COMMONWEALTH OF PENNSYLVANIA

Department of Environmental Protection
Hazardous Sites Cleanup Program

UGI Columbia Gas Plant Site
Columbia Borough, Lancaster County

Holder Tank Interim Actions

SDMS DocID 2079894

July 17, 1995

STATEMENT OF DECISION

The Commonwealth of Pennsylvania, Department of Environmental Protection ("DEP") files this statement of the basis and purpose of its decision in accordance with Section 506(e) of the Pennsylvania Hazardous Sites Cleanup Act, Act of October 18, 1988, P.L. 756 No. 108 ("HSCA"), 35 P.S. Section 6020.506(e).

The selected action for the relief holder is enhanced product recovery and the selected action for the gas holder is pumping. These removal actions have been chosen by comparative analysis of the four potential remedy options.

Because the surrounding aquifer is the primary migration pathway for dissolved phase contaminants, and because tar has migrated from the holders into fractured bedrock, the objective of the site Interim Action will be to eliminate the migration of hazardous constituents from the former holders into the surrounding aquifer. The contaminants within the holders are a potential source of groundwater contamination. Therefore, the scope of the Interim Action should include removing and/or stabilizing these contaminants. By accomplishing this specific objective, the general objective to mitigate the endangerment to the public health, welfare, and the environment will be accomplished. In addition, this remediation should reduce the toxicity, mobility, and volume of coal tar.

I. SITE INFORMATION

The Department makes the following finding of fact based upon the information contained within the administrative record compiled for this response.

A. Site History and Description

The UGI Columbia Gas Plant Site is located along Front Street in the Borough of Columbia, Lancaster County, Pennsylvania. The property encompasses approximately 1.6 acres, and is enclosed by a chain-link fence. The site can be located on the United States Geological Survey (U.S.G.S.) Columbia East, Pennsylvania 7.5 minute series quadrangle at 40° 01' 37" north latitude and 76° 30' 01" west longitude or 0.05 inch east and 4.9 inches north of the southwestern corner of the quadrangle.

The site was operated as a gas manufacturing facility from approximately 1853 to 1948. Prior reports indicate the Columbia Gas Company, which was organized in 1851, was the first to operate the site as a gas manufacturing facility. The property was owned and operated by Columbia Gas until 1935, when the property was transferred to the Pennsylvania Power and Light Company (PP&L). Then, in 1949, the property was transferred to the Lancaster County Gas Company, which later merged into UGI Corporation. Thomas Crouse purchased a portion of the property in 1976 from UGI Corporation. In October 1979, George Roach purchased two-thirds of the property from UGI and began operating the site as a boat dealership. The site was repurchased by PP&L on January 27, 1994.

Previous investigations indicate that manufactured gas was originally generated from wood. These investigations also indicate that there is no other information concerning operations at the site prior to 1910. The manufactured gas process began with the transport of gas from two gas generating sets through a washbox, condenser, washer cooler, and stored in a relief holder. From the relief holder, the gas proceeded through a tar separator, a purifier, and was finally distributed to a holder for distribution to the city.

The handling practices for the manufacturing gas process are of particular interest. These practices include the handling of three major waste streams: tars, boiler ash, and purifier wastes. The tar separator received liquids produced during the manufacturing process. The liquids originated from the washer-coolers, the drip pumps, and the overflows from the gas holder water seal. Tars were pumped to the relief holder pit and stored to allow for separation of the tar/water emulsion. After separation, the tar was pumped to oil tanks for storage. The water levels in the tar separator did not usually pose a problem in the summer months due to adequate evaporation. However, during the winter months of heavy precipitation, overflows occurred and discharged directly into an open ditch that led to the Susquehanna

River. Records indicate that local fishermen complained to the plant that their boats were being covered with tar.

A site layout map of the plant, dated 1935, revealed the structures present during operation. They include the following: 60 foot diameter relief holder; 40 foot diameter gas holder; oil tank; cooler tank; tar separator; tar tanks; meter house; boiler and generating house; brick room; and purifier house.

The gas holder, also known as the city or distribution holder pit, was located near the center of the property, east of the larger of the two on-site buildings. The gas holder was used to store gas prior to distribution. The 40 foot diameter structure was a brick-lined cylindrical pit with a concrete base. A boring drilled in 1985 revealed that the pit contained tar-coated fill material to a depth of approximately 17 feet. The concrete base was found to be fractured. A test pit dug near the wall of the pit indicated that tars were leaking from the wall into the test pit.

A more extensive investigation of the gas and relief holders was performed in December 1993 by Remediation Technologies, Inc. to determine the contents of both the gas and relief holders. The relief holder was constructed of riveted steel plates and was contained within a pit that was approximately 26 feet deep. Tars were stored inside the relief holder during the plant's operation to allow for the separation of tar/water emulsion. In 1947, the relief holder had a structural failure. However, the relief pit remained in use as a separator. Tar of good quality was sold and the remaining tar was left in the pit.

