

Project No. 0553-2040  
November 28, 1995

San Antonio Housing Authority  
818 South Flores  
San Antonio, Texas 78295

Attention: Mr. Oscar Cervantes

**Proposed Site Closure Plan  
10 Acre Site, 1901 South San Marcos Street  
San Antonio, Texas**

Fugro Environmental, Inc. is pleased to present the draft closure plan for the above referenced site. This report will be submitted to the Texas Natural Resource Conservation Commission (TNRCC) for review pending incorporation of your comments.

The provisions of the TNRCC Voluntary Cleanup Program (VCP) include the execution of an agreement with the TNRCC and an application fee of \$1,000. The completed application is provided in Appendix A and will require signature by a representative of SAHA. Please make the check payable to the Texas Natural Resource Conservation Commission and reference the Application and Agreement for Voluntary Cleanup Program.

The regulatory pathway for closure of this site was determined with the assistance of Mr. Jay Carsten, Project Manager, Voluntary Cleanup Program, Texas Natural Resource Conservation Commission.

We appreciate this opportunity to provide environmental consulting services to the San Antonio Housing Authority. If you have any questions concerning this report, please do not hesitate to call.

Sincerely,

FUGRO ENVIRONMENTAL, INC.



Timothy J. Dudit, R.G., C.P.G.  
Environmental Manager

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- APPENDIX B: Remedial Site Investigation Report
- APPENDIX C: SAHA 10.01 Acre Site Survey
- APPENDIX D: SAHA 10.01 Acre Site Development Plan

## INTRODUCTION

This report was prepared by Fugro Environmental, Inc. (Fugro) for the San Antonio Housing Authority (SAHA) for a ten acre site located at 1901 South San Marcos Street in San Antonio, Texas (Plate 1, Appendix A). This report was prepared for review by the Texas Natural Resource Conservation Commission (TNRCC) Voluntary Cleanup Program concerning the closure of a historical coal ash waste landfill located at the above referenced site (Plate 2, Appendix A). This report is intended to fulfill closure requirements under 30 TAC §335.563, Media Cleanup Requirements for Risk Reduction Standard No. 3.

The closure information for this site is provided in sections below concerning site setting, chemical constituent characteristics, exposure pathway evaluation, and closure plan. Additional information is provided in appendices to this report. The plates and maps referred to in this report are presented in Appendix B, Remedial Site Investigation Report.

## SITE SETTING

### Site History and Environmental Chronology

The site is a 10.01 acre property located at 1901 South San Marcos Street. The site is located adjacent to the Union Stock Yards, and was formerly the location of a meat packing facility from circa 1889 to 1960. The historical coal ash waste landfill is presumed to be a byproduct of coal fired boilers used at the site to produce steam for heating and meat packing from 1889 to circa 1920. The site is currently cleared of all buildings and surface facilities, and is fenced with a locked gate.

A chronology of the environmental studies at the site to date is provided below. This chronology is based on activities conducted by Fugro and on reports provided by SAHA. This chronology represents all environmental studies currently known to have been conducted on this site.

- January, 1989: Aptus Environmental Services - Report on the removal and disposal of PCB contaminated transformers from the site.
- July, 1991: Trinity Testing Laboratory - Closure report for removal of three underground storage tanks (USTs) and contaminated soil from the site.
- June, 1992: Trinity Testing Laboratory - Site assessment for soil and groundwater contamination from previously removed USTs.
- July and October, 1992: Trinity Testing Laboratory - Quarterly monitoring reports for monitor wells at the site.
- September, 1993: Clean Environments, Inc. - Phase I Environmental Site Assessment of the site.
- November, 1993: Clean Environments, Inc. - Report on sampling and analysis of waste oil drum contents.
- February 15, 1994: Fugro McClelland (Southwest), Inc. - Preliminary geotechnical study report including discovery of coal ash waste in Boring B-3.
- February 15, 1995: Fugro Environmental, Inc. - Phase II Environmental Site Assessment (ESA) of coal ash waste at the site.

- June 21, 1995: Fugro Environmental, Inc. - Remedial Site Investigation of the coal ash waste, soil and groundwater at the site.

