways would then also be closed as the site would be covered by buildings, landscape, hardscape, and paving. In each case, the analysis led to the result that there were no unacceptable risks for these compounds, with the possible exception of construction workers exposed to direct contact with subsurface soil. The potential for migration of COCs into present or future onsite structures was considered to be insignificant. The COCs identified at that time have low vapor pressures and do not volatilize under normal pressure and temperature conditions.

The construction workers exposure to the soils would then 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 contaminants identified as COCs and retained for inclusion in the human health risk assessment are: arsenic, aluminum, iron, manganese, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene. The only completed exposure pathway consisted of incidental soil ingestion. Based on the assessment of noncancer risks to construction workers from the incidental ingestion of chemicals in total soil and dermal contact with total soil, the risk is acceptable. The soil noncancer risk or Hazard Index was calculated to be 0.68, which is below the HSCA action level of 1.0. The soil cancer risk was calculated to be $1.3X10^{-5}$, which is above the HSCA action level of $1X10^{-5}$. However, COCs were found at appreciably higher concentrations in one soil sample collected from GP-3 (0-2 ft. below ground surface) during the RI. This is indicative of a potential localized "hot spot" as a representative number of soil samples

were collected. Soil removal of the hot spot will reduce the soil cancer risk to an acceptable level, or covering the site with a minimum of 2 feet of clean fill, and requiring that all excavation work occurs within clean fill, will ensure that construction workers are not exposed to any soils left in place that exceed $1X10^{-5}$.

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. At the present time, as well as in future site plans, the site will remain paved and developed. 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 inorganic 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, and the tidal components of the Christina River, the resulting concentrations entering into the river would be below the Delaware Surface Water Quality Standards (DSWQSs). Therefore, there were no unacceptable risks to the Christina River based on current site use or future plans for the site.

4.0 INTERIM REMEDIAL ACTION ACTIVITIES

On May 6, 2004 one (1) 1,500 gallon gasoline UST (UST #1) and one (1) 7,000 gallon UST (UST #2) of unknown contents were removed from Operable Unit #3 (OU-3) of the site as a remedial interim response action. All UST removal activities were performed by a Delaware Certified Tank Removal Contractor in a manner consistent with the Delaware Regulation Governing Underground Storage Tank Systems.

Samples collected during UST removal activities were above DNREC-Tank Management Branch (TMB) action levels. As a result, impacted soils from the UST #1 and UST #2 locations were over-excavated and transported offsite for proper disposal at Clean Earth of New Castle. All confirmation samples collected following excavation activities were below DNREC-TMB Risk Based Screening Levels (RBSLs) for soil to groundwater; however, several exceedances of the direct contact RBSLs were noted due to elevated polynuclear aromatic hydrocarbons (PAHs) present in the soil samples. Elevated PAHs are consistent with site-wide conditions noted during the RI and Phase II investigations and are, therefore, addressed via the initial proposed plan of remedial action, detailed in Section 6 of this amended proposed plan.

Therefore the residual impacted soil poses no threat to human health and safety and to the environment as long as the residual impacted soils remain undisturbed. As a result, DNREC-TMB recommends no further action (NFA) with regards to UST #1 and UST #2 previously located on OU-3 of the site. In the event impacted soils are disturbed in the future by digging, boring, or excavating in the area of residual contamination, all disturbed soils must be properly managed in accordance with the site-wide Operation & Maintenance (O&M) Plan.

Only 1,2-Dibromoethane exceeded the RBSL for groundwater in one sample. However, 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 exposure to site groundwater.

DNREC-SIRB accepts DNREC-TMB's conclusions and recommendations with regards to the removal and excavation activities performed for UST #1 and UST #2, and hereby incorporates them as part of the third amended proposed plan of remedial action for OU-3 of the 200 S. Market Street site.