Once operation of the plant ceased, the pit was filled with general refuse, construction fill, and soil. After Mr. Roach purchased the property in October 1979, he observed tar oozing up through the parking lot area, which subsequently resulted in the regrading of the property. The former relief holder foundation was found to be filled with refuse, construction debris, and fill.

During regrading of soils on the site, tars within the relief holder were displaced and reportedly released to the surface soils in the immediate area. The tars were then forced into a former pedestrian tunnel/underpass located on the property and enclosed within the underpass through the construction of a small dike. The total volume of tar contained within the tunnel was estimated at 7,500 gallons during the 1985 site investigation.

Currently, there are two unoccupied buildings on the property. Two concrete pads, one 45 by 45 feet and one 65 by 65 feet, are located southeast of the buildings. These pads cover the former gas and relief holders respectively. Conrail railroad tracks run adjacent to the site on the northeastern side. There was a pedestrian tunnel which passes under the railroad tracks. The former pedestrian tunnel has since been blocked off at the eastern end due to the expansion of the railroad track. The remainder of the site is covered with gravel.

The UGI Corporation filed a Notification of Hazardous Waste Site Form with the EPA for the Columbia Gas Plant Site on June 9, 1982. UGI was uncertain of the former practices of the gas manufacturing facility or the nature of the waste at the site. The company filed with the EPA as a precautionary measure. On August 14, 1984, the Pennsylvania Department of Environmental Protection (PADEP) initiated a preliminary assessment of the UGI Columbia Gas Plant Site. During the assessment coal tar that was moved to the former pedestrian tunnel was found.

PP&L agreed to fund a site investigation along with UGI Corporation on December 7, 1984. The purpose of the site investigation was to determine the nature and extent of contamination.

In 1985, TRC Environmental Consultants, Inc. was hired by PP&L and UGI Corporation to perform an extensive field investigation of the property. These investigations included the construction of nine monitoring wells, test pits, and borings to determine the extent of contamination on and around the site. Also, seismic refraction surveys were performed to delineate fracture zones in the bedrock.

The site investigation conducted by TRC led to a removal action in 1987, which included the recovery of the materials in the tunnel area and the capping of the gas and relief holders. The sludge and soils from the pedestrian tunnel were removed and the tunnel walls steam cleaned. An eight-inch cement floor was constructed near the entrance of the tunnel. The closure, of both the relief and gas holders, was performed by means of concrete slabs. This was done to prevent dermal contact and inhalation exposure to the holder contents. One leak was found during the closure of the two holders and was plugged with Bentonite. An unknown amount of coal tar remained in the holders.

A second investigation was commissioned by PP&L in 1987 to determine the extent of coal tar contamination in the Susquehanna River. The investigation concluded that approximately 800 cubic yards of Susquehanna River sediment southwest of the site were contaminated with coal tar. The contamination is potentially attributed to a pipe found in the river bank which originates from the site.

On August 18, 1988, the NUS Corporation performed a non-sampling site reconnaissance of the Columbia Gas Plant Site. The information obtained during this study can be found in a report entitled "Non-sampling Site Reconnaissance Summary Report, UGI (PP&L) Columbia Gas Plant Site", dated November 3, 1988. In addition, the NUS Corporation completed a site inspection report in July 1989 using available information for the subject site.

In 1991, the NUS Corporation performed an expanded site inspection of the Columbia Gas Plant Site. The inspection characterized and evaluated the potential risk associated with a hazardous waste control problem at the site. This investigation characterized an unacceptable risk to groundwater and water supplies resulting from tars in the relief and gas holders at the site. Tars have migrated from the holders resulting in soil contamination and bedrock contamination. Subsequently, groundwater has come in contact with tars and contains dissolved constituents.

In 1993 Halliburton NUS performed a hazardous ranking system for the site recommending the site for listing on the NPL. PP&L subsequently retained Remediation Technologies, Inc. to evaluate a removal action of the holders. This led Remediation Technologies, Inc. to perform an investigation of the gas holder at the Columbia Gas Plant Site. In December 1993, three borings were drilled into the holder in order to determine its contents.

On June 23, 1993, EPA proposed the Site for listing on the National Priority List (NPL), and on May 31, 1994 the site was listed on the NPL.

Regulatory action that has taken place at the site includes numerous inspections by personnel from the PADEP. The PADEP has overseen and approved the remedial action that has taken place on the site, monitoring of the site, and studies and investigations into the contamination of the site.

B. Release of Hazardous Substances

Based on the operational history of the site, the former gas and relief holders were identified as sources of contamination. Subsurface samples taken in and around the holders show elevated levels of some semi-volatile organic compounds including the polynuclear aromatic hydrocarbons (PAHs) including benzo (a) pyrene, and volatile organic compounds including benzene, ethylbenzene and toluene. The highest detected concentration in the former gas holder, was 1,320 mg/kg for naphthalene, which was also found at elevated levels in the groundwater near the holder. The contaminants of concern (COCs) include: 16 PAHs, 4 volatile organic compounds, one inorganic compound (cyanide), and 2 other semi-volatile organic compounds.

