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SMYRNA COAL GAS SITE
FINAL PLAN OF REMEDIAL ACTION

INTRODUCTION
In January 1995, the Department of Natural Resources and Environmental Control (DNREC) reached an agreement with Chesapeake Utilities Corporation (Chesapeake) to perform a remedial investigation under the authority of 7 Del. C., Chapter 91, the Delaware Hazardous Substance Cleanup Act (HSCA) at the Smyrna Coal Gas Site in Smyrna, Kent County. The investigation and interim response activity concluded in July, 1995. The investigation discovered the presence of a buried gas holder containing soil and rubble contaminated with coal tar compounds. This contaminated material was excavated and removed from the site as an interim response activity. Further investigation demonstrated that soil and ground water outside the gas holder was not contaminated.

The Department has determined that the interim response activity eliminated risks to public health and the environment associated with chemical hazards at the site. It therefore recommends no additional investigation or cleanup action at the Smyrna Coal Gas Site.

PURPOSE
Adoption of a Remedial Action Plan under HSCA is a two step process which allows for public review and comment of the Department’s recommendations. The Department released a Proposed Plan for the Smyrna Coal Gas site on February 12, 1996. No comments were received during the public comment period. The Department therefore finalizes the recommendations discussed in the Proposed Plan as the Final Plan.

The procedures for publishing the Proposed Plan, receiving comments and issuing the Final Plan are established by the Regulations Governing the Cleanup of Hazardous Substances, Section 8 and 12, and the HSCA.

SITE DESCRIPTION AND HISTORY
The Smyrna Coal Gas site is a parcel of less than one-half acre located at the intersection of Route 13 and Mill Street within the Town of Smyrna. The adjacent property is the Town of Smyrna water supply well no. 2. The site is level but the grade falls off steeply immediately to the south towards Mill Creek. The site is owned by Chesapeake. (See Attachments 1 and 2.)

The site was occupied by a coal gas plant from the 1880's until 1927. The plant manufactured gas from coal for local consumption until 1927. Several structures were present on the site during this period including a gas holder, retort house, purifier and coal shed. It is not known when these structures were demolished, but by the time of the Remedial Investigation, the only building present on the site was a small, fenced one-story
structure which had been used by Chesapeake as a meter house. Chesapeake had also used the site for storage of small amounts of fill material and sand left over from utility work in Smyrna.

PREVIOUS INVESTIGATIONS
The site was of interest to state and federal regulatory authorities because of its close proximity to a public drinking water supply well. In 1989, the Department performed a Preliminary Assessment of the site for the US Environmental Protection Agency under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). A review of existing chemical analytical data from the public water supply well no. 2 indicated no contamination by substances attributable to the coal gas plant site. This was followed up by a Site Inspection (SI) in 1989. The SI included sampling of shallow soils from the site, ground water from well no. 2, and surface water and sediment from nearby Mill Creek. The results of this sampling indicated possible contamination of surface soils and sediments by coal tar related compounds. However, these results were not conclusive and DNREC conducted additional sampling under HSCA in 1993. Four soil borings were made on the site for this evaluation. Three of the borings encountered only clean material, but the fourth discovered an area of heavy coal tar contamination. Ground water samples from three nearby wells including well no. 2 were also sampled at this time and found to be free of site related contamination. Non-site related contamination in well no. 2 will be discussed later.

REMEDIAL INVESTIGATION SCOPE AND PROCEDURES
In view of the results of the 1993 evaluation, Chesapeake agreed to conduct a Remedial Investigation focused on site soils and possible routes of migration from the site to Mill Creek. According to a Work Plan submitted by Chesapeake and approved by DNREC, this investigation consisted of test pits and shallow groundwater samples collected from temporary wells on the south side of the site. The Work Plan also provided for an extensive review of existing ground water quality information and an evaluation of past and future impacts to the Smyrna municipal water supply well no. 2 from the site.

The Work Plan anticipated encountering a subsurface vessel or structure containing heavy coal tar contamination. It therefore included provisions for the excavation and removal of contaminated soils as an interim response activity. The scope of the investigation was adjusted in response to site conditions discovered during test pitting. By the conclusion of the investigation, seven soil borings had been placed to confirm the extent of contamination.