In addition, this site was evaluated for the potential of vapor intrusion from vapor migration from neighboring portions of the Christina Landing development. 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 crawlspaces. 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. Remedial options were evaluated utilizing the qualitative and quantitative objectives and the following considerations:

- The site will be redeveloped into an urban residential building with a parking lot and sidewalks;
- The surrounding land use is to remain commercial and industrial;
- The site is bordered by the Christina River with a bulkhead acting as a physical barrier between the site and the river;
- The risk posed to future construction workers through exposure to contaminated soil; and
- The risk posed to human health through the ingestion of contaminated groundwater and exposure to contaminated soils.

The qualitative objectives are as follows:

- Prevent residential exposure to impacted media;
- Minimize potential exposure to site contaminants of concern for residents and construction workers at the site;
- 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 to the surrounding community.

Based on the qualitative objectives, the quantitative objectives are:

1. Prevent human exposure to contaminated soils, groundwater and volatile organic 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 verbal and written comments to:

DNREC Site Investigation and Restoration Branch
391 Lukens Drive
New Castle, Delaware 19720
(302)395-2600
Attention: Kristen Thornton

Pursuant to 7 Del. C. § 9107(e) (2), DNREC invites written comments on this proposed plan. The public comment period begins on Monday, August 9, 2004 and will close on 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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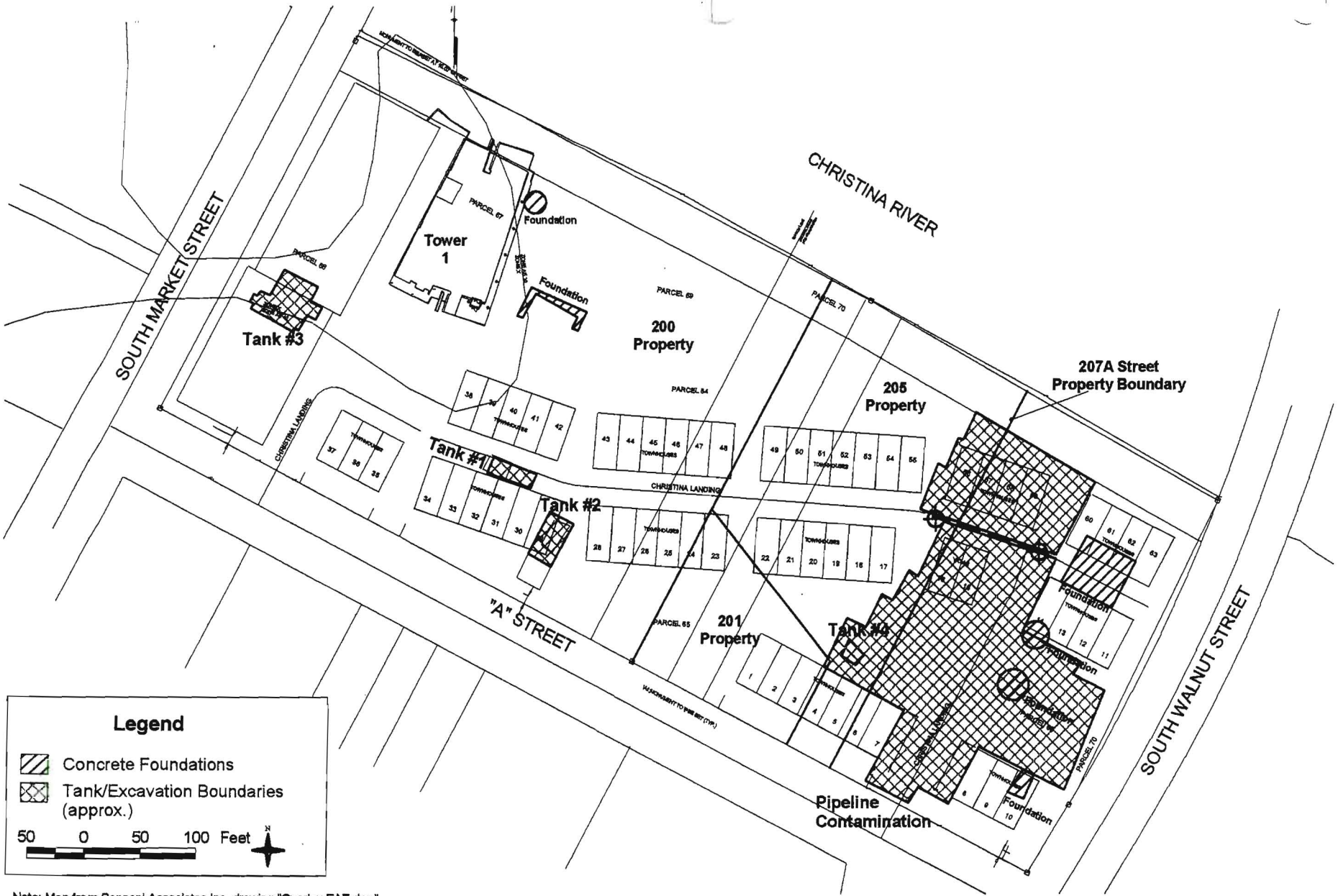
John Blevins, Director
Division of Air & Waste Management