C. Response Category

The proposed response to address the holder tanks will be conducted as an Interim Response. This action will be implemented under the Hazardous Sites Cleanup Act and comply with the requirements set forth in the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), as amended, 42 U.S.C. §§ 9601 et seq., and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.R.F. Part 300. The response action will be implemented to eliminate the migration of hazardous substances from the holder tanks to groundwater and soils. This action will cost less then $2,000,000 and take less than 1 year to complete.

II. ANALYSIS OF ALTERNATIVES

This proposed response is not a final remedial response pursuant to Section 504 of the Hazardous Sites Cleanup Act or Section 300.430 or 300.435 of the NCP, 40 CFR §§ 300.430 or 300.435 and therefore is not required to meet the cleanup standards which apply to final remedial responses. The scope of the response action is limited to migration of hazardous waste from the holders. Further response action may be needed to achieve a complete, permanent, and final cleanup for the site.

Applicable, Relevant and Appropriate Requirements

This section of the document presents a preliminary review of Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) for the interim action at the site. For the purposes of this analysis, ARARs have been grouped into three categories: contaminant-specific, location-specific, and action-specific.

The scope of the interim action for this project will be limited to the contents of the former gas holders. Therefore, potential ARARs will include the State's Solid Waste Management Regulations and Air Quality Control Regulations. Because aquifer remediation is not part of the immediate scope, most groundwater regulations are not potential ARARs. However, waste water disposal may be a component of the selected remedy, therefore waste water disposal or discharge regulations may be considered potential ARARs. If process water is to be discharged to a public sanitary waste water system or a Publicly Owned Treatment Works then many of the State's Water Quality Management Regulations will be potential ARARs.

Chemical Specific ARARs

Air Quality Article VII, Chapter 123, 25 PA Code § 123.1 et. seq.: This chapter on "Standards for Contaminants" sets forth requirements for fugitive emissions, including open burning and demolition activities, and specifies limitations for particulate matter, sulfur dioxide, odor, and visible emissions.

Article VII, Chapter 131, 25 PA Code § 131.1 et. seq.: This chapter on "Ambient Air Quality Standards" adopts ambient air quality standards plus sets forth additional State standards for settled particulate, beryllium, sulfates, fluorides, and hydrogen sulfide.

Article VII, Chapter 135, 25 PA Code § 135.1 et. seq.: This chapter on "Reporting of sources" requires the submission of data necessary for the identification and quantification of potential and actual air contaminant emissions.

Article VII, Chapter 141, 25 PA Code § 141.1 et. seq.: This chapter on "Variances and Alternative Standards" establishes that the Department may impose more stringent standards that set forth in other Bureau of Air Quality regulations, where 1) the standard is related to achieving ambient air quality standards, 2) the standard can be achieved through BAT, or 3) the standard is necessary to protect the public health, safety and welfare.

To the extent that new point source emissions result from the implementation of the selected remedy, 25 PA Code § 127.12 (a)(5) will apply requiring that emissions be reduced to the minimum obtainable levels through the use of best available technology (BAT), as defined in 25 PA Code Section 121.1.

The Department's major source of standards and requirements governing air quality are found under the Air Pollution Control Act, Act of January 8, 1960, P.L. 2119, 35 P.S. § 4001, et. seq. (Statutory Authority)

National Emissions Standard for Hazardous Air Pollutants (NESHAPs) set forth in 40 CFR Part 61.64(b) and promulgated under the Clean Air Act, 42 U.S.C. § 7401, contain emissions standards for fugitive leaks from equipment containing greater than or equal to 10% benzene.

Water Quality Article VII, Chapter 91, 25 PA Code § 91.1 et. seq.: This chapter sets forth general provisions for administration and enforcement of Pennsylvania's Water Pollution Control Program, and establishes specific application requirements and conditions for the approval and permitting of the construction and operation of waste treatment projects.

Article VII, Chapter 92, 25 PA Code § 92.1 et. seq.: This chapter sets forth provisions for the administration of the National Pollutant Discharge Elimination System (NPDES) Program within Pennsylvania, and establishes criteria for the content of NPDES permit applications, effluent standards, monitoring requirements, standard permit conditions, public notification procedures, and other requirements related to the NPDES Program.

Article VII, Chapter 93, 25 PA Code § 93.1 et. seq.: This chapter sets forth general and specific standards for the quality of Pennsylvania's waters and includes specific water quality criteria and designated water use protection for each stream in Pennsylvania. It is reviewed and updated, as necessary, at least once every three years. Section 93.8A establishes Chapter 16 regarding the toxics management strategy and statement of policy.

Article VII, Chapter 95, 25 PA Code § 95.1 et. seq.: This chapter sets forth water treatment requirements for all discharges including general requirements for "High Quality Waters" and "Exceptional Value Waters" and procedures for dealing with special circumstances, such as developing wasteload allocations, discharges to acid impregnated streams and discharges to lakes, ponds, and impoundments.

