2.0 BACKGROUND

Due to concerns regarding potential impacts to groundwater quality from the use of fly ash as fill at the Battlefield Golf Club, the City of Chesapeake is undertaking efforts to supply water to homes on Murray Drive, from Centerville Turnpike to Whittamore Road; Whittamore Road, from Centerville Turnpike to Murray Drive; and, Centerville Turnpike, from Murray Drive to Whittamore Road. (With the installation of a City Water System Extension, other homes and businesses along Centerville Turnpike could also connect to the water system between the southern terminus of Albemarle Acres and Etheridge Manor Boulevard). This Water Supply Feasibility Study assesses four alternatives for providing potable water to these homes based on regulatory compliance, property owner impact, operational requirements, technical feasibility, administrative/permitting concerns, and present worth cost (capital and operations and maintenance (O & M) costs).

2.1 Project Area Background

The Murray-Whittamore-Centerville project area is located in the City of Chesapeake, VA. See Figure 1 for a Site Location Map. The area is represented on the Fentress, Virginia USGS topographic quadrangle at an approximate elevation of 10 to 15 feet (ft) above mean sea level (MSL), and it slopes eastwards.

The 216-acre Battlefield Golf Course is located on Centerville Turnpike between Murray Drive and Whittamore Road. It is understood based on information provided to URS that the site was constructed by using 1.5 million tons of fly ash originating from the Chesapeake Energy Facility operated by Dominion Power. Under Virginia’s administrative code, fly ash, a coal combustion byproduct, can be used as a fill material as long as there are two feet of separation between the groundwater and an 18-inch cap of soil covering the fly ash at all times. Construction of the golf course took approximately 5 years and was completed in the summer of 2007.

In 2008, residents living in the immediate vicinity of the Golf Course voiced concerns to the City regarding the potential impacts to groundwater quality from the use of the fly ash. According to City documents, there are approximately 93 dwelling units adjacent to the golf course using wells as the primary source of drinking water.

In response to resident concerns, the City began to test drinking water wells of the surrounding residents for constituents of concern, including arsenic, barium, boron, chromium, cadmium, lead, selenium, silver, vanadium and mercury. On July 16, 2008, the City sent a letter to the U.S. Environmental Protection Agency (EPA) regional office requesting the Agency to respond to the detection of various analytes in the groundwater in support of the surrounding residents. The City then commissioned URS to investigate water supply alternatives described in Section 2.2 to bring reliable, potable water to the community.
2.2 Water Supply Feasibility Study Objectives

The purpose of this study is to provide stakeholders with information on existing conditions and to assess viable alternatives that assures potable water supply to city residents. Existing local hydrogeology data, water well information, and recent well water quality data have been collected and evaluated to determine suitable water sources, well yield limits, and potential constituents requiring treatment to comply with drinking water standards. Based on this information URS has generated the following four alternatives to provide potable water to 100 equivalent residential connections (ERC):

Alternative 1: Extend the City of Chesapeake’s central water distribution system via a water main extension.

Alternative 2: Install a “stand alone” community groundwater supply, treatment, storage and distribution system capable of providing potable water service to 100 ERC.

Alternative 3: Install point-of-entry (POE) treatment systems on existing private wells currently used to provide water to these homes/businesses.

Alternative 4: Install and develop new individual residential and commercial water supply wells into aquifer(s) offering potentially less susceptibility to reduced water quality conditions and potential contaminants from the fly ash.

The alternatives have been compared to identify the relative suitability of each alternative, and to provide a recommended alternative based on the analysis performed.

2.3 Homeowner Study Area Questionnaire Responses

On December 8, 2008, the City of Chesapeake mailed 93 questionnaire forms to the residences and businesses within the Murray-Whittamore-Centerville study area. In the questionnaire, the City requested information about individual water wells and public opinion on connecting to the City water system. An example of the questionnaire is included in Appendix A.

Table 1 in Appendix A summarizes the responses from this investigation. At the time this feasibility report was prepared (February 3, 2009), there were 15 responses, including two businesses. The following illustration summarizes some important responses contained on the questionnaire. Among the respondents, 85% expressed an interest in connecting to City water if it became available.

According to the survey results, the water wells were installed between 1950 and 2000. Most of them are accessible. Only three households indicated problems with water pressure. The respondents provided little, if any, information about the configuration of their wells, such as depth of the well. Seventy (70) % of the respondents have experienced iron or manganese issues, and 50% of the respondents have experienced calcium scaling. About half have installed individual treatment devices.
Resident Questionnaire Summary

In the study area, three were tested for water quality by the City in July 2008; three had water quality tests performed in 2008, one in 2005, and another one in 1996.

