UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION III

STATEMENT OF BASIS

INACTIVE PORTION OF
FORMER ARCO CHEMICAL COMPANY
400 FRANKFORT ROAD

MONACA, PENNSYLVANIA

EPA ID NO. PAD068730225

Prepared by
Office of Remediation
Land and Chemicals Division
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List of Acronyms

AOC	Area of Concern
AR	Administrative Record
AST	Above-ground Storage Tank
bgs	below ground surface
BTEXS	benzene, toluene, ethylbenzene, xylenes, styrene
CO&A	Consent Order and Agreement
EPA	Environmental Protection Agency
LNAPL	Light Non-Aqueous Phase Liquid
MCL	Maximum Contaminant Level
PADEP	Pennsylvania Department of Environmental Protection
RA/CP	Risk Assessment/Cleanup Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
RSL	Regional Screening Level
SHS	Statewide Health Standard
SB	Statement of Basis
SSS	Site-Specific Standard
TCLP	Toxicity Characteristic Leachate Procedure
UST	Underground Storage Tank
VOC	Volatile Organic Compound

Section 1: Introduction

The United States Environmental Protection Agency (EPA) has prepared this Statement of Basis (SB) to solicit public comment on its proposed remedy for a portion of the former Arco Chemical Company facility located in Monaca, Pennsylvania. This SB applies to the property currently owned by the Lyondell Environmental Custodial Trust and the Beaver County Corporation for Economic Development (hereinafter referred to as the Inactive Portion). The Inactive Portion is located within the larger, former Arco Chemical Company facility (the Facility). The remaining Facility property, referred to herein as the Active Portion, is now owned by NOVA Chemicals Corporation.

EPA's proposed remedy for the Inactive Portion consists of monitored natural attenuation and the re-establishment of a groundwater monitoring program for the former waste disposal areas, compliance with a Post-Remediation Care Plan (PRCP), and the implementation of land and groundwater use restrictions.

This SB highlights key information relied upon by EPA in proposing its remedy for the Inactive Portion.

The Facility is subject to EPA's Corrective Action program under the Solid Waste Disposal Act, as amended, commonly referred to as the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901 et seq. The Corrective Action program requires that facilities subject to certain provisions of RCRA investigate and address releases of hazardous waste and hazardous constituents, usually in the form of soil or groundwater contamination, that have occurred at or from their property. The Commonwealth of Pennsylvania is not authorized for the Corrective Action Program under Section 3006 of RCRA. Therefore, EPA retains primary authority in the Commonwealth for the Corrective Action Program. EPA notes that all areas of the Facility received a release of liability from the Pennsylvania Department of Environmental Protection (PADEP) under Pennsylvania's Land Recycling Program (Act 2) with the last area receiving a release in 2001.

EPA is providing a thirty (30) day public comment period on this SB. EPA may modify its proposed remedy based on comments received during this period. EPA will announce its selection of a Final Remedy for the Inactive Portion in a Final Decision and Response to Comments (Final Decision) after the public comment period has ended.

Information on the Corrective Action program as well as a fact sheet for the Facility can be found by navigating http://www.epa.gov/reg3wcmd/correctiveaction.htm. The Administrative Record (AR) for the Inactive Portion contains all documents, including data and quality assurance information, on which EPA's proposed remedy is based. See Section 8, Public Participation, below, for information on how you may review the AR.

Section 2: Facility Background

The Facility is located at 400 Frankfort Road, Monaca, Pennsylvania 15061. It occupies approximately 420 acres bounded by commercial properties to the west and east, the Ohio River to the north, and primarily undeveloped hilly land to the south. For remedial purposes, the Facility has typically been divided into six areas: the Central Plant/Styrene II Area, the Over-the-Hill Tank Farm Area, the Raccoon Creek Area, the West Landfill/Dravo Quarry Area, the East Landfill Area, and the Phthalic Anhydride Area. The Raccoon Creek Area, the West Landfill/Dravo Quarry Area, the East Landfill Area, and the Phthalic Anhydride Area comprise the Inactive Portion of the Facility and are addressed in this SB.

A location map and Facility layout are attached as Figures 1 and 2, respectively.

The Facility was initially constructed in 1942 by Koppers United Company (Koppers) on behalf of the United States government to produce chemicals used to make synthetic rubber. In 1946 Koppers purchased a portion of the Facility to begin production of polystyrene. By the 1950s, Koppers purchased the remainder of the Facility and operations shifted primarily to polystyrene and expandable polystyrene production.

In 1965 a partnership was created between Koppers and Sinclair Oil Corporation, which operated the Facility until 1970, when Sinclair's portion of the Facility was sold to ARCO Polymers, Inc. (ARCO). In 1974, ARCO became sole owner through the purchase of Koppers' portion of the Facility. The Active Portion was sold to NOVA Chemicals Corporation (NOVA) in 1996, and the Inactive Portion was transferred to Lyondell Chemical Company (Lyondell) when Lyondell purchased ARCO from the Atlantic Richfield Company. Lyondell declared bankruptcy in 2009 and created the Lyondell Environmental Custodial Trust (the Trust) to own and manage the Inactive Portion. In December 2017, the East Landfill Area and the Phthalic Anhydride Area within the Inactive Portion were sold to the Beaver County Corporation for Economic Development; the Trust continues to own the West Landfill/Dravo Quarry Area and the Raccoon Creek Area within the Inactive Portion. The Active Portion is still owned by NOVA, which continues to manufacture expandable polystyrene and advanced foam resins for use in the automotive, packaging, construction, and other industries.

The proposed remedy described in this SB is for the Inactive Portion only. EPA anticipates proposing a remedy for the Active Portion in a separate SB which will be subject to the necessary public participation requirements.

Section 3: Summary of Environmental Investigations

For all environmental investigations conducted at the Facility, groundwater concentrations were screened against federal Maximum Contaminant Levels (MCLs) promulgated pursuant to Section 42 U.S.C. §§ 300f et seq. of the Safe Drinking Water Act and codified at 40 CFR Part 141, or if there was no MCL for a contaminant, EPA Region III Screening Levels (RSL) for tap water for chemicals. Soil concentrations were screened against EPA RSLs for industrial soil. For historical consistency, Pennsylvania's Act 2 non-residential Statewide Health Standards will be referenced when discussing investigations performed under oversight of PADEP. These standards are equivalent to EPA's MCLs and RSLs for individual contaminants at the Facility.