SOIL CLEANUP LEVELS
Soil cleanup levels for this site were determined by DNREC and included in the Work Plan with agreement by Chesapeake. In establishing cleanup levels, DNREC considered all chemicals that might reasonably be expected from the coal gasification process, their toxicity,
mobility, potential to affect human or environmental receptors and regulatory status. DNREC believes that the resulting cleanup levels are acceptable for human exposure resulting from residential use of the parcel. Since residential use involves the greatest potential exposure, the cleanup levels are protective of human health for any other land use.

Table 1. Soil Cleanup Levels for the Smyrna Coal Gas Site

<table>
<thead>
<tr>
<th>Substance</th>
<th>Concentration in soil (mg/kg)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs)</td>
<td>0.97</td>
</tr>
<tr>
<td>benzene</td>
<td>0.455</td>
</tr>
<tr>
<td>naphthalene</td>
<td>650</td>
</tr>
<tr>
<td>lead</td>
<td>500</td>
</tr>
<tr>
<td>cyanide</td>
<td>3900</td>
</tr>
</tbody>
</table>

* milligrams per kilogram (parts per million), dry weight

INTERIM RESPONSE ACTIVITY

The first backhoe test pit performed for the investigation encountered a curved masonry structure about two feet below the ground surface. Excavation revealed a brick gas holder foundation 27.5 feet inside diameter and 10 feet deep. It contained concrete rubble, scrap metal, coal tar contaminated soil and an apparent layer of free flowing coal tar approximately one foot thick at the bottom of the structure.

Chesapeake proposed and DNREC approved a plan to stabilize material on the site and remove it for treatment and disposal at an off site facility. The relatively small volume of material and the proximity to residential neighborhoods made off site treatment preferable to on site treatment in terms of both cost and public convenience. Approximately 270 cubic yards of material were eventually excavated from the gas holder and mixed with 200 cubic yards of wood ash for stabilization. Brick and concrete debris totaling 77 tons was crushed on the site and removed for disposal. At the end of excavation, the surface of the work area was scraped to remove contamination which might have been spread during processing. In all, 35 roll off containers of material were transported to Clean Earth, Inc. of Wilmington for thermal treatment in a rotary kiln. Because it was stabilized, the material could be shipped and treated as a solid non-hazardous waste. Clean Earth, Inc. was permitted to treat the soil by the Division of Air and Waste Management, Solid Waste Branch.

The concrete bottom of the brick gas holder was found to be intact. The sides and floor of the structure were pressure washed and steam cleaned. Wash water was collected and combined with water which had been previously recovered during dewatering. Approximately 5000 gallons of this waste water were sent to the Du Pont Chambers Works for disposal as a hazardous waste.
After an inspection by DNREC, the gas holder was filled with clean fill material and the surface of the site was re-graded and seeded. Chesapeake chose to demolish the one small building remaining on the site.

CONFIRMATION SAMPLING RESULTS
Prior to site closure, Chesapeake proposed and DNREC approved a sampling plan to determine whether the cleanup levels had been achieved. Five soil samples were taken around the gas holder from approximately ten feet below ground surface. (See Attachment 3.) This sample depth was chosen because it is just below the bottom of the gas holder and would therefore be expected to reveal any leakage of the holder which may have occurred. The samples were analyzed by field screening and also by an approved laboratory. The analytical results show that the soils meet the prescribed cleanup levels. (See Attachment 4.)

Shallow ground water samples were taken from two locations between the gas holder and the southern boundary of the property. Laboratory analysis results indicated no contamination of ground water by site related compounds except for cyanide. Cyanide was present in both ground water samples but at concentrations well below regulatory levels set for public drinking water supplies by the U.S. EPA.

The conclusion of confirmatory sampling is that the interim response activities achieved the cleanup goals specified by DNREC.