### **Site Ownership and Planned Use**

The site is presently owned by SAHA and was recently purchased to build a warehouse and maintenance facility with offices. The warehouse facility will be used to store materials used by SAHA in maintaining various public housing projects throughout the city of San Antonio. The maintenance facility will be used for equipment repair. Based on the results obtained by Fugro from the Remedial Site Investigation, SAHA has altered previous facility location plans to avoid construction of buildings over the coal ash waste. Current architectural plans have sited the asphalt parking lot for the facility over the delineated coal ash waste area. SAHA has purchased this site only for warehouse and storage use and has no plans to develop the site for any public housing projects in the future.

### **Geologic and Hydrogeologic Setting**

A detailed discussion of the geologic and hydrogeologic setting is provided in the Remedial Site Investigation (RSI) report, which is included in this report as Appendix A. In summary, the site lies on the outcrop of Quaternary age Fluvatile Terrace Deposits consisting of uncemented, alluvial gravel, sand, silt, and clay. The Fluvatile Terrace Deposits overlie the Cretaceous age Navarro Formation, which is composed of clay and marl layers.

The Fluvatile Terrace Deposits contain shallow groundwater of varying quality. This aquifer is not used for drinking water in San Antonio. The Navarro is not considered an aquifer, however the upper ten feet of weathered Navarro can contain interconnected fractures which can carry minute amounts of groundwater.

The site is located over the artesian zone of the Edwards Aquifer, which is the sole source of drinking water for the city of San Antonio. The top of the Edwards Aquifer lies approximately 800 feet beneath the shallow groundwater at the site. Two Edwards water wells exist on the site, but these were plugged and abandoned by SAHA in October, 1995. Shallow monitor wells in the alluvium at the site show that the shallow, perched groundwater table flows east at an approximate gradient of 0.12 feet per foot. A groundwater contour map is presented on Plate 6 of Appendix B. The shallow, perched aquifer is not connected to the deeper Edwards Aquifer.

## CHEMICAL CONSTITUENT CHARACTERISTICS

### Chemical Type, Concentration, and Affected Media

The results of the RSI showed low concentrations of 16 regulated semi-volatile organic chemicals, two volatile organic chemical, and six metals in the coal ash waste and groundwater in contact with the coal ash waste. The maximum concentrations compared with regulatory levels of the organic chemicals from 30 TAC 335, Subchapter S are presented on Table 1. The maximum concentrations compared with regulatory levels of the metals from 30 TAC §335, Subchapter S are presented on Tables 1c and 2b in Appendix B.

The distribution of these chemicals in the soil, coal ash waste, and shallow groundwater is discussed in detail in Section 4.0 of Appendix B. In summary, the semi-volatile hydrocarbons are polycyclic aromatic hydrocarbons found in coal. The soil and groundwater analyses show that these chemicals are found only within the coal ash waste and in the groundwater in contact with the coal ash waste. These chemicals are not found in shallow soil outside the coal ash waste (B-23, with the exception of fluorene) and are not present in shallow groundwater directly downgradient of the coal ash waste.

Beryllium is present in the groundwater within the coal ash waste above regulatory levels but is below detection limits in MW-5 and MW-6 downgradient of the coal ash waste. Beryllium is not present in the soil downgradient of the coal ash waste in boring B-23 (Appendix B, Table 1c).

### Chemical Mobility

The polycyclic aromatic hydrocarbons discussed above are naturally present in coal, these chemicals are nearly insoluble in water, and have very low soil mobility potential. The soil mobility of chemicals can be classified by examination of the thermodynamic partitioning of the chemicals in soil, according to Donnelly, et. al., (1994). The soil partition coefficient ( $K_d$ ) has been estimated on the basis of the quantity of organic carbon present in the soil and the organic carbon partition coefficient ( $K_{oc}$ ) for each chemical. These relationships are presented on Table 2. The chemicals encountered in the coal ash waste at the site are generally immobile based on his classification. The characteristic of these chemicals as present in soils at the site exhibit extremely low potential for migration. This greatly reduces the potential for migration of the chemicals through the soil.