A. The Facility

ARCO began environmental investigations at the Facility in the late 1980s and early 1990s, when several site assessments, remedial investigations and feasibility studies of each area were completed for PADEP review. The primary site-wide contaminants identified were benzene, toluene, ethylbenzene, xylenes, and styrene (BTEXS). In 1991, ARCO and PADEP discussed cleanup standards for groundwater. PADEP concurred with ARCO's analysis that groundwater remediation to background or drinking water levels was not practical. Analysis conducted by ARCO and approved by PADEP concluded that the MCL for ethylbenzene could not be met in fewer than 100 years.

In July 1994 ARCO entered into a Consent Order and Agreement (CO&A) with PADEP to complete planning/mobilization, supplementary site sampling, hydrogeology studies, groundwater treatability tests, soil vapor extraction, and in-situ bioremediation at the Active Portion and required continued groundwater monitoring in that Portion. In September 1997, ARCO entered the Facility into the Act 2 program. In October 1997, ARCO entered a second CO&A with PADEP to complete the investigation of the Inactive Portion and to complete remediation of the entire Facility under the Act 2 Program.

By 2001, PADEP provided the entire Facility relief of liability under Act 2. The Central Plant/Styrene II Area, Over-the-Hill Tank Farm Area, Raccoon Creek Area, West Landfill/Dravo Quarry Area, and East Landfill Area achieved a Site-Specific Standard (SSS) under Act 2 for groundwater and soil; the Phthalic Anhydride Area met the Statewide Health Standards for soil (no relief of liability from groundwater was given for the Phthalic Anhydride Area).

B. Inactive Portion

The following provides further details on the remediation activities within each area of the Inactive Portion:

1. Raccoon Creek Area

The Raccoon Creek Area (RC Area) was defined as an approximately 18-acre area on the floodplain of the Ohio River. This area was used for the disposal of various plant wastes from

1943 to 1975. Pits were excavated for burning acid washings, consisting of light oil treated with sulfuric acid, and distillation residues from the benzene production facilities. Fly ash from the coal-fired boilers was also placed in the former disposal pits. The hydrogeology of the RC Area has relatively impermeable bedrock forming an effective lower boundary for shallow groundwater, which primarily flows within the sand and gravel deposits that overlie bedrock to a maximum thickness of approximately 60 feet in the upper terrace (southern portion) of the RC Area. Groundwater within the sand and gravel deposits of this area is typically under confined conditions, as a relatively impermeable silt and clay alluvial unit up to 30 feet thick overlies the sand and gravel unit near Raccoon Creek. Groundwater is generally encountered between four and 28 feet below ground surface (bgs) in the lower terrace (northern portion) of the RC Area, and up to 75 feet bgs in the upper terrace.

ARCO submitted a RI/FS of this area in 1990, which indicated that disposal of chemical residues and waste products in the former disposal pits, and fly ash used as fill in the lower terrace, were the major sources of organic and inorganic contaminants. BTEXS constitute most of the soil and groundwater contamination in the RC Area, with some semi-volatile contaminants and arsenic found in soil and sediment. The risk analysis concluded that potential risks to human health or the environment were considered significant from exposure to shallow contaminated soils and exposure to Raccoon Creek and Ohio River surface waters after mixing with contaminated groundwater discharging from the RC Area. The remedial action recommended in the RI/FS included a RCRA-type low-permeability cap, slurry cutoff wall, groundwater extraction within the cutoff wall and outside its perimeter, and soil vapor extraction inside the cutoff wall.

By the time of the 1997 CO&A, ARCO had demonstrated the infeasibility of many of the initially-proposed remedial components to PADEP, so that the remedy outlined in the 1997 CO&A consisted of maintaining the existing vegetative cover over the RC Area to ensure at least 70% ground cover of permanent plant species and regular inspections of the area, including activities to address subsidence or erosion from former disposal pits that would continue for no longer than ten years in accordance with the PADEP-approved PRCP. Surface water sampling would continue for 12 consecutive quarters at specified transects and locations along Raccoon Creek for attainment demonstration purposes.

In February 1998 ARCO submitted a Risk Assessment/Cleanup Plan (RA/CP) for the RC Area, with revisions submitted in June and September 1998. Only arsenic exceeded non-residential SHS in surface soils for direct contact exposure; benzene and arsenic exceeded non-residential SHS in subsurface soils for direct contact exposure; benzene exceeded non-residential SHS in subsurface soils for the volatile inhalation pathway; and arsenic, benzene, ethylbenzene, lead, naphthalene, selenium, styrene, and toluene exceeded non-residential SHS for the soil-to-groundwater pathway. Benzene, bis(2-ethylhexyl) phthalate, chlorodibromomethane, 1,1,2-trichloroethane, and 1,1,2,2-tetrachloroethane exceeded surface water screening criteria, and bis(2-ethylhexyl) phthalate, butyl benzyl phthalate, and dibenzofuran were carried into the Risk Assessment based on their potential to bio-accumulate in fish. Each of these exposure pathways and constituents were evaluated quantitatively in the Risk Assessment. Sediment screening in the RC Area showed no exceedances of human health criteria, and since groundwater is not used or planned for future use, no pathways exist for exposure to groundwater; therefore, sediment and groundwater were not evaluated further in the Risk Assessment.

On-site workers, construction workers, trespassers, and recreational swimmers and fishermen were identified in the Risk Assessment as potential receptors. Potential exposure pathways for on-site workers and trespassers were incidental ingestion and direct contact of surface soil, and inhalation of volatiles from soil; these same pathways were evaluated for construction workers but included subsurface soil exposures as well. Potential exposure pathways for the recreational swimmer were direct contact and incidental ingestion of surface water, and were direct contact with surface water and ingestion of fish from Raccoon Creek for the recreational fisherman. The summed theoretical excess lifetime cancer risks over all pathways for the on-site worker ($4x10^{-6}$), construction worker ($1x10^{-6}$), trespasser ($1x10^{-6}$), recreational swimmer ($6x10^{-8}$), and recreational fisherman ($3x10^{-6}$) were all within EPA's allowable risk range; and the estimated non-cancer hazard indices for the on-site worker (0.03), construction worker (0.18), trespasser (0.03), recreational swimmer (0.0004), and recreational fisherman (0.02) were all under EPA's allowable hazard index of 1. The Cleanup Plan outlined further details of the remedy for this area as proposed in the 1997 CO&A and described the four elements of post-remediation care: 1) annual visual inspections of the former disposal areas for five years, 2) implementation of a soils management and worker protection program, 3) a notice of the environmental conditions of the area to be recorded on the deed for the property, and 4) no post-remediation sampling would be performed. PADEP approved the RA/CP in October 1998.