Article VII, Chapter 97, 25 PA Code § 97.1 et. seq.: This chapter sets forth specific provisions concerning the discharge of industrial waters to Pennsylvania waters.

Article VII, Chapter 101, 25 PA Code § 101.1 et. seq.: This chapter sets forth special provisions for incidence which would endanger downstream users of Pennsylvania waters, and specifies actions to be taken when such emergency incidence occur.

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The Federal Safe Drinking Water Act, including MCLs and non-zero MCLGs for the contaminants of concern.

Underground Injection Control Program regulations promulgated at 40 CFR 144-148 would regulate the underground injection of the selected remedy's treated process water into the subsurface soils.

Article VII, Chapter 109, 25 PA Code § 109.1 et. seq.: This chapter sets forth drinking water quality standards at least as stringent as federal standards: maximum contaminant levels (MCLs), and additional state requirements: secondary maximum contaminant levels (SMCLs) for public water systems including permit design and construction, source quality and siting requirements.

Pennsylvania Safe Drinking Water Act, Act of May 1, 1984, PL.206, 35 P.S. § 721.1 et. seq. (Statutory Authority).

Article VII, 25 PA Code, Chapters 260-266 and 270: These regulations apply to the identification and listing, generation, transportation, storage, treatment and disposal of hazardous waste. They also contain the requirements under the federal Resource, Conservation, and Recovery Act (RCRA) for a state to implement a federally-approved hazardous waste program.

Pennsylvania Solid Waste Management Regulations; Pennsylvania Code, Title 25 - Environmental Protection, Articles VII, VIII and IX.

Pennsylvania Solid Waste Resource Recovery Regulations; Pennsylvania Code, Title 25 - Environmental Protection, Chapter 283 Solid Waste - Resource Recovery Development.

Pennsylvania Worker and Community Right-To-Know Law; Pennsylvania Statute, Title 35 - Health and Safety, Chapter 41, PL 734.2.1.2.2

Location-Specific ARARs

PA SWMA, Act 97, 25 PA Code Chapters 269 and 288, and 25 PA Code 93.4, 93.7, 93.8(a), and Chapter 93, Section 93.9; and 25 PA Code Chapter 16: These regulations are potential ARARs for activities potentially affecting a stream or river.

PA SWMA, Act 97, Chapter 269: These regulations are potential ARARs for subsurface waste disposal activities over areas of coarse, unconsolidated deposits, including heavily fractured bedrock.

PA SWMA, Act 97, Chapter 269: These regulations are potential ARARs for the habitats of rare, threatened, or endangered species

Action-Specific

25 PA Code, Chapters 91 & 92 if the removal action includes discharge of treatment system effluent.

25 PA Code, Chapter 91 and PA SWMA, Act 97, Chapters 264 or 265 if the removal action includes the underground injection of wastes and treated groundwater.

PA SWMA, Act 97, Chapters 264 or 265 and 297 if the removal action includes waste stabilization.

PA SWMA, Act 97, Chapters 264 or 265 and 297, and APCA if the removal action includes activated carbon treatment of ground/surface water.

PA SWMA, Act 97, Chapters 261 and 266 if the removal action includes the recovery/reclamation of solvents or oils. The Action-Specific ARARs will be more precisely defined after the removal action is defined.

Pennsylvania Hazardous Substances Transportation Regulations, PA. Code Titles 13 & 15, and Pennsylvania Department of Transportation, Act of June 1, 1945 (P.L. 1242, No. 421) (36 P.S. Sections 670-411, 670-420 and 670-702).

Resource Conservation and Recovery Act requirements as set forth in 40 CFR 264.18 (b) for hazardous waste treatment storage and disposal facilities located within a 100 year floodplain. These requirements are applicable for actions that will occur in a floodplain and will be considered during the removal action.

40 CFR 6, Appendix A sets EPA policy for carrying out the provisions of Executive Order 11988 (Floodplain Management). These requirements are applicable for actions that will occur in a floodplain.

The Storm Water Management Act, Act of October 4, 1978, P.L. 864 No. 167, as amended, 32 P.S. § 680.1 - 680.17

The Flood Plain Management Act, Act of October 4, 1978, P.L. 551, No. 166, 32 P.S. § 679.101 et seq.

A. Alternative 1 - No Action With Monitoring

Description of the Alternative

A no action alternative is required for consideration by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and provides a baseline for comparing other alternatives. Long-term human health and environmental risks for this alternative would essentially be the same as those for a baseline risk assessment. A no action alternative is usually only considered in instances where contaminated materials are characterized by low mobility. Some form of monitoring will still be required with no action and will include groundwater, surface water, and air emissions monitoring; a site reassessment is also required on a regular basis. A no action alternative is named as such due to the fact that no contaminant removal actions will be taken. Precautionary measures are to be used with the no action alternative, but they do not in any way remove contaminated media or reduce the potential spread of contamination. Such a precautionary measure was taken by PP&L by capping the holders to prevent direct contact with the contents. Measures that will be taken in this action alternative include maintaining the existing fence to prevent human contact with contaminated materials and establishing deed restrictions on land to inhibit site access and prevent direct contact with the contents. The no action with monitoring alternative will not remove any of the contaminants.