## Distribution

The semi-volatile hydrocarbon chemicals are only found within the coal ash waste at the site but not in soil outside the coal ash waste. The semi-volatile hydrocarbon chemicals are present in the groundwater only within the deposit of coal ash waste where the groundwater is in direct contact with the coal ash waste. The exposure of these chemicals in the coal ash waste to the groundwater at the site for up to 100 years may be the reason they were detected in the groundwater. Chemical analysis of the groundwater in all monitor wells outside and down gradient of the coal ash waste are below detection limits for the semi-volatile hydrocarbon chemicals found in the coal ash waste.

## EXPOSURE PATHWAY EVALUATION

The exposure pathways commonly used in risk assessments were evaluated for the site with respect to food, groundwater, soil, sediment, and surface water. A summary of the potential exposure pathways is presented on Table 3. The result of the pathway evaluation is that soil and sediment are the identified pathways at the site.

The exposure pathway analysis was prepared in consideration of existing architectural plans for development of the site. The current plans exclude building or foundation construction within the area containing coal ash waste and use the area only for paved parking or entry drives. All stormwater will be directed away from this area to a detention pond outside the limits of the coal ash waste. Specific details regarding site development are discussed in the Closure Plan.

Dermal contact, ingestion, and inhalation of soil or ash during construction activities were identified as potential exposure routes. The coal ash waste is currently covered by fill material (soil and rock) at thickness' ranging from 0.5 to 5 feet. Additional fill material will be added to this area to increase the elevation for suitable site grading and paving. Provisions in the closure plan and construction bid documents are made which exclude excavation with the area containing coal ash waste.

Due to these considerations, these potential exposure routes were not retained for additional pathway analysis.

## TNRCC RISK REDUCTION STANDARDS

In previous sections of this report, the location, chemical constituents of concern, chemical mobility, and the limited extent of the impact from coal ash waste on soil and groundwater at the SAHA site were discussed. The closure of the site under the Risk Reduction Standard No. 3 found in Title 30 of the Texas Administrative Code (TAC), specifically 30 TAC §§335.551-335.599 is discussed in this section. The particular regulatory pathway for closure of this site is discussed below with emphasis on the unique conditions found at the site. The specific sections are discussed in order using the section numbers found in the regulations.

This section presents information on the compliance of the site with the Risk Reduction Standard No. 3. The future plans of SAHA to add compacted fill and an impermeable parking lot above the coal ash waste area, restrict construction activities, deed record the site, and monitor downgradient groundwater quality constitute a corrective measure which will provide additional surety that the chemicals of concern at the site will be controlled in an effective manner.

### **335.553(b)(1); Remedial Investigation Report**

The remedial investigation report required by this subsection is provided in Appendix B.

### **335.553(b)(2); Baseline Risk Assessment**

As presented above and summarized in Table 3, there are no completed pathways at the site, the chemicals of concern have existed at the site for up to 100 years, the chemicals of concern are limited to the immediate coal ash waste area, migration of the chemicals of concern are unlikely given their chemical properties, and the chemicals of concern have not migrated off the site. Potential adverse effects from the chemicals of concern are very limited based on the current characteristics of the site and the planned future use. A baseline risk assessment using standard or site specific exposure factors is not necessary if there are no completed pathways and therefore no exposures to calculate.

The purchase of this tract of land by SAHA is only for use as a warehouse and maintenance facility. There are no plans to construct public housing on any portion of this site. This site was selected by SAHA for its central location to the public housing projects maintained by SAHA. The storage and stockpiling of materials and equipment used in public housing maintenance reflects an industrial rather than a residential use.

### **335.553(b)(3); Remedy Evaluation Factors**

The remedy evaluation factors under 335.562 include compliance with other laws and regulations, long-term effectiveness, reduction of mobility, short term effectiveness, implementability, and cost. SAHA will comply with applicable laws and regulations in regard to the management of the coal ash waste at this site. The site development plans by SAHA will be effective in the long term since SAHA provides a significant, long term community function and their presence at the site is assured for the foreseeable future. Since the coal ash waste has existed at the site for up to 100 years at elevations near the surface and probably in contact with shallow groundwater for a significant portion of that time, the effect of adding compacted fill and an impermeable parking lot can only be to reduce the mobility of the chemicals of concern by eliminating surface water infiltration. The short term effectiveness of eliminating infiltration of surface water will be to reduce leaching potential of the chemicals from the ash. The site design feature of adding fill material above the coal ash waste and inclusion of strict provisions in the construction contract documents will minimize disturbance of the coal ash waste. The future plans can be implemented easily since SAHA has completed the final design plans and is on track to bid the construction of the site in the immediate future. The cost of the future development plans is already budgeted for by SAHA, so the cost impact of the plans will be minimal.