ARCO submitted a Final Report for the RC Area in December 1998, with revisions submitted in February 1999. The Final Report documented that the RC Area had attained the SSS under Act 2 as approved by PADEP in the RA/CP and as agreed to in the 1997 CO&A. Surface water sampling results from the first four quarters of monitoring had achieved the specifications for attainment, a recent aerial photograph and walking inspection demonstrated that more than 70% of the area is vegetated with permanent plant species, and a contribution of $100,000 was made to the Penns Corner Conservancy Charitable Trust for wetlands mitigation activities to resolve wetlands issues in this area and the West Landfill/Dravo Quarry Area (below) as approved by PADEP. The elements of PRCP were expanded and added to in the Final Report, to include greater specificity in inspection requirements (banks of Raccoon Creek will also be inspected during quarterly stream sampling for erosion/subsidence, and native plant species with enhanced root structures should be planted along the stream bank where necessary based on quarterly observations or annual inspections) and closing all but a specified list of ten groundwater monitoring wells in the area. PADEP approved the Final Report in March 1999 and further noted that the RC Area may be subject to deed restrictions.

Upon request from EPA and PADEP, the Trust performed quarterly sampling of available wells in the RC Area from November 2015 to November 2016 to confirm that remaining groundwater contamination in this area is stable or decreasing. A well-by-well statistical analysis on benzene concentrations (the predominant contaminant) demonstrated that the trend in each well is either decreasing or statistically insignificant, suggesting that remaining groundwater contamination in the RC Area is stable or decreasing. Surface water and sediment samples from three transects of Raccoon Creek were collected during the August 2016 sampling event to help determine if surface water and sediment were impacted by groundwater contamination remaining in the area. Only aluminum concentrations in an upstream surface water sample slightly exceeded Ambient Water Quality Criteria for ecological receptors. For sediment, seven metals (arsenic, barium,

cadmium, chromium, cobalt, iron, manganese, and nickel) exceeded conservative ecological screening values (either EPA Region 3 BTAG Freshwater Sediment Screening Benchmarks or NOAA Screening Quick Reference Tables); however, the highest exceedance was less than three times the screening value, suggesting that impacts to aquatic organisms are unlikely to be significant. Only the sediment sample closest to the former disposal areas had the highest exceedances, suggesting that contamination is localized to a small stretch of the Raccoon Creek bank. Four metals (arsenic, cadmium, cobalt, and vanadium) also exceeded a conservative screening against Act 2 residential SHS for soil; however, each exceedance is less than twice the human health criteria, and considering the very low exposure times and durations for sediment (as opposed to soil) along the mouth of Raccoon Creek for any human receptors, these exceedances are likely negligible.

2. West Landfill/Dravo Quarry Area

The West Landfill/Dravo Quarry Area (WL/DQ Area) is approximately 14 acres and includes a landfill (West Landfill) that was active from 1943 to 1972, open space and roads in the western section of the Facility, a wooded area and pond southwest of the main plant area, and an inactive quarry. The West Landfill was the primary disposal area for plant process wastes, including acid washings and light oil residues from the benzene facility, residue from the styrene facilities, waste polystyrene and expandable polystyrene beads, cleaning solutions containing less than 1% toluene, and spent catalysts. The hydrogeology of the WL/DQ has relatively impermeable bedrock forming an effective lower boundary for shallow groundwater, which occurs at a depth of approximately 70 feet bgs, primarily flows within the sand and gravel deposits that overlie bedrock, and appears to be in direct hydrologic communication with the Ohio River. A silty clay layer (believed to be the remnant of an abandoned river channel) exists above the sand and gravel in thicknesses varying from less than 1 foot in the northern boundary of the WL/DQ Area to 17 feet in the southern boundary. Perched groundwater atop this silty clay layer exists within the overlying fill, flows to the northwest, and appears to be primarily related to infiltration of precipitation.

In February 1989 ARCO submitted a Site Assessment of the WL/DQ Area, which identified BTEXS as the primary contaminants. Maximum concentrations of BTEXS and some poly-nuclear aromatic hydrocarbons generally followed an east-west transect through the area corresponding to the axis of the abandoned river channel, which served to limit contaminant migration into underlying subsoils. No significant concentrations of volatile contaminants were detected in the sand and gravel deposits immediately below this silty clay layer until reaching the depth of groundwater, suggesting that contamination from a source to the east (Central Plant/Styrene II Area) may have migrated with groundwater to the WL/DQ Area. Localized elevated lead and mercury concentrations were also detected within fill and in three northern monitoring wells, which may be attributable to perched water overflow from the landfill. The risk analysis performed as part of the 1989 Site Assessment concluded that potential risks to human health or the environment were considered significant from exposure to shallow contaminated soils in the WL/DQ Area, with arsenic, which may be present at background levels, driving a substantial portion of this risk.

ARCO submitted a RA/CP for the area in January 1998, with revisions submitted in May and

June 1998. Arsenic, lead, and thallium exceeded SHS for surface soil and subsurface soil, and bis(2-chloroethyl)ether and dibromochloromethane exceeded SHS in subsurface soil for volatilization. Groundwater was not evaluated quantitatively since it is not used and no complete exposure pathway exists. Contaminants from the WL/DQ Area were modeled to the Ohio River and screened against water quality criteria after mixing; no exceedances were noted. Surface water and sediments from the pond were also screened against water quality criteria and soil SHS, respectively, and no exceedances were noted. Surface soil exceedances were evaluated for on-site workers via dermal contact and incidental ingestion pathways. Subsurface soil exceedances were evaluated for construction workers via dermal contact, incidental ingestion, and particulate inhalation pathways, and for trespassers via the inhalation of volatiles pathway. For each receptor, non-cancer hazards were less than one and theoretical excess lifetime cancer risks were on the order of 10^{-5} or less. The RA/CP specified the remedial actions for the WL/DQ Area as required by the 1997 CO&A and described the four elements of post-remediation care: 1) annual visual inspections of the West Landfill for five years, 2) implementation of a soils management and worker protection program, 3) a notice of the environmental conditions of the area to be recorded on the deed for the WL/DQ Area, and 4) no post-remediation sampling would be performed. PADEP approved the RA/CP in September 1998.