Feasibility, Effectiveness, Implementability, Permanence

The short-term effectiveness is not applicable in the no action alternative because construction or field activities would not be implemented. However, since no action is being taken, no further exposure, particularly to workers will occur. Further exposure to the holder contents will be less for this alternative than any of the others considered, especially excavation.

The magnitude of remaining potential risks to public health in a no action alternative is relatively high because migration of groundwater containing site-related constituents may reach off-site locations. In the event of future off-site contaminant migration, an increased threat to human health and the environment would exist. Since migration of contamination is occurring now, through groundwater and coal tar movement, this problem will only worsen if no action is taken. This alternative does not provide for any reduction of the mobility or volume of contaminated media but does provide slow reduction of toxicity through attenuation. The no action alternative does not achieve any removal objectives nor does it maintain control of contaminants until a long-term solution is implemented. The no action alternative is easily implemented and is technically feasible.

Compliance with ARARs:

The no action alternative is not likely to comply with Solid Waste ARARs because significant quantities of contaminants will remain in place. It will not comply with Water Quality ARARs since there will be no reduction in mobility of the coal tar or coal tar constituents.

Cost:

Typical cost components for this alternative include institutional controls, maintaining the existing fence, and deed restrictions. Groundwater monitoring would be performed on an annual basis and comprises the majority of this alternatives cost. For the purpose of this analysis, it has been assumed that groundwater monitoring will consist of: installing four monitoring wells; collecting one sample per well, once per year, with one duplicate; performing PAH and BTEX analyses on each sample; one full day of labor per sampling round for sampling; one full day of labor per sampling round for reporting; travel costs; and purge water disposal. Total present worth of this alternative is $228,000.

B. Alternative 2 - Excavation

Description of the Alternative

For this alternative, the affected materials will be excavated and properly disposed of. Excavation of the holder contents will require a planned sequence for control of surface water and groundwater, segregation and containment of materials, stockpiling for treatment or disposition, and backfilling or regrading, all of which must be performed under appropriate health and safety guidelines.

Complete excavation will be used to remove the threat of continued site contamination. The excavation project will be accomplished using a variety of conventional and customized construction equipment. The following activities will be associated with the excavation process. Exclusion zone development, redirection of current work activities around the proposed excavation, and the development of water and air monitoring programs for the local community. Access development, such as roadways, ramps, staging areas, and decontamination areas. Preparation of stockpiling areas with containment features for excavated wastes and contaminated materials. Control of surface and groundwater from entering and leaving the excavation and exclusion zone. Excavation of materials at rates dependent on stockpile, treatment, or disposition capacity. Pretreatment of excavated materials to improve consistency or lower water content for improved stockpiling, treatment, or hauling characteristics. Treatment or disposition of excavated materials. Backfilling and regrading of excavated areas. Decontamination of adjacent areas and equipment.

Excavation activities may vary due to factors such as climate changes including heavy precipitation and freezing conditions. Other factors affecting activities include depth to groundwater, traffic, buildings, utility lines, and buried structures or debris.

Feasibility, Effectiveness, Implementability, Permanence

Excavation rates are highly variable, depending on the nature of site areas (confinement, subsurface conditions including groundwater or buried structures, contaminant levels, and climatic factors). Selection of backfill materials can affect performance of a remediation technology, and backfilling rates are usually affected by the same factors as excavation. Availabilities, costs and/or liabilities of secure disposal or treatment facilities must also be considered. Excavation will remove 100% of the contaminants.

During the implementation of Alternative 2, workers may be exposed to excavated materials and although measures will be taken to limit public exposure, the stockpiling of materials may pose a risk to the health of the public and community. At a minimum, the soil will be stockpiled on plastic to prevent contamination of clean topsoil. Daily, the stockpile will be covered with plastic to prevent runoff due to precipitation and to prevent air emissions. As with other alternatives, site remediation workers will be health and safety trained before construction activities begin. Excavation would remove the source contamination at the site and is generally effective at controlling current contamination levels, but may not affect continued migration of contaminants which remain on site. It is estimated that approximately three months will be required to implement the remedy.

The level of removal expected through the use of this alternative is much greater than alternative 1. In addition, source removal would minimize future potential risks associated with known contaminants. The sources of the remaining potential risks are contaminated soils and groundwater. However, the potential risk is less because the exposure pathway through which this risk would be realized (leaching of constituents to the groundwater) is ultimately controlled by the concentration of source materials. This alternative adequately addresses the principle potential threats at the site by preventing continued contamination of groundwater.

Standard construction equipment and practices will be used to implement this alternative. The technologies used as part of this alternative are proven and are expected to meet projected efficiencies and performance goals.