2.4 Drinking Water Regulations

2.4.1 Introduction

The enactment by Congress in 1893 of the Interstate Quarantine Act provided federal authority to establish standards for drinking water systems. The first formal and comprehensive review and investigation of drinking water concerns was initiated in 1913. Federal regulation of drinking water began in 1914, when the U.S. Public Health Service set standards for the bacteriological quality of drinking water for contaminants capable of contagious disease. These standards were then revised and expanded in 1925, 1946, and 1962. The 1962 standards, regulating 28 substances, were the most comprehensive Federal drinking water standards in existence before the Safe Drinking Water Act (SDWA) of 1974.

In 1974 Congress passed the SDWA to ensure that public water supplies meet national standards that protect consumers from deleterious contaminants in the water. This law had
Figure 1
Site Location
Chesapeake, Virginia

Legend
- Golf Club Boundary

Battlefield Golf Club
significant amendments in 1986 and 1996 and is administered by the United States Environmental Protection Agency’s Office of Groundwater and Drinking Water (EPA). These laws apply to all public water systems\(^1\). Both publicly or privately-owned community water systems are included in this definition.

### 2.4.2 Current Water Quality Regulations

The SDWA gave the EPA the authority to delegate the primary responsibility for enforcing drinking water regulations to states provided that they meet specific requirements. States that comply are considered to have “primacy.” Virginia has assumed primacy and the State’s Department of Health, Office of Drinking Water (VDH) receives grants from the EPA to help pay for the oversight of water systems. As a primacy state, Virginia drinking water regulations are at least as stringent as federal regulations. Appendix B presents the Water Quality Standards for the Commonwealth of Virginia. The Virginia Department of Environmental Quality (DEQ) is the agency in charge of enforcing water withdrawal and wastewater disposal regulations.

A summary of the EPA’s National Primary Drinking Water Regulations and Secondary Drinking Water Regulations is presented in Appendix C. Primary Contaminants are legally enforceable standards that apply to public water supply systems. Primary standards protect public health by limiting the amount of contaminants in drinking water through maximum contaminant levels (MCLs). Contaminants may be microorganisms, inorganic chemicals, organic chemicals, disinfectants, disinfection-by-products, and radionuclides.

Secondary contaminants are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (e.g. tooth or skin discoloration) or aesthetic effects, such as taste, odors, or color in drinking water.

The following are also water quality regulations that apply to community or public water treatment plants and water distribution systems:

- EPA’s Trihalomethane Regulation.
- EPA’s Phase I Regulations for 8 Volatile Organic Compounds (VOCs).
- EPA’s Surface Water Treatment Rule (SWTR).
- EPA’s revised Total Coliform Rule (TCR).
- EPA’s Phase II Regulations for Synthetic Organic Compounds and Inorganic Compounds.
- EPA’s Lead and Copper Rule.
- EPA’s Phase V Drinking Water Regulations.
- EPA’s Consumer Confidence Reports (CCRs).

\(^1\) Public Water Systems provide water to at least 25 people or 15 service connections for at least 60 days per year. Today approximately 155,000 public water systems provide water to more than 292 million people.
• EPA’s Stage 1 D/DBP Rule and the Interim Enhanced Surface Water Treatment Rule.
• EPA’s Radionuclides Rule.
• EPA’s Filter Backwashing Recycling Rule.
• EPA’s Stage 2 D/DBP.
• EPA’s Long-term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR).

Additionally, under the 1996 amendment to the SDWA the EPA publishes guidance to primacy states to carry out source water assessments within the state’s boundary. This establishes a coordinated and comprehensive protection of groundwater resources within a state.

2.4.3 Contaminant Candidate List

The SDWA includes a process that the EPA must follow to identify new contaminants that may require future regulation. This list serves as the starting point for future regulations. The contaminants on this list are not subject to any current or proposed drinking water regulation. These contaminants are known or anticipated to occur in public water systems and may, in the future, require regulation. In February 2005, the EPA published the second Contaminant Candidate List (CCL) of 51 potential contaminants. Appendix D is a fact sheet of the Drinking Water Contaminant Candidate List published by the EPA along with a list of the chemical contaminant candidates. On February 21, 2008 the EPA published a draft of the third CCL in the Federal Registrar. This is presented in Appendix E.