8/10/04
Date of Review of Proposed Plan



Note: Map from Pennoni Associates Inc. drawing "Overlay.EAE.dwg".

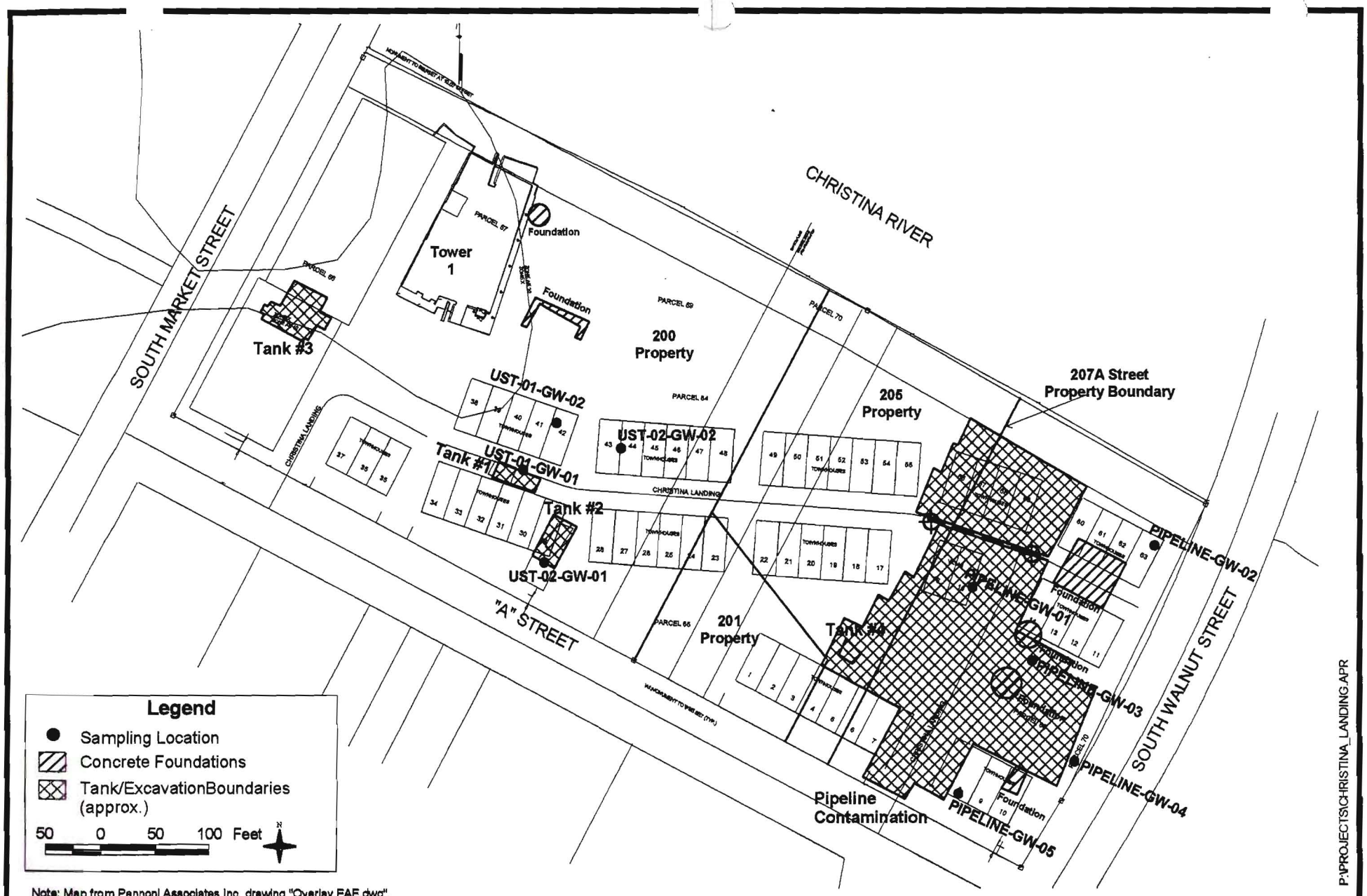
EA Engineering, Science, and Technology, Inc.