A potential difficulty that will be encountered is the close proximity of the holders to an active Conrail rail line embankment located less than 5 feet from the holders. Excavation activities next to this embankment would require extensive structural support and/or a shutdown of the rail line. In the case of the large holder, the foundation extends to bedrock, 26 feet below the surface. Excavation will therefore require digging to bedrock. To successfully brace sidewalls and the embankment, bracing should extend below the level of the excavation. In this case it would have to extend into bedrock.

Additionally, the structural integrity of the embankment may be questionable following excavation activities. It is also expected that Conrail will request a design review which may further delay the removal process. It is expected that the design to excavate these holders will be considerable and that many design reviews will be required. Because of the proximity of the rail line, this design/design review process could take several years before all parties are satisfied that adequate precautions have been taken.

A significant delay is expected with this alternative. Another problem associated with the excavation alternative is the lack of on-site surface area needed to stockpile excavated materials. One procedure that would eliminate on-site stockpiling, is the immediate transport of materials off-site for disposal. The costs associates with this form of materials handling are quite substantial and make this alternative more difficult to implement.

The lack of surface area for stockpiling pertains to the east half of the site, where the holders are located. The western half is currently used for business by a boat dealer. If necessary, the west half could be used for stockpiling. However, this may necessitate closing of the boat dealership. The boat dealer has stated that no other suitable site exists for his business in the community. In all likelihood, the boat dealer would be put out of business if this alternative is selected. If the boat dealer remains in the building adjacent to the site, strict health and safety measures will be established and followed during the removal action.

Compliance with ARARs

Compliance with ARARs will be achieved through excavation if the holder contents are transported and disposed of according to the state's solid or hazardous waste regulations. The water within the holders will also have to be treated and discharged or disposed of according to the state's Water Quality regulations. Compliance with Air Quality regulations is not expected to be problematic. However, engineering controls will most likely be required to control odors and quantify air quality. It is important to note, however, in some cases at Manufactured Gas Plant (MGP) sites excavations have been enclosed to prevent air quality problems and nuisance odors. This adds expense associated with the enclosure, the need for workers to work in Level B safety equipment, air treatment equipment since the enclosure needs venting and air permitting.

Cost

Excavation of the contaminants of this site will be very costly especially considering the support structures that are necessary for the railroad embankment. Included in these costs are bracing and shoring, water disposal, excavation, transportation and disposal of the excavated material, backfilling of the excavation, support services and engineering. Costs not included but which may be necessary include buying or relocating the boat dealership, enclosing the excavation and air treatment equipment. Lastly, should the rail line need to be closed during excavation, the costs would be prohibitively high. Total present worth of this alternative is $745,000.

C. Alternative 3 - Pumping

Description of the Alternative

Alternative 3 involves the pumping of flowable liquids, via wells, from the holders until all flowable liquids have been removed. Well systems typically consist of a cased borehole completed into groundwater zones to allow collection and pumping of water. Control and removal of groundwater can be effective, depending on the hydrologic characteristics of the media and the contaminants present. Both aqueous and non-aqueous phase liquid (NAPL) can be addressed with this technology. Typical well systems include: Suction wells, similar to well points but spaced at larger intervals with greater capacity due to dedicated suction pumps at each well. Deep wells with submersible pumps, capable of large flow rates and extensive influence and generally requiring large diameter boreholes. Well extraction systems are utilized to collect and remove contaminated groundwater and NAPL, and will be placed within each holder. At present, two wells exist, one within each holder. The performance of well extraction systems is influenced by the following: Uniformity (i.e., homogeneity and isotropy) of subsurface hydrogeologic characteristics and features that affect the extent and direction of influence of individual wells and the well system. Hydraulic conductivity, storativity, and transmissivity of the affected soils that control the flow rate and influence groundwater movement. Soil/contaminant interactions that retard migration of contaminants in water to the well.

Groundwater quality and water/contaminant interactions that affect the quality of pumped water and can cause precipitation and clogging of well systems. In this case, wells will be installed in the holders and the contents will be pumped until flowable liquids are removed. It is anticipated that three wells will be required. The water and any NAPL removed will require disposal which could be accomplished with an on-site treatment system or could be introduced into the sanitary sewer system if a discharge permit can be obtained.

After the pumping process has been completed, a flowable fill will be injected into the holder for stabilization. The flowable fill will be a blend of cement, fly ash, aggregate and water. The flowable fill will be injected into the holders under pressure and will cure within one day. This action will solidify the remaining materials thus removing the potential for future migration of groundwater through the holder. Several locations in the holder will be used for injection of grout. Upon completion of the grouting and curing of the grout, a core will be removed and tested for uncompressive strength and TCLP of volatile organics to ensure the effectiveness of the solidification.