In August 1999, ARCO submitted the Final Report for the WL/DQ Area. PADEP approved the Final Report in November 1999. The Final Report documented that the WL/DQ Area had attained the SSS for soils and groundwater. The Final Report also documented that ARCO had re-contoured and upgraded the cover on the West Landfill, in part by using soil from five soil piles that had been placed at the West Landfill and 2800 cubic yards of soil and material from a containment cell in the Central Plant Area; placed a layer of topsoil over the ground surface, and seeded disturbed areas to provide an effective and permanent vegetative cover. The Final Report noted that the WL/DQ Area may be subject to deed restrictions.

3. East Landfill Area

The East Landfill Area (EL Area) is approximately 54 acres located to the east of Raccoon Creek and a facility owned and operated by BASF. The EL Area was used until 1986 for the occasional disposal of waste polystyrene and expandable polystyrene beads, cleaning solutions containing less than 1% toluene, and calcium phosphate sludge generated during polystyrene production. The hydrogeology of this area is similar to the Raccoon Creek Area, with relatively impermeable bedrock forming an effective lower boundary for shallow groundwater, which primarily flows within the sand and gravel deposits varying in thickness from approximately 80 feet at the eastern side of the area to approximately 120 feet at the western side. The silt and clay layer overlying the sand and gravel may form an effective low-permeability zone beneath the disposal units in the EL Area. Depth to groundwater varies in this area from roughly 11 feet bgs near the Ohio River to more than 84 feet bgs near the southeast boundary.

ARCO submitted a Closure Assessment Report in September 1988 to assess the EL Area and document recent closure activities. Closure activities, including placement of soil cover over eight existing solid waste disposal units, were performed from 1982 to 1983 and 1986 to 1987. An unlined sanitary landfill covered approximately seven acres and contained two layers primarily of cardboard, wood pallets, and paper, in addition to polystyrene beads, polystyrene

board, demolition debris, plastic bags, scrap metal, assorted rubbish, and a small amount of food wastes. An unlined phosphate sludge landfill covered approximately 2.5 acres with a maximum depth of 37 feet and received waste from five phosphate sludge dewatering units, each approximately 0.5 acres, unlined, and 12 to 15 feet deep, which were used to dewater phosphate sludge from the wastewater treatment plant (located on an active portion of the Facility called the Over-the-hill Tank Farm Area) prior to the wastes being covered in-place or disposed in the unlined phosphate sludge landfill. An unlined latex landfill, approximately 1.5 acres in size and 14 feet deep, received liquid latex sludge from the wastewater treatment plant for dewatering and in-place disposal.

The Closure Assessment Report provided the following conclusions regarding the closure activities in the EL Area:

1. Soil placed on the eight disposal units met regulatory requirements;
2. Depth of cover at four of the five phosphate sludge dewatering units and the phosphate landfill was inadequate;
3. Cover soils appeared to be well-compacted;
4. Vegetative covers are adequate to meet regulatory requirements;
5. Burrowing animal activity was observed in one area and identified as a potential problem;
6. Erosion did not appear to be a problem in the EL Area;
7. Undesirable slightly concave cover soil conditions existed at some of the phosphate sludge dewatering units;
8. Surface water drainage was needed at the phosphate sludge and latex landfills;
9. The EL Area was readily accessible by roadway, which was identified as a potential liability; and
10. Gas venting and monitoring systems did not exist and might be required.

In August 1992 ARCO submitted a Preliminary Site Assessment (PSA) of the EL Area, which used soil gas sampling and geophysical investigations to identify areas of waste disposal, and the installation of soil borings and monitoring wells to perform sampling to characterize the nature and extent of contamination throughout the area. Primary contaminants identified in soil were benzene, toluene, ethylbenzene, and styrene, and were most prevalent within the former lagoon area in the southwestern corner of the EL Area, in the central portion of the area to the west of an old cemetery, and within the footprint of the sanitary and phosphate sludge landfills. Elevated semi-volatile contaminants also were detected in most of these areas within the EL Area; however, metals concentrations in the vicinity of the Facility did not appear to be significantly different from metals concentrations within known waste areas. In groundwater, metals concentrations met drinking water standards except for arsenic in one well screened within the phosphate sludge landfill. Primary contaminants in groundwater were benzene and toluene, with the highest concentrations occurring within the former lagoon; semi-volatile contaminants were also elevated within the former lagoon. The PSA Report noted a potential for off-site migration of contaminated groundwater to the east, possibly due to influence by high-volume production wells being used at industrial plants along the Ohio River.

The PSA Report offered several recommendations based on the assessment:

- Define the lateral extent of organic-contaminated fill via test borings and field screening;
- Install several monitoring wells along the eastern edge of the area to determine if volatile contaminants are present and could potentially impact off-site receptors;
- Install additional wells to define the lateral extent of the plume beneath the former lagoon;
- Install automatic water level recorders in three wells and the Ohio River to characterize water level fluctuations, including the influence of the river and off-site pumping wells;
- Obtain concurrent rounds of water level measurements from area well and adjacent areas (e.g., RC Area) to provide a larger perspective on groundwater flow characteristics;
- Conduct a supplemental round of groundwater sampling for volatile organics; and
- Investigate alluvial groundwater to the east of the EL Area.

In January 1998 ARCO submitted a RA/CP for the EL Area, with revisions submitted in May 1998. Arsenic was the only contaminant in area soils that exceeded SHS. Groundwater was not evaluated quantitatively since it is not used and no complete exposure pathway exists; however, groundwater transport was modeled to the eastern Facility property boundary due to the groundwater flow direction off-site to the east as a result of pumping wells on the neighboring property for manufacturing purposes and potable use. The model predicted that no constituents associated with the soil to groundwater to receptor pathway would reach the Facility's eastern property boundary at concentrations above applicable SHSs. Dermal contact and incidental ingestion pathways for soil were evaluated for the on-site worker, trespasser, and construction worker exposure scenarios, and the particulate inhalation pathway was evaluated for the construction worker exposure scenario. For each receptor, non-cancer hazards were less than 0.1 and theoretical excess lifetime cancer risks were on the order of 10^{-6} or less.