WATER QUALITY EVALUATION FOR SMYRNA WELL NO. 2
As part of this Remedial Investigation, Chesapeake agreed to conduct a review of existing data for well no. 2 which supplies the Town of Smyrna's water system. Well no. 2 is located only about 75 feet from the gas holder. It also has a history of contamination by chlorinated volatile organic compounds (VOCs). One of the most common VOCs is trichloroethene (TCE) which is used to clean and de-grease metal parts. It can also occur as a breakdown product of dry cleaning solvent.

TCE was detected in Smyrna's municipal water supply well no. 2 in the fall of 1977. This occurrence triggered heightened concern over the safety of the drinking water supply and the source of the contamination. Sampling was conducted eight times in 1978 by the US EPA. Samples were analyzed for VOCs including TCE and also for contaminants sometimes associated with coal gas plants such as benzene. No coal gas site related compounds were detected in the well water. TCE was not in general use when the plant operated and there is no evidence of a spill of the substance on the property. The well water is now treated by aeration to remove the TCE before it is introduced to the public water system.

In 1980, the Delaware Division of Public Health began a regular sampling program. Well no. 2 was sampled at least annually until 1992. At that point, sampling of raw well water was reduced to once every three to five years because of diminishing concentrations of
chlorinated VOCs. Coal tar related compounds were never detected by the Division of Public Health during this period.

In conclusion, the evaluation of data collected from Smyrna well no. 2 over a period of 15 years suggests that coal gas manufacturing activities on the site did not impact the public water supply. The source of TCE contamination in the public well is not known conclusively although the coal gas site has been eliminated as a possible source. The treatment system on the well is effective and the drinking water supply meets state and federal standards for quality and safety.

CONCLUSIONS
Successive investigations identified a limited area of coal tar contamination on the site. Coal tar was confined to the intact foundation of a gas holder which was apparently demolished and buried after the gas plant ceased operations. The structure was excavated, cleaned and refilled with clean fill as an interim response under DNREC direction. This removal activity reduced soil contamination on the site to levels below the quantitative cleanup goals established in the Remedial Investigation Work Plan. Therefore, no additional deed restrictions or other institutional controls are necessary. The excavated material was processed on the site and removed to an off site facility for treatment and disposal. Additional soil and ground water sampling showed that no contamination from the gas plant operation remains on the site. A review of existing data from Smyrna well no. 2 demonstrated that the site has not affected the ground water or public drinking water supply in the last fifteen years.

The investigation and interim remedial activity conformed to applicable state and federal laws and regulations relating to the handling, transportation and treatment of the waste material.

RECOMMENDATIONS
As a result of the successful completion of the interim response action and the findings of the Remedial Investigation, the Department recommended in the Proposed Plan that no further cleanup is required at the Smyrna Coal Gas Site. There being no objections raised to this proposal during the public comment period, the Department has adopted “no further action” as the Final Plan of Remedial Action under HSCA.

PUBLIC PARTICIPATION
The Department advertised the release of the Proposed Plan of Remedial Action in The Wilmington News-Journal and The Delaware State News on February 12, 1996, in accordance with Section 12 of the Regulations. The ads solicited public comments or questions on the Proposed Plan in writing or by telephone. No comments were received during the comment period which closed on March 8, 1996.
DECLARATION
This Final Plan of Remedial Action for the Smyrna Coal Gas Site is protective of human health, welfare and the environment and is consistent with the requirements of the Delaware Hazardous Substance Cleanup Act.

Nicholas A. DiPasquale, Director
Date
Division of Air and Waste Management
Former Smyrna Coal Gas Plant

Location of the Former Smyrna Coal Gas Plant in Smyrna

Figure 2
Locations of soil borings drilled during the RI/RA
## Summary of Ground-Water and Soil Chemical Quality Analysis at the Former Smyrna Coal Gas Plant - Smyrna, Delaware