### **335.553(b)(3); Corrective Measure Study**

The corrective measure study is not required since there are no completed pathways at the site and the future plans for site development coincidentally implement control measures that provide further assurance that the mobility and impact of the chemicals of concern are limited.

### **335.553(b)(4); Final Report**

A final report documenting the completed site development, groundwater monitoring, and deed recordation will be submitted to the TNRCC after acceptance of this plan by the TNRCC and implementation of the above referenced activities.

### **335.563(b), (c) (e); Carcinogens, Systemic Toxicants, & Standard Exposure Factors**

The risk of human cancer, deleterious effects from systemic toxicants, and the use of standard exposure factors is not applicable since none of the exposure pathways are completed.

**335.563(f); Air**

The chemicals of concern are not exposed at the surface, where uptake through inhalation is possible. The coal ash waste is covered by fill and will be covered in the future by further amounts of compacted fill. Volatile chemicals present at the site are below current standards for Risk Reduction Standard 2 and over 90% of the chemicals are not volatile. Based on this information, the air exposure pathway is not completed.

**335.563(g); Surface Water**

The chemicals of concern are not exposed at the surface, will be covered by future development, and are not volatile so the surface water exposure pathway is not completed. Facility design plans direct stormwater away from the coal ash waste location to a detention pond on the southeastern corner of the site.

**335.563(h); Groundwater**

The chemicals of concern are not detected in upgradient or downgradient shallow groundwater monitor wells, are nearly insoluble in groundwater, and are only detected within the monitor well installed in the coal ash waste. The apparent low permeability of the clayey gravel alluvium comprising the shallow, perched aquifer and the chemical immobility of the chemicals of concern combine to restrict the migration of the chemicals in the shallow groundwater.

**335.563(h)(2)(A) and (C).** Alternate concentration limits assumes the completion of an exposure pathway and the groundwater exposure pathway is not completed at this site. The shallow groundwater at this site is not used for a drinking water supply, and the shallow groundwater zone beneath the site can be declared exempt from the groundwater cleanup requirements (see below).

**335.563(h)(2)(B).** We request that the executive director of the TNRCC authorize the shallow groundwater zone underlying this site around the coal ash waste to be excluded from the groundwater cleanup requirements of 335.563(h). This request is based on the current conditions, future use, and future controls planned at this site, as discussed above. The shallow groundwater zone is not used for water supply due to the limited saturated thickness, low apparent permeability, and the exclusive use by the City of San Antonio of the deep Edwards Aquifer water for drinking water supply.

**335.563(i); Soil**

The coal ash waste is not exposed at the surface and future plans will place compacted fill and an impermeable parking lot over the extent of the coal ash waste. The exposure pathway of human ingestion and direct contact with the coal ash waste is not completed and further protection will be provided by the future development plans. The restriction of disturbance of the soil over the coal ash waste during construction and the addition of soil fill above the coal ash waste will preclude future contact with the coal ash waste.

## CLOSURE PLAN

The SAHA 10.01 acre site complies with Risk Reduction Standard No. 3 requirements due to the properties of the chemicals of concern, the current site conditions, and the future development plans over the coal ash waste area. To provide further assurance that the exposure pathways from the chemicals of concern in the coal ash waste remain incomplete, SAHA requests that the TNRCC grant closure of the site with the legal controls, site development features, site control features, and groundwater monitoring plan components discussed below.

### Legal Controls

The 10.01 acre site located at 1901 South San Marcos Street in San Antonio, Texas is described in a survey map and a meets and bounds description provided in Appendix C. SAHA will deed record the presence and location of the coal ash waste, the prohibition on withdrawal of shallow groundwater from the coal ash waste area, specific excavation restrictions to be applied during site development, and the prohibition of ground disturbance within 50 feet of the coal ash waste area without the written permission of SAHA. This deed recordation will limit the disturbance of the coal ash waste in the future, especially by public utilities.