ARCO submitted a Final Report for the EL Area in December 1998 documenting that the EL Area had attained the applicable groundwater and soil SSSs. The Final Report stated that an inspection of the EL Area was performed on September 23, 1998, and did not indicate any signs of erosion or subsidence. The Final Report also documented the following requirements for post-remediation care: 1) annual visual inspections of the East Landfill for five years starting with the September 1998 inspection, 2) implementation of a soils management and worker protection program, 3) a notice of the environmental conditions of the EL Area be recorded on the deed for the Facility property.

In discussions with EPA and PADEP, a prospective purchaser of the area offered to sample available wells in the EL Area in March 2014 to confirm that remaining groundwater contamination in this area is stable or decreasing. Sampling results showed that no volatile or semi-volatile contaminants exceeded MCLs. Total concentrations of chromium exceeded the MCL, and total concentrations of aluminum and iron exceeded EPA's Secondary Drinking Water Standards; however, dissolved concentrations of these constituents were all below appropriate standards. These results suggest that contamination remaining in the EL Area is stable and that the primary contaminants in the area (benzene and toluene) have not migrated further to the east or off-site.

4. Phthalic Anhydride Area

The Phthalic Anhydride Area (PA Area) is roughly four acres in size and located in the eastern portion of the Facility. The Phthalic Anhydride Plant was constructed in 1945 and produced phthalic anhydride from naphthalene until 1962. Originally, mercury was used as the heat transfer medium, but was later replaced with a mixture of diphenyl and diphenyl oxide. Between 1967 and 1975, all aboveground plant structures and equipment in the PA area were removed; the office building and warehouse were removed in 1980 and 1987, respectively. The hydrogeology of the PA Area is largely identical to the EL Area, except that depth to groundwater is more uniform (approximately 70 feet bgs).

In December 1989, ARCO submitted an Environmental Site Assessment of the PA Area. Semi-volatile contaminants and some metals, particularly mercury, were detected at elevated concentrations in surface soils; some metals were also elevated in subsurface soils and groundwater samples. The risk assessment identified dermal contact and incidental ingestion of area soils and ingestion of groundwater as the major contributors to potential human health risks, with receptors of concern identified as on-site workers, construction workers, off-site users of groundwater, and aquatic biota in the Ohio River. Carcinogenic risks were all below levels of concern. Mercury in soil drove an unacceptable non-cancer risk to on-site workers, and although groundwater was not used as a potable source on-site, groundwater was recommended to be restricted to ensure that an unacceptable non-cancer risk due to potable groundwater use on-site would not occur.

ARCO submitted a Final Report (PA Final Report) in December 1997. The PA Area Report screened all media against SHS and showed that only mercury exceeded its SHS in soils. Soils containing mercury in concentrations above the SHS were removed in November 1997. The contaminated soils were segregated and disposed of off-site; confirmatory sampling demonstrated that soils remaining in the PA Area did not exceed SHSs, and the excavation was backfilled with clean fill, regraded, seeded, and mulched. The PA Final Report also modeled soil and groundwater contributions to Ohio River surface water; the model suggested that no exceedances of water quality criteria would result from the contamination remaining in the area. PADEP approved the Final Report in June 1998, granting relief of liability for soils.

Section 4: Corrective Action Objectives

A. Soils

Several soil cleanups have occurred under PADEP oversight. No significant exposure to remaining contaminants in soil occurs at the Inactive Portion because most of the remaining soil contamination exists at depths greater than 15 feet bgs; minimal operations are conducted in the Inactive Portion, and the Inactive Portion is fully fenced and patrolled by security personnel to deter trespassing. Therefore, EPA's Corrective Action Objectives for soil are to:

1) Prevent exposure to remaining contaminants in soil within the Inactive Portion where metals and volatile contaminant concentrations remain above Industrial RSLs, and
2) Establish inspection and maintenance requirements that ensure the long-term integrity of the covers over the disposal areas in the West Landfill Area, Raccoon Creek Area, and East Landfill Area.

B. Groundwater

EPA expects final remedies to return usable groundwater to its maximum beneficial use within a timeframe that is reasonable given the particular circumstances of the project. For facilities associated with aquifers that are either currently used for water supply or have the potential to be used for water supply, EPA will require the groundwater be remediated to National Primary Drinking Water Standard Maximum Contaminant Levels (MCLs) promulgated pursuant to Section 42 U.S.C. §§ 300f et seq. of the Safe Drinking Water Act and codified at 40 C.F.R. Part 141, or to EPA Regional Screening Levels (RSLs) for tap water for chemicals for which there are no applicable MCLs.

Since it has been demonstrated that contaminant concentrations remaining in groundwater beneath the Inactive Portion are not migrating off-site or impacting surface water above ambient water quality criteria, and both contaminant concentrations and the impacted areas beneath the Inactive Portion are stable or decreasing, EPA expects that natural attenuation processes will restore the remaining impacted portion of the aquifer outside of the former disposal areas within a reasonable timeframe. Groundwater beneath the Inactive Portion is not currently used as a drinking water source, nor is it anticipated to be used for drinking water in the future. Any other exposures to contaminated groundwater are unlikely due to the depth to groundwater (typically greater than 15 feet), which precludes exposure from construction or trenching/intrusive operations, and the flow rate and elevation control of the Ohio River, both of which serve to limit the impact of any contaminated groundwater discharging to surface water.

Because some contaminant concentrations remain in the groundwater beneath the Inactive Portion above their respective MCLs, the corrective action objectives for groundwater are to:

1) Control exposure to the hazardous constituents remaining in groundwater beneath the former disposal areas and within the RC Area until MCLs are met,
2) Protect Raccoon Creek from contaminant concentrations above PADEP Ambient Water

Quality Criteria, and

3) Monitor groundwater for increasing contaminant trends or off-site migration.

Section 5: Proposed Remedy

A. Soils

EPA's proposed remedy for soils within the Inactive Portion consists of the following components:

1) The Inactive Portion shall be restricted to commercial and/or industrial purposes and shall not be used for residential purposes unless it is demonstrated to EPA that such use will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy and the owner(s) of the Inactive Portion provides prior written approval from EPA for such use.

2) Any intrusive operations conducted within the Inactive Portion shall be conducted in accordance with the PADEP-approved soils management and worker protection program, which will be outlined in a Post-Remediation Care Plan (PRCP) to be approved by EPA.

3) Any excavation or disturbance of soil in the former disposal areas within the East Landfill Area, West Landfill Area, and Raccoon Creek Area is prohibited without prior written notice to, and prior written approval by, PADEP and EPA.

4) The integrity of the covers over the former disposal areas within the East Landfill Area, Raccoon Creek Area, and West Landfill Area shall be maintained.