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SB-5 (water) mg/l</th>
<th>SB-6 (water) mg/l</th>
<th>Soil Cleanup Criteria mg/kg</th>
<th>SB-7 (soil) mg/kg</th>
<th>SB-8 (soil) mg/kg</th>
<th>SB-9 (soil) mg/kg</th>
<th>SB-10 (soil) mg/kg</th>
<th>SB-11 (soil) mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Volatile Organic Compounds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzene</td>
<td>ND</td>
<td>ND</td>
<td>0.455</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>ND</td>
</tr>
<tr>
<td>Toluene</td>
<td>ND</td>
<td>ND</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.005J</td>
</tr>
<tr>
<td>Ethylbenzene</td>
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<td>ND</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.006</td>
</tr>
<tr>
<td>Total BTEX</td>
<td>ND</td>
<td>ND</td>
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<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.011</td>
</tr>
<tr>
<td>via Laboratory Analysis</td>
<td>ND</td>
<td>ND</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.011</td>
</tr>
<tr>
<td>via Immunoassay Test</td>
<td>--</td>
<td>--</td>
<td>0.5</td>
<td>0.4</td>
<td>0.2</td>
<td>0.3</td>
<td>0.9</td>
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<tr>
<td><strong>Semi-Volatile Organic Compounds</strong></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Naphthalene</td>
<td>ND</td>
<td>ND</td>
<td>650</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>ND</td>
</tr>
<tr>
<td>Phenanthrene</td>
<td>ND</td>
<td>0.00018J</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>ND</td>
</tr>
<tr>
<td>Fluoranthene</td>
<td>ND</td>
<td>ND</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.0041J</td>
</tr>
<tr>
<td>Benzo (g,h,i) perylene</td>
<td>ND</td>
<td>ND</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.810</td>
</tr>
<tr>
<td>Indeno (1,2,3,cd) pyrene</td>
<td>ND</td>
<td>ND</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.139</td>
</tr>
<tr>
<td>Total Carcinogenic PAHs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>via Laboratory Analysis</td>
<td>ND</td>
<td>0.00018J</td>
<td>0.97</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.9531</td>
</tr>
<tr>
<td>via Immunoassay Test</td>
<td>--</td>
<td>--</td>
<td></td>
<td>0.010</td>
<td>0.123</td>
<td>0.013</td>
<td>0.104</td>
<td>&gt;0.500</td>
</tr>
<tr>
<td><strong>Inorganics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead</td>
<td>0.00093J</td>
<td>0.00030J</td>
<td>500</td>
<td>0.92</td>
<td>1.17</td>
<td>1.33</td>
<td>0.79</td>
<td>1.15</td>
</tr>
<tr>
<td>Cyanide</td>
<td>0.0194</td>
<td>0.0184</td>
<td>3900</td>
<td>ND</td>
<td>3.0</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
</tbody>
</table>

J = Estimated value, below the practical quantitation limit  
ND = Not Detected  
-- = Not included in the analysis for this sample

Attachment 4.
Attachment 5.

PROPOSED PLAN of Remedial Action for the Smyrna Coal Gas Site under the Hazardous Substance Cleanup Act. The Department of Natural Resources and Environmental Control (DNREC) announces the completion of investigation and interim response actions at the Smyrna Coal Gas Site at the intersection of Route 13 and Mill Street in Smyrna. DNREC reached an agreement with Chesapeake Utilities Corporation to investigate the presence of coal tar contamination at the site. During the investigation, the foundations of a gas holder were identified. Contaminated material was excavated from the holder, stabilized on the site and removed for treatment. Subsequent investigation demonstrated that no other soil or groundwater contamination is present on the site. Since the risks of the site have already been eliminated, DNREC proposes that no further investigation or cleanup action is needed. A copy of the Proposed Plan summarizing the completed cleanup and recommendations is available at:

DNREC
Division of Air and Waste Management
715 Grantham Lane
New Castle, DE 19720
(302) 323-4500

DNREC invites comments or questions on the Smyrna Coal Gas Site. Members of the public may also request a public meeting on the Proposed Plan of Remedial Action pursuant to 7 Del. C. 9112. The comment period begins on February 12, 1996 and ends on March 8, 1996. Please send comments or requests in writing to Stephen F. Johnson at the above address.

Stephen F. Johnson
Division of Air and Waste Management
715 Grantham Lane
New Castle, DE 19720
(302) 323-4500