### Site Development Features

The final site development plans are presented on a map as Appendix D to this report. The coal ash waste area is shown on the map, the amount of compacted fill over the coal ash waste ranges from \_\_\_ feet to \_\_\_ feet, and the presence of an asphaltic concrete parking lot is shown on the map. These features will serve to further isolate the waste, minimize surface water infiltration, and limit disturbance of the coal ash waste.

### Site Control Features

The site will be surrounded by a gated security fence and the access to the site will be controlled by SAHA personnel on site. All contractors who work on the site will be informed of the presence and location of the coal ash waste and the prohibition on disturbance of the coal ash waste. If a contractor or public utility must disturb the ground surface within 50 feet of the boundary of the coal ash waste, information on the chemicals of concern will be provided and the contractor or public utility will sign a statement confirming the receipt of the information and intent to comply with Occupational Safety and Health Administration employee protection requirements. SAHA will also include information on the location and nature of the chemicals of

concern in the coal ash waste as part of the routine safety information and training for SAHA personnel at the site.

### **Groundwater Monitoring Plan**

To provide evidence of the maintenance of current exposure pathway incompleteness, and the effectiveness of the legal controls, site development features, and site control features, SAHA proposes to monitor the downgradient monitor wells on an annual basis. The three monitor wells downgradient of the coal ash waste (MW-4, 5, and 6) will be purged, sampled and analyzed for semi-volatile hydrocarbons using EPA SW-846, Method 8270. The groundwater elevation will be measured in each monitor well at the site and the elevations contoured to show groundwater gradient and direction. The downgradient monitor wells will be monitored annually until a statistically significant number of samples have been analyzed and shown to consistently comply with the Maximum Contaminant Levels in 30 TAC §335.568, Appendix II for the chemicals of concern detected in the monitor well within the coal ash waste (MW-3). The annual groundwater monitoring results will be forwarded to the TNRCC upon completion and a final request for cessation of groundwater monitoring will be submitted for TNRCC approval.

## CONCLUSIONS

The coal ash waste located within the 10.01 acre site located at 1901 South San Marcos Street can be closed under Risk Reduction Standard No. 3. The items summarized below show that a site closure can be achieved, that the incomplete exposure pathways will be further isolated, that the performance of the controls discussed above is effective, and that the effectiveness of the controls can be monitored and verified.

- The site is located over a shallow alluvial aquifer not used for drinking water or other purposes and is located in a city which is completely dependent on the Edwards Aquifer drinking water supply.
- The shallow groundwater is not connected to the deeper Edwards Aquifer.
- The coal ash waste is limited to a well defined 0.91 acre area within the 10.01 acre site, is presumed to originate from coal fired boilers used at the site between 1890 and circa 1920, and has been present at the site for more than 100 years.
- The chemicals of concern found in the coal ash waste are only in the coal ash waste and groundwater directly in contact with the coal ash waste.
- The chemicals of concern are not present outside of the coal ash waste area in the soil and are not detected in the three monitor wells downgradient of the coal ash waste.
- The organic chemicals of concern are immobile in soil, are not volatile, are relatively insoluble in water, and are only detected in the groundwater due to direct contact with the coal ash waste and the length of time in contact with the coal ash waste.
- The only metal of concern, beryllium, is present in the coal ash waste exceeding regulatory levels but is not present in soil or groundwater downgradient of the coal ash waste.
- The only possible exposure pathways at the site are groundwater and soil and both of these pathways are incomplete due to the present conditions and future use of the site.

- The lack of a completed exposure pathway precludes the necessity for a baseline risk assessment, a corrective measures study, human exposure concerns, and air, surface water, groundwater, and soil cleanup concerns.
- The shallow alluvial aquifer underlying the site is not a present or likely future source of drinking water and the shallow aquifer zone underlying the site can be declared exempt from the groundwater cleanup requirements by the TNRCC.
- The use of legal controls, site development features, site control features, and downgradient groundwater quality monitoring will assure an effective and verifiable closure of this site.

## REFERENCES

DONNELLY, K. C., C. S. ANDERSON, G. C. BANBEE, AND J. J. MANEK, 1994 Soil Toxicology in Basic Environmental Toxicology, CRC Press, Boca Raton, Florida