CHRISTINA LANDING

WILMINGTON, DELAWARE

Figure 2-1
Site Plan

JULY 2004



Note: Map from Pennoni Associates Inc. drawing "Overlay.EAE.dwg".

EA Engineering, Science, and Technology, Inc.

CHRISTINA LANDING

WILMINGTON, DELAWARE

Figure 2-2
Groundwater Sample Locations

JULY 2004

3.0 SUMMARY OF SOIL/CONSTRUCTION WORKER RISK ASSESSMENTS

3.1 Identification of Chemicals of Potential Concern

For exposure of construction workers to Chemicals of Potential Concern (COPC), the concentrations of chemicals in soil were compared to Delaware Department of Natural Resources and Environmental Control (DNREC) Uniform Risk-Based Standards (URS) for soil. If the concentrations exceeded DNREC URS soil values, the maximum detected concentrations were compared with U.S. Environmental Protection Agency (EPA) Region III Risk Based Concentration (RBC) residential screening values. If the maximum detected concentration exceeded the residential RBC, the chemical was designated a COPC, and a quantitative risk assessment was performed. COPC for the three property locations are as follows:

200 S. Market Street: benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, benz(a)anthracene, aluminum, iron, manganese, and arsenic.

201/205 A Street.: benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, benz(a)anthracene, arsenic, iron, and manganese.

207 A Street.: benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, benz(a)anthracene, benzene, aluminum, arsenic, iron, and manganese.

3.2 Reasonable Maximum Exposure Calculation

Data for the identified COPC at each location were examined to determine if they were log normally or normally distributed using the Shapiro-Wilk W statistic. No data were found to be normally distributed. The majority of data were log normally distributed, in which case the H-Statistic was used to estimate the Reasonable Maximum Exposure (RME). In cases where the data fit neither normal nor log normal distributions (dibenz(a,h)anthracene at 200 S. Market Street and arsenic at 201/205 A Street) a log normal distribution was assumed (consistent with U.S. EPA guidance) and the H-Statistic used to estimate the RME. RME values used for the risk assessment can be found in Attachments A, B, and C for the three properties.

3.3 Exposure Parameters

Appropriate RME exposure parameters for the incidental ingestion of soil and dermal contact with soil by the construction worker were assigned using standard guidance documents. It was

3.5.3 207 A Street

Based on the risk assessment for 207 A Street, non-cancer risks to construction workers from the incidental ingestion of chemicals in total soil and dermal contact with total soil were acceptable once target organs are taken into account. Cancer risks exceed acceptable State risk levels (1.0×10^{-5}) at 1.4×10^{-5}. Arsenic was responsible for cancer risks of 3×10^{-6}. These risks were driven by arsenic concentrations in two samples, MW-4 (3-5 ft) at 41 mg/kg and MW-6 (4-6 ft) at 17 mg/kg. In addition to arsenic, PAH contributed to cancer risks, primarily benzo(a)pyrene, with smaller contributions from dibenz(a,h)anthracene and benzo(b)fluoranthene. All three of these PAH were found at appreciably higher concentrations in Sample MW-6 (4-6 ft), indicative of a potential localized higher concentration.