B. Groundwater

EPA's proposed remedy for groundwater beneath the Inactive Portion consists of monitored natural attenuation until MCLs are met or until EPA approves cessation of monitoring and the establishment of a groundwater monitoring program for the former disposal areas within the RC Area, WL/DQ Area, and EL Area; compliance with a PRCP; and a restriction on groundwater use so that groundwater shall not be used for any purpose other than to conduct the operation, maintenance, and monitoring activities required by EPA, unless it is a) demonstrated to EPA that such use will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy, and b) EPA provides prior written approval for such use. The PRCP, to be submitted to EPA for review and approval, shall include, at a minimum, groundwater monitoring of a frequency and duration to ensure that remaining BTEXS contamination remains stable or decreasing in both location and concentration.

C. Subsurface Vapor

EPA's proposed remedy for subsurface vapor beneath the Inactive Portion requires that any building or structure that is constructed in the future within the Inactive Portion and that will be occupied, be evaluated for the potential for vapor intrusion into such a building or structure prior to the building or structure being constructed, and additional remedial measures, as necessary, shall be performed to mitigate unacceptable risks associated with vapor intrusion into the

building or structure.

D. Additional Requirements

1) On an annual basis and when requested by PADEP or EPA, submit a written certification of compliance with all terms of the Final Remedy selected by EPA for the Inactive Portion

2) Within one month after any of the following events, require the then current owner to submit written documentation to PADEP and EPA describing any:

- observed noncompliance with land and groundwater use restrictions,
- transfer of ownership,
- change in land use,
- application for building permits, and
- proposed site work that could affect the effectiveness of the Final Remedy.

3) Prohibit any use of the Inactive Portion that would adversely affect the protectiveness of the Final Remedy.

3) EPA will require the owner(s) of the Inactive Portion to include a coordinate and metes and bounds survey of the Facility boundary in the enforceable mechanism which implements the Final Remedy. At a minimum, the coordinate survey would be in a form amenable to publicly accessible mapping programs (e.g., Google Earth® or Google Maps®) and include boundaries of each area under a use restriction defined as polygons using the World Geodetic System (WGS) 1984 datum, with the latitude and longitude of each polygon vertex in decimal degrees format to at least seven decimal places and a negative sign used for west longitude.

Implementation

EPA proposes that the Final Remedy for the Inactive Portion be implemented through an enforceable mechanism such as a permit, order, or an Environmental Covenant. If an Environmental Covenant is selected as the enforceable mechanism, it will be recorded in the chain of title for the Inactive Portion of the Facility property pursuant to the Pennsylvania Uniform Environmental Covenants Act.

Section 6: Evaluation of Proposed Remedy

This section provides a description of the criteria EPA used to evaluate the proposed remedy consistent with EPA guidance. The criteria are applied in two phases. In the first phase, EPA evaluates three decision threshold criteria as general goals. In the second phase, for those remedies which meet the threshold criteria, EPA then evaluates seven balancing criteria.

Threshold Criteria	Evaluation
1) Protect human health and the environment	EPA's proposed remedy for the Inactive Portion protects human health and the environment by eliminating, reducing, or controlling potential unacceptable risks through the implementation and maintenance of use restrictions. EPA is proposing to restrict land use to commercial or industrial purposes at the Inactive Portion. Remaining soil contamination within the Inactive Portion is primarily deep within the subsurface (>15' bgs) or within the footprint of former disposal areas, and any residential exposures to soils within the Inactive Portion are prohibited through land use restrictions. Worker exposures to contaminated soil are expected to be insignificant due to minimal operations being conducted outdoors in areas of exposed soil; construction/utility worker exposures are expected to be minimal due to the depth to contamination but are also controlled through appropriate health and safety procedures as outlined in the EPA-approved PRCP. No exposures to contaminated groundwater exist due to the prohibition of its use, the depth to groundwater which makes it unlikely for construction/utility workers to encounter contaminated groundwater during any excavation activities, and its discharge to surface water not exceeding ambient water quality criteria.
2) Achieve media cleanup objectives	EPA's proposed remedy meets the media cleanup objectives based on assumptions regarding current and reasonably anticipated land and water resource use(s). The remedy proposed in this SB is based on the current and future anticipated land use at the Inactive Portion as commercial or industrial. The Inactive Portion of the Facility achieved the appropriate Statewide Health or Site-Specific Standards in all areas under Pennsylvania's Act 2 program by 2001. More recent sampling requested by EPA has confirmed that contaminant concentrations in groundwater beneath the Inactive Portion have continued to decrease or are stable. Exposures to remaining subsurface soil and groundwater contamination are adequately controlled through land use restrictions.

3) Remediating the Source of Releases	In all proposed remedies, EPA seeks to eliminate or reduce further releases of hazardous wastes and hazardous constituents that may pose a threat to human health and the environment. The Inactive Portion of the Facility has met this objective, to the extent feasible, by removing mercury contamination in the PA Area, and by closing and capping disposal areas in the WL/DQ Area, RC Area, and EL Area. Therefore, EPA has determined that this criterion has been met.

Balancing Criteria	Evaluation
4) Long-term effectiveness	The long-term effectiveness of the proposed remedy for the Inactive Portion will be maintained by the continuation of monitoring and maintenance of disposal area covers throughout the Inactive Area, appropriate soil management procedures, adherence to the PRCP, and the implementation of use restrictions.
5) Reduction of toxicity, mobility, or volume of the Hazardous Constituents	The reduction of toxicity of the volatile contaminants remaining in soil and groundwater beneath the Inactive Portion has primarily occurred (and continues to occur) through natural attenuation processes that serve to degrade these contaminants to non-toxic or less toxic constituents. Mercury-contaminated soil was removed from the PA Area, further reducing the volume of hazardous constituents within the Facility.
6) Short-term effectiveness	EPA's proposed remedy does not involve any activities such as construction or excavation that would pose short-term risks to workers, residents, and/or the environment. EPA anticipates that the land use restrictions will be fully implemented shortly after the issuance of the Final Decision and Response to Comments.
7) Implementability	EPA's proposed remedy is readily implementable. EPA proposes to implement the use restrictions through an enforceable mechanism such as an Environmental Covenant, permit or order.
8) Cost	EPA's proposed remedy is cost effective. Most of the costs associated with this proposed remedy have already been incurred and the remaining costs to implement an enforceable mechanism are minimal.
9) Community Acceptance	EPA will evaluate community acceptance of the proposed remedy during the public comment period, and it will be described in the Final Decision and Response to Comments.
10) State/Support Agency Acceptance	PADEP has reviewed and concurred with the proposed remedy for the Inactive Portion.