Feasibility, Effectiveness, Implementability, Permanence

Alternative 3 presents a removal strategy that will effectively remove flowable liquids from the holders. The problem with this alternative is that the relief holder on the site contains large amounts of dense non-aqueous phase liquid (DNAPL), which has a greater viscosity than is characteristic of flowable liquids. This is based on the measured results from a DNAPL sample in the relief holder. The pumping alternative would not adequately achieve removal objectives for the relief holder.

Alternative 3 would be effective for the gas holder, which does not contain free flowing DNAPL or a noticeable floating or sinking hydrocarbon fraction. Therefore, the remainder of this discussion will concentrate on the application of this alternative to only the gas holder. It is uncertain on the amount of contaminants that would be removed with this method. Data is not currently available which may indicate the level of remaining hydrocarbon concentrations within the soil following pumping. Data of this sort would be difficult to obtain given the heterogeneity of the holder's contents. It is for these reasons that stabilization has been included as a follow-up to liquid removal. However, significant quantities of DNAPL are not expected.

Pumping of the gas holder is effective at controlling current contaminant levels and removing the threat of continued site contamination. Pumping would not, however, control contaminant levels in the relief holder or remove the threat of continued site contamination. Short-term off-site effects of this alternative would be minimal or non-existent. Exposure to contamination is possible during the construction and implementation of this alternative and workers exposed to soil and groundwater during drilling activities would be protected through the use of adequate health and safety protocols. It is estimated that approximately three months will be required to implement the remedy.

The long-term objectives of remediation for the gas holder should be met with this remedy. Contaminated water and any flowable DNAPL present will be removed and no longer be a source to contaminate groundwater. Grouting will further reduce the mobility of any remaining coal tar left in the gas holder. Routine monitoring of groundwater constituent concentrations will be required to evaluate the alternative's effectiveness in preventing off-site migration and to ensure that constituent levels diminish over time as expected.

Standard construction equipment and practices will be used to implement this alternative. The technologies used as part of this alternative are proven and are expected to meet projected efficiencies and performance goals. Alternative 3 is a technically feasible removal action for the gas holder and would require approximately 1 month to implement.

Compliance with ARARs

Compliance with ARARs would most likely be achieved because the contaminated media would be removed from the ground and water discharge or disposal criteria would be met. After grouting the mobility of any remaining constituents in the gas holder will be prevented thus eliminating a pathway for contaminating groundwater. Therefore; groundwater quality is expected to improve to regulatory acceptable levels with time. Pumping will not produce any atmospheric emissions of concern and the residual soil contamination within the holder will not be able to migrate to subsurface soils or waters.

Cost

The costs presented are only for the gas holder and not for both holders. Included in these costs are well installation, water treatment, grouting, site services and engineering. Monitoring costs for this alternative have been halved since it applies to only one holder. Total present worth for this alternative is $100,000.

D. Alternative 4 - Enhanced Product Recovery

Description of the Alternative

Enhanced product recovery will use proven secondary oil recovery technology (i.e., The Contained Recovery Oily Wastes, CROWTM, Process). The coal tar in the holder will be mobilized through the injection of steam. This will cause the temperature of the holder contents to rise thereby decreasing the viscosity of the coal tar. Once the coal tar viscosity is lowered, it will be pumped with the water from the holder. This technology is being evaluated for only the relief holder since this contains Dense Non-Aqueous Phase Liquids (DNAPL) which has a high viscosity and cannot be pumped. Implementing this process will occur by first mobilizing the coal tar in the center of the holder. Three wells will be installed for the injection of steam and one recovery will be installed in the center of the holder. Once the coal tar is recovered from the center of the holder, additional steam injection wells will be used at the perimeter of the holder with recovery again occurring at the center of the holder. This pattern is used for the purpose of mitigating any possible release of coal tar from the relief holder during remediation through any cracks in the side walls.

The simulated installation results performed by the Western Research Institute (WRI), on tar from the Columbia holder showed it had an initial boiling point in excess of 217 F. Therefore there should be no problem with vapors being produced in the holder and no need for a vapor recovery system. Additionally, the product recovery system is a closed system in that the holder is capped and pumping of water and coal tar will occur through production wells in the holder. Both the tank used for separation of coal tar and water, and the coal tar storage tank will be covered. Volatile organic compounds will be contained.

Enhanced product recovery at the Columbia Site will be designed to extract groundwater at a rate of approximately 15 gpm. The extracted groundwater will then flow to a temporary storage tank. The ambient cooling will cause an increase in the density of the DNAPL. The liquid will then separate and the DNAPL can be recovered off the bottom and stored for subsequent reuse or incineration. After the oil phase is grossly separated from the aqueous phase, the water will be re-injected as steam through injection wells. The coal tar will then be transported off-site for recycling or incineration This will eliminate the migration pathway of contamination to groundwater. Following the completion of the CROW process, pressure grouting will be used at multiple locations in the holder.