Section 7: Financial Assurance

EPA has evaluated whether financial assurance for corrective action is necessary to implement EPA's proposed remedy at the Inactive Portion. Given that EPA's proposed remedy does not require any further engineering actions to remediate soil, groundwater or indoor air contamination at this time, and given that the costs of implementing institutional controls and a groundwater monitoring program at the Inactive Portion will be minimal, EPA is proposing that no financial assurance is required.

Section 8: Public Participation

Interested persons are invited to comment on EPA's proposed remedy. The public comment period will last thirty (30) calendar days from the date that notice is published in a local newspaper. Comments may be submitted by mail, fax, or electronic mail to Mr. Griff Miller at the contact information listed below.

A public meeting may be held upon request. Requests for a public meeting should be submitted to Mr. Miller in writing at the contact information listed below. A meeting will not be scheduled unless one is requested.

The Administrative Record contains all the information considered by EPA for the proposed remedy at this Facility. The Administrative Record is available at the following location:

U.S. EPA Region III
1650 Arch Street
Philadelphia, PA 19103
Contact: Mr. Griff Miller (3LC20)
Phone: (215) 814-3407
Fax: (215) 814 - 3113
Email: miller.griff@epa.gov

Attachments:
Figure 1: Location Map
Figure 2: Facility Diagram

Date: _____ _____

John A. Armstead, Director
Land and Chemicals Division
US EPA, Region III

Section 9: Index to Administrative Record

Closure Assessment Report of the East Landfill Site, prepared by Baker/TSA, September 1988.

Site Assessment – West Landfill, prepared by IT Corporation, February 1989.

Environmental Site Assessment – ARCO-East Parcel, prepared by IT Corporation, December 1989.

Remedial Investigation/Feasibility Study – Raccoon Creek Area, prepared by Applied Hydrology Associates, February 1990.

Preliminary Site Assessment of the East Landfill Area, prepared by Wehran Engineering Corporation, August 1992.

Consent Order and Agreement between Commonwealth of Pennsylvania Department of Environmental Protection and Arco Chemical Company Beazer East, Inc., October 1997.

Final Report – Phthalic Anhydride Area, prepared by ICF Kaiser, December 1997; revisions May 1998.

Risk Assessment and Cleanup Plan – East Landfill Area, prepared by ICF Kaiser, January 1998; revisions May 1998.

Risk Assessment and Cleanup Plan – West Landfill and Quarry Area, prepared by ICF Kaiser, January 1998.

Risk Assessment and Cleanup Plan – Raccoon Creek Area, prepared by ICF Kaiser, February 1998; revisions June and September 1998.

Final Report – East Landfill Area, prepared by David S. Smallwood and Associates, December 1998.

Final Report – Raccoon Creek Area, prepared by David S. Smallwood and Associates, December 1998.

Final Report – West Landfill and Quarry Area, prepared by David S. Smallwood and Associates, August 1999.

Final Environmental Indicator Inspection Report for Nova Chemical, prepared by Foster Wheeler, June 2003.

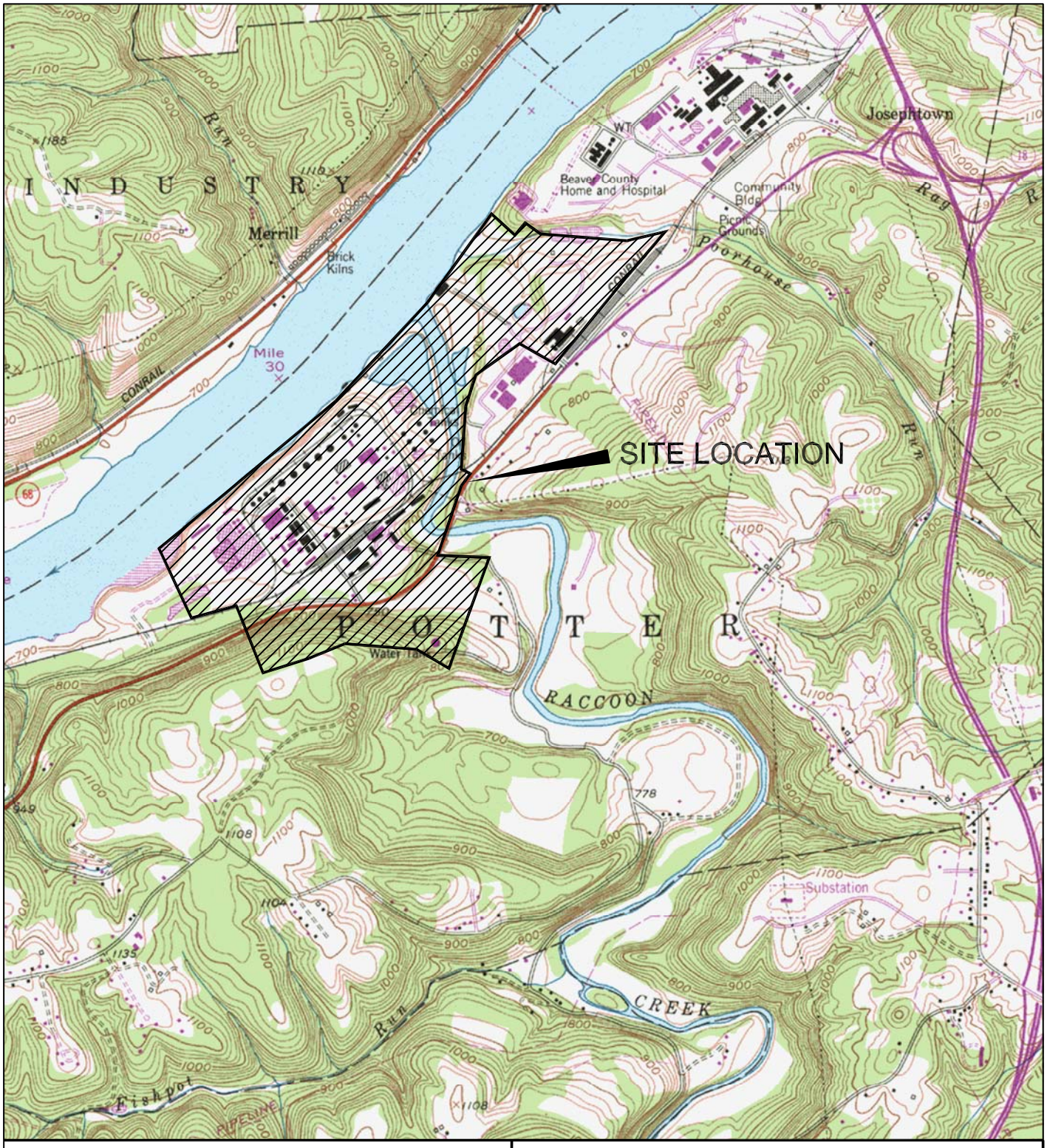
Raccoon Creek Groundwater Sampling Report, prepared by Tetra Tech, January 2016.

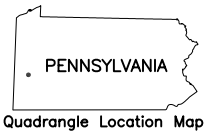
Raccoon Creek Groundwater Sampling Report – Second Quarter 2016, prepared by Tetra Tech,

August 2016.

Raccoon Creek Groundwater, Surface Water, and Sediment Sampling Report – Third Quarter 2016, prepared by Tetra Tech, October 2016.

Raccoon Creek Groundwater Sampling Report – Fourth Quarter 2016, prepared by Tetra Tech, February 2017.





Quadrangle Location Map

0 2000 4000 Feet

N

Source: U.S.G.S. Topographic Maps (7.5 Minute)
Beaver, PA

Commonwealth of Pennsylvania
Department of Environmental Protection

Nova Chemical (aka Nova Chemical Cattwo,
Beaver Valley Plant, formerly ARCO Chemical)

Figure 1
Site Location Map

FOSTER WHEELER ENVIRONMENTAL CORPORATION

site investigations_2002\NOVA Chemical\Nova_siteloc.dwg

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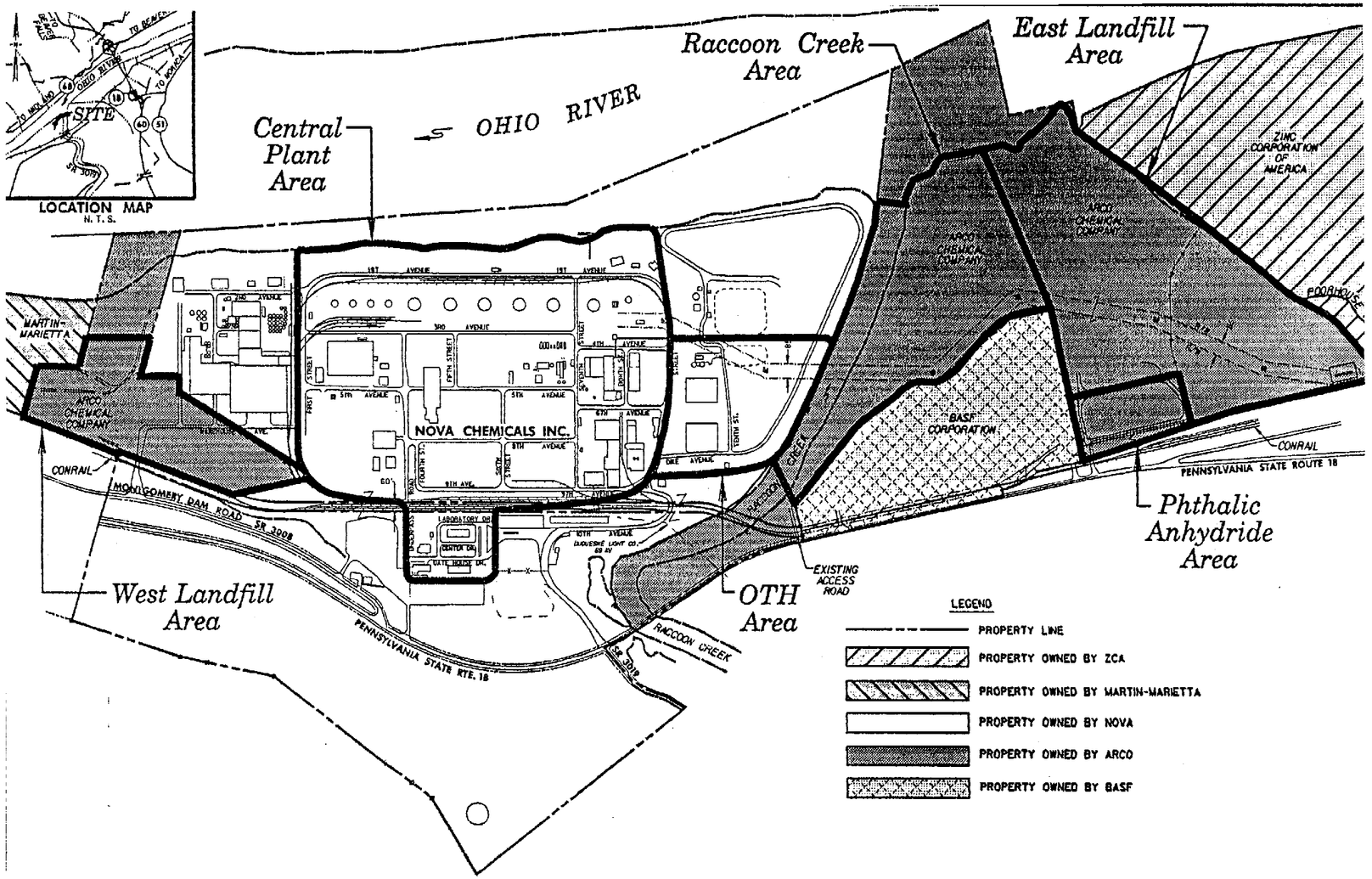

SOURCE:
BAKER ENGINEERS AND SURVEYORS,
BEAVER, PENNSYLVANIA
FIGURE: 1–1, "MAP SHOWING THE SIX AREAS OF ENVIRONMENTAL CONCERN, AND THE PROPERTIES OF ARCO CHEMICAL AND NOVA CHEMICALS INC",
DATE: 9/22/98,

Commonwealth of Pennsylvania
Department of Environmental Protection

NOVA Chemical
Monaca, Pennsylvania

Figure 2
Six Areas of Concern That
Underwent PADEP Act 2 Closure

FOSTER WHEELER ENVIRONMENTAL CORPORATION

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