Feasibility, Effectiveness, Implementability, Permanence

Based on experience at other sites, an enhanced recovery process is likely to remove 60% to 90% of free-phase coal tar. The remaining tar will be in the form of residual adhered to the particle surfaces. Data is not currently available which may indicate the level of remaining hydrocarbon concentrations within the soil following enhanced recovery. Data of this sort would be difficult to obtain given the heterogeneity of the holder contents. It is for these reasons that stabilization has been included as a follow-up to tar removal.

The potential for exposure with Alternative 4 are minimal during the construction and implementation phase until remedial response objectives are met. Site workers may be exposed to coal tar and coal tar contaminated soils during drilling and well installation. During operation, coal tar will be separated from the produced water and subsequently pumped into tank trucks for removal from the site. The community will not be exposed to any potential risks associated with the construction and implementation phase. Air monitoring for organic contaminants will be performed daily. Current site restrictions that limit access to the site by the community will be maintained. A site safety plan will be developed and all site remediation workers will be health and safety trained and have current medical examinations on file. Workers exposed to soil and groundwater during construction will be protected through the use of adequate health and safety protocols. The surrounding environment will not be adversely impacted by the construction or implementation phases of the removal activities. It is estimated that approximately six months will be required to implement the remedy. The remedial response objectives will be reached within a six-month period.

Enhanced product recovery is not likely to have much incremental effectiveness, over straight pumping, in the gas holder because there is very little or no free coal tar to mobilize. Therefore, this analysis will be focused on the relief holder only. Recovering subsurface deposits of oily wastes in the relief holder to residual saturation levels will reduce the volume and mobility of coal tars, also the enhanced product recovery process can decrease the toxicity of the surrounding groundwater by eliminating source areas of contamination. Grouting will prevent any further migration of contaminants from material left in the holder.

For the most part, standard construction equipment and practices will be used to implement this alternative. Well installation uses conventional techniques. Above ground equipment such as tanks, boiler, piping and water treatment are readily obtainable. The technologies used as part of this alternative are proven and are expected to meet projected efficiencies and performance goals. Enhanced product recovery has been implemented successfully for other subsurface DNAPL removal actions where excavation has been infeasible. Enhanced product recovery provides proven recovery techniques with conditions favorable to public health and the surrounding environment. The past performance of enhanced product recovery provides adequate assurance that the proposed system will be capable of meeting removal objectives. Operation of the CROW process and achieving residual saturation will not alone achieve soil cleanup goals. However, enhanced recovery will eliminate the mobility of the coal tar and grouting will eliminate the pathway of residual coal tar contaminating groundwater. Therefore, this action will eliminate the migration of contamination from this source. Routine monitoring of groundwater constituent concentrations will be required to evaluate the system's effectiveness in preventing off-site migration and to ensure that the treatment system is capable of effectively treating the groundwater.

Compliance with ARARs

Compliance with ARARs will be achieved because all free coal tar will be removed from the holder and all waters will be treated to the state's water quality standards. Residual contamination within the holder will not be able to migrate to the surrounding soils and waters. Therefore, in time the groundwater quality will improve since the migration pathway has been eliminated. Air quality will not be an issue. However, a gasoline powered boiler will have to comply with the state's emission requirements.

Cost

These costs include capital equipment (such as tanks, piping, electrical, boiler, well installation, pumps, water treatment/disposal and coal tar disposal), subcontractors (such as earthwork, electrical, plumbing and WRI), engineering and site services. Total present worth for this alternative is $668,593.

III. SELECTED RESPONSE

The selected action for the relief holder is enhanced product recovery and the selected action for the gas holder is pumping. These removal actions have been chosen by comparative analysis of the four selected remedy options.

The relief holder would be best remediated by enhanced product recovery because this removal action: protects human health and the surrounding environment; protects workers during implementation; complies with ARARs; achieves removal objectives; reaches the level of treatment/containment expected; maintains control until long-term solution is implemented; is technically feasible; adapts to environmental conditions; can be implemented within one year; and utilizes available equipment, personnel and services. Once the flowable contents of the relief holder have been removed and all water pumped out, the holder will be grouted to eliminate the mobility of any contamination remaining.

The gas holder would be best remediated by pumping because this removal action: protects human health and the surrounding environment; protects workers during implementation; complies with ARARs; achieves removal objectives; reaches the level of treatment/containment expected; maintains control until long-term solution is implemented; is technically feasible; adapts to environmental conditions; can be implemented within one year; and utilizes available equipment, personnel and services. After the pumping process has been completed, a flowable fill will be injected into the holder for stabilization. The flowable fill will be a blend of cement, fly ash, aggregate and water. The flowable fill will be injected into the holders under pressure and will cure within one day

The proposed response for the gas holder and the relief holder is protective of the public health and the environment, complies with all Applicable, Relevant and Appropriate legal requirements, and is technically feasible.

V. RESPONSE TO PUBLIC COMMENTS

The Department did not receive any public comments concerning the selection of this response action. The selected response action is filed in the administrative record.

FOR THE COMMONWEALTH OF PENNSYLVANIA

Kenneth Okorn

Kenneth Okorn
Manager
Environmental Cleanup Program

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